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Research Article

Valuation of Non Timber Forest Product in Cameroon: A Case Study of a Community Forest in the East Region

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ABSTRACT

The collection and sale of non-timber forest products (NTFPSs) is a major source of income for households around community (CF) in Cameroon. Although, the importance of NTFPs in sustaining livelihood and poverty smoothening in rural communities, they are highly depleted and poorly conserved. Indeed, the forests where NTFPs are harvested are becoming depleted due to unsustainable exploitation of timber and NTFPs, lack of financial resources to protect the forest and this is threatening the livelihood of those households. To address this issue, sustainable harvesting practices must be adopted and financial resources must be mobilize by households holding the CF. Therefore, this study applied the contingent valuation method by estimating the average willingness to pay (WTP) and the minimum price the households are willing to pay to protect NTFPs. Sixty household surveys from eight villages were undertaken at Morikouali-ye CF in the East Region of Cameroon. To estimate the average WTP for NTFPs sustainable management at the CF level, the study use the logit model and for the minimum price the households are willing to pay, the Turnbull estimator was used. Our findings showed that, the average WTP is 6845.2861 FCFA per household each year and 570.440 FCFA per household each month. Furthermore, the minimum price the households are willing to pay to protect the forest product is 4940 FCFA per household each year and 411.667 FCFA per household each month. The fact that households are willing to pay to protect forest product like NTFPs reflects the high importance of the NTFPs in their daily lives: nutrition, income and health. Therefore, to enhance NTFPs sustainable harvest methods among CF households, it is important to mobilize financial resources, organize and teach NTFPs sustainable harvest methods. Improve traditional use of the forests and promote alternative plants for the same uses should be considered as part of conservation strategies. Moreover, it is suggested that incentives like financial resources should be giving to CF forest protection team members to be more actively involved in sustainable harvest monitoring.

Keywords: Contingent valuation method; Logit model; Non-timber forest product; Sustainable harvest methods; Turnbull estimator; Willingness to pay

Jel classification: Q23, Q100, O13

INTRODUCTION

Forests have a direct economic significance through the provision of timber and wood that can be used for the industry but also for the fuel wood and fodder particular in developing countries where households can depend entirely on wood for their energy. Forests are also a source of non-timber forest products (NTFP). These include all biological products extracted from forests apart from timber through agro-forestry.

NTFPs include any kind of product and service that result from forests, except for lumber, including fruit, nuts, vegetables, fish, green manure, wild edible plants, thatching grasses, rattan, resins, pesticides, animal bedding, veterinary medicines, green manure, ornamental plants, cosmetics, gums, honey, wildlife products, birds, mushrooms, medicinal plants, glue, scents, and a wide range of acrylics [1,2].

The importance and value of NTFPs increase day to day. In facts, human use of NTFPs begins with human life. Nevertheless, these products were previously regarded as products of low importance, and as a result, they used to be called minor forest products [3]. Similarly, the potential economic value of NTFPs was ignored or at least underestimated in terms of exploitation and market value [4]. However, simultaneous with the propagation of social forestry and sustainable development concepts, NTFPs had been argued

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positively and significantly improving rural livelihoods and needing natural resources management [5].

Now the great importance and high economic potential of NTFPs, their contributions to the livelihoods of households and their role in developmental and protective purposes of forests are recognized and also the high economic dependence of rural household on these types of products [3,6]. According to the FAO, 80 % of developing countries depend on NTFPs for their health and nutrition demands. It is obvious that the excessive and irregular exploitation of NTFPs, in long term, can lead to physiological weakness of trees and negative impacts on their regeneration i.e. forest degradation.

The forest falls within the category of public goods, a source of positive and negative externalities. Economic theory shows that the fundamental nature of renewable resources such as NTFPs is the common or collective property [7]. The common property resources are open access, open to a defined group of interdependent users who set the rules for use and restrict access to non-member users. This dynamic of open access is known under the name of tragedy of the commons [8]. NTFPs are public goods. The concept of a Public Good is intimately related to the concept of an externality. Public goods are defined as follow:

- Everybody can use them without depleting their availability for others (economists call this «non-rivalry»)
- It is very difficult, technically, to prevent people from using them. In other words, public goods are «non-excludable»

The problem with public goods is that everyone has a relatively small incentive to provide or manage the good. Therefore people will tend to free-ride on others providing or managing it and enjoy it for free! As a consequence, public goods are under-provided or, reversing the argument, there will be an over-exploitation or degradation.

The theory of Welfare Economics, developed by economists, such as Hicks and Kaldor, in the 1930s and 1940s, provides a clear criterion for decision-making in virtually all cases where a public policy action would benefit somebody and cause costs to others. Welfare economics provided the theoretical foundations for considering the natural resources and environment as goods for which society and individuals' willingness to pay could be measured.

Degradation of NTFPs is a negative externality. In facts, the theory of externalities dates backs to the seminal work of Pigou in 1920. An externality occurs when a benefit or a cost incurred by a party is caused by somebody who does not take this effect into account in his or her decisions. While externalities were originally thought to be a theoretical curiosity, environmental science has shown that environmental externalities can be pervasive and affect individuals across space and time dimensions.

Balland et al. [9] are distinguish between common property regulated and unregulated common property. The common properties are unregulated protected only by the restrictions on being a member or not of the community without rule of strict conservation. While the common properties controlled based on both a use restriction to members and usage rules applied to members. The free resources are characterized by the absence of property rights, where access to the resource is free and open to all [10,11]. Individuals have the privilege of extracting the resource, and have no right to the resource: thus no user can prevent another to extract the resource.

The main objective of economists has been to analyze solutions to the externality problem such as through the use of taxes (Pigouvian taxes) and regulations. Often governments need to intervene in the case of externalities. Traditionally proposed to solve the problem of externalities solutions are state intervention or privatization. However, authors have shown the existence of a solution other than privatization or state management: community management based on the principle of negotiation [7,11-13]. In facts, this perception was modified after the publication of Coase paper in 1960, who suggested that parties could negotiate a solution to externalities in the absence of government intervention. However, such negotiation is unlikely when there are many individuals affected by the externality, as in the case of many pollution externalities.

Thus, the introduction of the concept of community forestry in Cameroon forest legislation through the concept of community forest (CF) has been a great innovation in the sub-region of Central Africa. According to the forest sector stakeholders and development in general, it was a great revolution in the forestry sector in Cameroon. CF's in Cameroon have a simple management plan (SMP) approved by the forestry administration, any activity in these forests must comply with this plan. However, about seven and fifteen years after the adoption of the new law in January 1994, a development activity does not seem to meet expectations [14].

NTFP can be over-exploited and degraded when regulations are lacking. The conservation and sustainable use of commercially important NTFP resources is a challenging task. Increased commercial utilization of these resources can entice local communities to over-exploit the products, while ignoring traditional harvesting practices that may be sustainable, which can have significant impacts on the resource base.

The excitement generated by the exploitation of NTFPs for food security and income is very high in the eastern region of Cameroon [15]. The CF Morikouali-ye in the Eastern Region of Cameroon has many exploitable forest resources where exploitation of timber and NTFPs is active. Some authors have noted that NTFPs could have a negative impact, especially when it exceeds the regenerative capacity, as is often the case.

Harvesting is usually done by residents who sell to collectors. These in turn deliver the products to exporting companies. According to Sunderland et al. [15], to collect yohimbe, bark, and residents cut down trees in 98 % of cases and only 2% debarking is done on foot. The shooting down of the tree before harvesting the bark is motivated by the simple desire to maximize production and get immediate profit, all this in the detriment to the survival of the species. For some vegetable NTFPs all the leaves are harvested to the extent possible. When new leaves appear they are immediately harvested. This harvesting method has a significant impact on the growth and regeneration capacity of the plant.

In the CF, many companies use the forest for timber with non-sustainable environmental methods. Thus, threats on NTFPs have two main causes: the commercial exploitation of the resource and industrial exploitation of timber. Planned and organized exploitation of NTFPs by household is need for their sustainable development. Therefore, what is the households in the CF willingness to pay (WTP) for the sustainable exploitation of NTFPs.

A variety of studies have been conducted with regard to the financial evaluation and economic value estimation of NTFPs in different countries, primarily in the tropical forests of Latin America and recently in Africa [16-19] and Asia to estimate the NTFPs value at the local and sometimes national levels. Since few years, other study was conducted to assess environmental impact of NTFPs and WTP for their sustainable exploitation.

In the forest sector, many studies using contingent valuation method have emerged in developing countries to assess WTP. Lynam et al. studied WTP for environmental services from trees on communal land in Zimbabwe [20]. Garrod et al. found CVM a useful tool in informing local-level management decisions, providing information on use and non-use values of forests accruing to members, values of new additional reserves of different habitat types and the income generation potential for a new conservation program [21]. Kramer et al. estimate an annual average willingness to receive of $ 108 per household for the establishment of a national park at Mantadia in Madagascar [22].

Köhlin et al. analyzes the population WTP for a new plantation of trees in CF at Orissa in India. It uses different prices for direct sale: 10, 20, 30, 45 and 75 rupees and 22 villages were randomly selected for investigations [23]. Maraseni et al. estimated the WTP for forest restoration for asparagus by collectors in Makawanpur District, Nepal [24]. Asparagus contributes a significant amount of income for these collectors and is an inseparable part of their livelihood. The overall analyses of the two scenarios show that the collectors are WTP a significant amount of money to ensure the long-term viability of this enterprise. Nnaemeka et al. used the CVM to ascertain the determinants of WTP for organized management of CF for NTFPs conservation [25]. A multistage random-sampling technique was used in selecting 180 respondent households used for the study. The findings showed that the mean amount a household was willing to pay annually for systematic management of CF by community members was N582.59 ($4.55).

Consequently, organizing the uses of the NTFPs, mobilizing financial resources, developing sustainable exploitation methods for these resources through the participation of local households will ensure the constancy of the products. Thus, household's willingness to pay for sustainable exploitation of NTFPs are important measures to encourage the best management of these valuable resources.

In this study we contribute to the NTFPs literature on valuation of NFTPs by applying the CVM from a developing country perspective using Cameroon CF as a case study with a goal of aiding the design of appropriate sustainable management program at a CF level and informing CF household to support NFTPs provision and contribute to financial resources for forest product protection.

The rest of the paper is structured as follow. Section 2 presents the methodology (description of the study area, survey design and data collection, empirical model and variables. Section 3 presents the estimation results and discussions. The policy recommendation and conclusions are presented in section 4 and 5 respectively.

RESEARCH METHODOLOGY

Description of the study area

The study was conducted in the East Region of Cameroon at the Morikouali-ye CF. The choice of this CF was based on a set of criteria namely: high susceptibility of NTFPs to degradation; high level of biodiversity with intensive and effective harvest of timber and NFTPs. Moreover, it has been fairly well studied by NGOs through which we have reliable report in terms of measuring biodiversity and the CF is located is the district with the largest number CF (20) in the Eastern Region.

The CF was created in 2002 and has 5000 ha. The CF comprises eight villages associated for sustainable management of the forest: Modoumo, Mobalo, Nyabonda, Biwala or Mpougnogo, Limoé, Djalobékoé, Malabango and Newton. Timber in this CF is harvested since 1980.

Survey design and data collection

A pre-survey of 13 household was conducted in February 2019 at the eight villages bordering the CF Morikouali-ye in order to refine the survey design. After refining, the survey was conducted from 13 March au 19 April 2019 (Table 1).

The survey was conducted in eight villages bordering the CF Morikouali-ye the sample size is calculated on the basis of data from simple management plan (SMP) of the CF. Each village does not have the same weight; we calculated the frequency village dividing the number of people in the village by the total number of people in all villages. Frequency per village multiplied by the sample size gives the number of households to be surveyed per village [26]. Our concern is to respect a representation of all the village communities of the CF. The surveyed households were selected randomly. The person answering the questions is the head of household. The survey questionnaire also includes questions on socio- economic characteristics of households interviewed (age, sex, occupation, etc.). This information allows testing the validity of the contingent valuation model, the dependent variable being the WTP.

Empirical model

The survey was conducted in eight villages bordering the CF Morikouali-ye the sample size is calculated on the basis of data from SMP of the CF. since, each village does not have the same weight; we calculated the frequency of village by dividing the number of people in the village by the total number of people in all villages. Frequency per village multiplied by the sample size gives the number of households to be surveyed per village [26]. Our concern was a whole representation of all the village communities of the CF. The surveyed households were selected randomly. The person answering the questions is the head of household.

This study was done by making the effort to follow the general principles of the implementation of a CVM exercise. Thus we used a matter of valuation as a referendum and interview face to face

Table 1: Villages in the sample.

Village	Limoé	Djalobékoé	Modoumo	Biwala	Nyabonda	Mobalo	Malabango	Newton	Total
Number	1	11	6	9	18	5	8	2	60

Source: Author Survey Data

as strongly recommended by the panel of economists NOAA [27]. This method gives some credibility to the results. In every step, the guidelines of NOAA panel [28] were adhered to as follows:

Elicitation methods

In order to make absolutely clear the understanding of the scenario, face-to-face interviews were carried out for the elicitation of WTP values.

Pre-testing of questionnaire and its final setting

The various deals offered to respondents to the question of recovery were determined at the end of the survey questionnaire test of 13 households. This test also aimed to verify the proper understanding of the issues by the respondents. After this test, the survey questionnaire was refined to complete the survey involved a stratified sample of 60 households given the time and material and financial resources available to us to conduct this research, we limited ourselves to this sample size for the entire investigation.

The hypothetical scenario development

You have extensive experience of collecting NTFPs from the CF. You know how abundant NTFPs was in the CF forests year ago and you also know the depleting status of NTFPs nowadays, and the increasing international demand and market prices of these products. Moreover, lack of financial resources to protect forest product in our CF is a big issues. You are more familiar than others with the legal and other related problems of collecting NTFPs from the CF. You know how heavily you and your family are dependent on NTFPs collection: housing, cooking, etc. The CF forest protection team members would like to manage the CF in such a way that the current harvesting rate of NTFs would be sustained with new plantation, etc., and you would have the legal right to collect NTFs from the CF.

Payment vehicle

The vehicle of the payment will be in the form of a tax per kg of NTFPs given to CF forest protection team members committee and private organization will look after.

Pre-test scenario

The open question below was asked to investigate after a good presentation of the hypothetical scenario: If such a program was put in place and every household in the CF should contribute annually how much are you willing to pay? _____FCFA. Two of the 13 respondents expressed a willingness to pay zero. The reason for refusal is not related to the challenge of the scenario presented, but rather the fact that these respondents wanted to have the free program. We selected 4 offers: 2000, 4000, 6000 and 8000 FCFA respectively corresponding to the 20th, the 40th, 60th and 80th percentile of 10,000 FCFA, which is the highest amount from the test questionnaire. This method is justified by the work which led to the conclusion that the proposed amounts should never be outside the range formed by the 15th and 85th percentiles for a simple closed question [29]. According to Arrow et al. [27], this system is the best because it is the one that is closest to the market situation in which the consumer accepts or not the exchange price offered.

Survey scenario

The CF forest protection team members would like to manage the CF in such a way that the current harvesting rate of NTFs would be sustained with new plantation, etc., and you would have the legal right to collect NTFs from the CF. would you be willing to pay x FCFA (2000, 4000, 6000 and 8000 FCFA) for sustainable exploitation of NTFPs in the CF?

The mean value of WTP was used in this study. The questionnaire also includes relevant questions to overview the socio- economic characteristics of households interviewed (age, gender, income, number, education, occupation, etc.) for statistical and empirical analysis. This information allows testing the validity of the contingent valuation model, the dependent variable being the WTP.

The WTP of households for the sustainable exploitation of NTFPs follow Ninan et al. [30] and Maraseni et al. [24] studies. From the model of Hanemann et al. [31], a single closed question is asked to respondents; question that they can answer either «yes» or «no» (e.g.: would you be willing to pay x FCFA for sustainable exploitation of NTFPs?). To perform the search for predictors of WTP, we made use of the logistic distribution function. The distribution function is written as follows:

$$\log\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_1 M_i + \sum_{j=2}^{n} \beta_j X_j + \varepsilon_i$$

In addition to the parametric model, we will proceed to the use of non-parametric model for determining the terminal WTP. This is the Turnbull estimator, giving the lower bound of the WTP. The formula for calculating the mean WTP using the Turnbull estimator is given by

$$E_{\inf}(CAP) = \sum_{j=0}^{M_{\max}} t_j f^*_{j+1} \quad (2)$$

Which $t_{M_{\max}}$ represents the highest amount proposed in the investigation. Several authors have applied simultaneously these two approaches in their work [32]. The use of these two models is justified by the fact that the approach is very suitable for Turnbull estimation of the WTP. Indeed, it avoids the complexity of the statistical analysis of the parametric models and it is also used when the WTP using the logit model is overvalued. The logit model is more suitable with regard to the analysis of the effects of explanatory variables on the probability of accepting the proposed offer and test the model [33].

$$WTP\begin{cases}1 & \text{if the households says yes to the bid proposed}\\ 0 & \text{otherwise}\end{cases} \quad (3)$$

Variables

Our dependent variables are the binary variable WTP defined above. The variables uses in the logit model are defined in Table 2.

RESULTS AND DISCUSSION

Descriptive statistics

In this study all 60 households' respondents were formal collectors. But collectors within each household may be both formal and

causal collectors. The mean age in the sample is 49 years old. The education level is very low, 81% for primary and 19% secondary. The use of survey data shows that five species of NTFPs are the most collected in the study area: *Irvingia gabonensis*, the *Heudelotii ricinodendron*, *Gnetum*, and the Bark and Jujube are generally more a use. From the questionnaire test, four bids were retained in Table 3.

The result of Table 3 shows that, 68% of the households interviewed are willing to pay for the sustainable harvesting of NTFPs. A total of 60 households were interviewed. Socioeconomic and demographic profiles of households were collected. This information forms a basis for investigating heterogeneity in household's personal preferences. The summary statistics of the profiles of households interviewed is shown in Table 4.

Table 4 shows that, about 68% of the households are married. The average household's size is approximately 11, 4, and 8 members for child, women and men. The average distance from the CF is about 0.994 kilometers.

Model estimation results

Estimation of the average wtp

Logit model and Stata 14 econometric software were used for estimation.

From the Table 5, we can see that our model is globally significant (Prob > chi2 = 0.0000). They are variables influencing positively (sex, access to market, child, women, revenue, etc.) and negatively (bid and education level) the household's WTP. The results are also consistent with Maraseni et al. who found that revenue has a significant impact on WTP [24].

Furthermore, the result of Table 5 above, allow the estimation of household's WTP. Indeed, the calculation of mean WTP is based on econometric estimation results of the logit model according to the following expression:

$$E(CAP) = -\frac{1}{\beta_1}\ln\left(\frac{1+e^{\delta}}{1+e^{\delta-\beta_1 M_{\max}}}\right) \quad (4)$$

Who represents the estimated effect on the amount proposed coefficient is the sum of the products of the estimated coefficients and the average levels of significant explanatory variables of the model than constant parameter estimated. $M_{\max}$ is the maximum value of the amounts proposed (8000 FCFA in the case of this study). Substituting the estimated parameters with their values and using the average levels of significant predictors of logit model, we find that the average WTP is of the order of E (WTP) = 6845.2861 FCFA / household each year is 570.440/month.

Estimation of the minimum price the households are willing to pay to protect forest products

The lower bound of willingness to pay applying the formula (2) gives [34]:

Table 2: Variables used in the logit model.

Variables		Definition	Nature
Bid		Bid proposed in the scenario	Continuous
Sex		1 if woman and 0 otherwise	Binary
Age		In year	Continuous
Matrimonial status		1 if married and 0 otherwise	Binary
Level of education		1 if primary and 0 otherwise	Binary
Household	Child	Number of child in the household	Continuous
	Women	Number of women in the household	Continuous
	Men	Number of men in the household	Continuous
Access to market		1 if closed (less than 30 minutes' walk) and 0 otherwise	Binary
Main activity		1 if NTFPs harvest is the main activity and 0 otherwise	Binary
Secondary activity		1 if commercialization of NTFPs is the secondary activity and 0 otherwise	Binary
Time in NTFPs collection per day		In hour	Continuous
Distance between home and CF		Distance in Km from home to the CF	Continuous
Revenue		Proxy of households month expenses in FCFA	Continuous
Sustainable development		1 if the households is aware of sustainable development and 0 otherwise	Binary

Source: Author from survey questionnaire

Table 3: Bid proposed to respondents.

Bid	No	Yes	Number inquiring
2000	3	12	15
4000	4	11	15
6000	4	11	15
8000	8	7	15
Total	19	41	60

Source: Author from survey questionnaire

Table 4: Summary statistics of the respondents.

Variables		Mean	Standard deviation	Max	Min	Number
Bid		5565	4523	2000	8000	60
Sex		0.34	0.2675	1	0	60
Age		49.00342	38.5673	17	65	60
Matrimonial status		0.6755	0.4321	1	0	60
Level of education		0.74442	0.4002	1	0	60
Household	Child	11.2399	9.9321	8	13	60
	Women	4.4211	2.8854	2	5	60
	Men	7.8966	5.4332	5	9	60
Access to market		0.4489	0.3983	1	0	60
Main secondaire		0.7731	0.1843	1	0	60
Secondary activity		0.9112	0.4412	1	0	60
Time in NTFPs collection per day		5.0443	4.0511	3	6	60
Distance between home and CF		0.9944	2.3945	0.5	3	60
Revenue		22788.01127	15455.0223	17000	28500	60
Sustainable development		0.9412	0.3880	1	0	60

Source: Author from survey questionnaire

Table 5: Logit estimation result.

Variables		Parameters	dy/dx	t-statistic (z)	(P>|z|)
Constant		-33.81669		-1.83	0.367
Bid		-0.0023317*	-0.00003	-1.94	0.004
Sex		10.54149***	0.92835	1.81	0.070
Age		0.41422	0.00683	1.83	0.597
Matrimonial status		0.22315	0.03217	0.43	0.422
Level of education		-30.84328	0.99999	-1.85	0.264
Household	Child	3.38120***	0.05579	1.71	0.087
	Women	9.21663*	0.15209	1.80	0.002
Access to market		0.06509*	0.00107	0.26	0.003
Main secondaire		23.41099*	0.99990	1.97	0.008
Secondary activity		13.74001	0.03533	0.03	0.977
Time in NTFPs collection per day		5.97277**	0.70610	1.25	0.042
Distance between home and CF		2.91972	0.14575	1.69	0.223
Revenue		35.1115*	29.54807	1.01	0.313
Sustainable development		4.19028	0.05106	1.93	0.054
Number of observation = 60		Prob > Chi^2 = 0.0000		Log likelihood = 80.11818	

Note: *, **, *** significant at 1%, 5% and 10% respectively.

$$E_{inf}(CAP) = 0*0.2 + 2000*0.07 + 4000*0.26 + 8000*0.47 = 4940 FCFA \quad (5)$$

The average value of the WPT is 4940 FCFA per year or 411.667 per month.

The overall result shows that household's value importance of NTFPs in their daily lives and is willing to pay for the sustainable harvesting of NTFPs. Indeed, NTFPs contribute a significant amount of income for CF households and is an inseparable part of their livelihood. Therefore, the households are willing to pay a significant amount of money to ensure the long-term viability of NTFPs.

Our results are in tandem with findings from various studies on valuation of NTFPs. For example, Maraseni et al. [24] and Nnaemeka et al. [25] who found positive and high WTP for organized management of CF for NTFPs conservation. However, our results differ from findings by Gatto et al. [35] who found that respondents had no significant WTP for biodiversity conservation.

Policy implications

The main aim of the study was to apply the CVM by estimating the average WTP and the lower bound of the WTP of households for NTFPs sustainable harvesting practices scenario in a CF.

The study found that the average WTP is 6845.2861 FCFA per household each year and 570.440 FCFA per household each month. Furthermore, the minimum price the households are willing to pay to protect forest product like NTFP is 4940 FCFA per household each year and 411.667 FCFA per household each month. This show that household's in the CF are willing to contribute to sustainable NTFPs harvest methods, new plantations, etc.

These findings inspire some economic policy in the exploitation of forest products like NTFPs: it is essential to involve local people in the management and finance of natural resource as most country in developing countries lack financial resources, empower and train

them in sustainable NTFPs management and production of quality products, through NTFPs domestication and transformation, monitoring the activities of logging companies CF should be strengthened. In addition, promote alternative plants for the same uses should be considered as part of conservation strategies should be considered. It is suggested that incentives should be giving to CF forest protection team members to be more actively involved in sustainable harvest monitoring.

CONCLUSION

The goal of this study was to apply the contingent valuation method and estimate the average willingness to pay (WTP) and the minimum price of households to NTFPs sustainable harvesting practices scenario. This was financing of cost to protect forest products as many developing countries have lack of this. Sixty household surveys from eight villages were undertaken at Morikouali-ye community forest in the East Region of Cameroon. To estimate the average WTP for NTFPs sustainable management at the CF level, the study uses the logit model and the Turnbull estimator for the minimum price to protect forest products like NTFPs.

Our findings showed that, the average WTP is 6845.2861 FCFA per household each year and 570.440 FCFA per household each month. Furthermore, the minimum price to protect forest products is 4940 FCFA per household each year and 411.667 FCFA per household each month. The difference between these two values (1905.2861 FCFA) reflects a certain level of precision. The fact that households want to pay for the sustainable exploitation of NTFPs reflects the high importance of the NTFPs in their daily lives: nutrition, income and health. Indeed, household financial contribution help protect forest products as many developing countries like Cameroon have lack of financial resources of this. To enhance NTFPs sustainable harvest methods among CF households, it is important to organize and teach NTFPs sustainable harvest methods and improve traditional use of the forests. Therefore, it is suggested that, incentives and financial resources should be giving for forest protection team members to be more actively involved in sustainable harvest monitoring. The study provides an entry point for designing future forest management policies and financing of cost to protect forest products in Cameroon and provides valuable comparison for studies in other Cameroon CF in general and in other countries particularly.

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