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Monetary Valuation of the Non Timber Forest Products (NTFPs): Does it Contribute to Determine a Sustainable Management of those Resources ?

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Abstract

Since May 95, a CIRAD project has attempted to realise a monetary valuation of all nutritious NTFP extracted by a rural village population in the East Cameroon. The village of Gouté, where the survey is being achieved, is surrounded by a tropical moist forest. A logging company is established in the area too and can, at any time, exploit this ecosystem. The Cost-Benefit Analysis is an usual means of resolving conflicts between opposite users The purpose of this work is to give an economic value to the NTFP used by the Gouté inhabitants and to show that non-marketed natural resources could be integrated into the economic decision making process about tropical forest. So far, more than 130 NTFP have been listed.

Three economic valuation techniques have been used for these forest products: first, we have resorted to local market prices, whenever they exist, for valuing a few natural commodities. Second, we have used the market price of the nutritious substitute of the non-marketed NTFP. Finally, when none of these prices was available, one can assess the NTFP value by knowing the time spent in forest for its collect by the gatherer. This field work will last one year and will end in next April, when the monetary results are complete. This survey will insist on the specific limits of each technique and will question reliability of such monetary results.

Beyond the only attempt of quantifying the NTFP, one of the results of the monetary valuation was to demonstrate that the access modes to the natural resources depend on the commercialisation opportunities, the natural scarcity and the village kinship structures. In the village of Gouté, we note the coexistence of four different access modes: individual property, family property, village property and free access. As an example, it is interesting to see that the marketable forest products are generally privately or family-owned when they are rare but that they are in free access when they are abundant around the village.

If we can acknowledge that NTFP may be an important monetary resource, the opening of rural gathering systems to market will raise many questions about the management conditions evolution and the sustainability of the exploitation. The resort to the market as a means of giving value to some renewable resources is not neutral. Our objective is to understand, from a precise case study, how the common property regime may react with such changing conditions and evolve so as to ensure the sustainability of both economic and natural systems.

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Monetary Valuation of Non-Timber Forest Products (NTFPs): Does it Contribute to Determine a Sustainable Management of those Resources?

Guillaume Lescuyer[1]

Introduction

Non-timber forest products (NTFPs) were long considered a minor forest resource. Economic studies of forest management generally ignore the subsistence these resources provide local populations. Only for the last ten years has this theme attracted the attention of researchers, particularly those concerned with tropical forests.

National accounts usually only consider the market value of stand timber to estimate a forest's value. Our objective is to show that a forest ecosystem generates other uses which also have economic value. We do not wish to oppose timber market value to the economic value of gathered products, but rather to show that gathered products are part of the exploitable wealth of an ecosystem.

The economic approach to valuation of NTFPs is to calculate the benefits from their exploitation. Comparison of these costs and profits with those of alternative forest use projects makes it possible to determine the most efficient management of forest space. Failure to take these resources into account means neglecting a considerable source of wealth, at least locally, and prevent optimal resource allocation: many studies show that gathering these products creates higher present net benefits than those obtained from other types of forest exploitation (logging, livestock, itinerant agriculture)[2].
This article is in two parts. First, we see if products gathered by the population of an African forest village (Goute) make up a minor resource quantitatively. For this, we confront our field experience with existing literature on the subject and we present the methods of economic valuation we used to calculate the total value of NFTPs extracted in Goute in 1995-1996. Second, we examine how monetary valutaion of these forest resources contributes to determine a sustainable mode for exploiting these resources. We begin by showing the limits of the three valuation methods used, and question the link between economic value of a natural asset and sustainability. Specifically, we see how "monetarization" of free or common natural resources can change traditional use.

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This research was made with assistance of the french Ministry of Cooperation and the DG XI of the European Union.
[2] Economic valuation of NTFP is accompanied by an economic valuation of trees in the same forest space. It is thus possible to compare two different forest-use scenarios by a cost-benefit analysis.

I. NTFP integration into the market sphere

1.1 How are NTFPs treated economically in the literature

Many studies over the last ten years show the social and economic importance of NTFPs. Three main studies have given the framework for subsequent work on economic valuation of NTFPs: Panayotou & Ashton (1988) emphasized the lack of interest in exploitation of NTFPs: Beer & McDermott (1989) defined an analytical framework applicable to tropical forests on the basis of their work in SE Asia; and Peters et al. (1989) precisely valuated what a hectare of Amazonian forest could produce in terms of marketable NTFPs. Many researches have continued in this direction. The FAO (1990) made a state-of-the-art on the issue, showing theoretical advances and synthezing many field studies. According to the terminology currently accepted, NTFPs are defined as all biological material other than wood which are extracted from natural forests for human use. These products are usually extracted with simple, traditional techniques causing little damage.

These studies on gathered products, focused on South America, were made mostly by biologists whose main preoccupation was to show the wide range of natural products offered perenially by the forest. If we now are more familiar with the diversity of NTFPs in the tropical forest, economic valuation of these resources remains perfunctory. This is because forest products are mainly non-marketable goods, i.e. they have no set market price. Their importance is above all social because they are either consumed or bartered among individuals of the same community in non-monetary transactions: various studies have shown the economic valuation methods applicable to non-marketable NFTPs (de Beer & McDermott, 1989; Sodoy et al., 1995; Scoones et al., 1992), but most only estimate the value of forest product which have a market price (Myers, 1990; Lescuet et al., 1993; Peters et al.; 1989 Clay 1992). Economically, these results are unsatisfactory because they do not give a complete economic value of NFTPs, but simply give their market value. The fact that this value is often surprisingly high does not mean there is no need to determine the value of non-marketable NFTPs. Systematically using only market prices for economic valuation reinforces the predominance of marketed NFTPs, which does not necessarily correspond to their real role in rural life.

This brief summary of NTPF valuation work shows that two aspects are not treated in current research. First, there is no overall NTPF valuation, with estimation of the value of market and non-market gathered products. Second, valuation methods are not used together. Generally only one method is used, thus avoiding the problem of adding up values calculated with different methods.

In this context, the first part of our study has two goals. First, to present the NFTPs in the zone studied and to quantify extraction; second, to present our methods designed to express the total value of all NTFPs gathered during one year. To begin with we describe the area under study.

1.2. Description and use of NFTPs in a forest society

The forest is semi-decidious, the most common in the East-Cameroon province. Although exploited for its precious woods ten years ago, the studied forest area is still in fairly good shape[3]. The forest is used by different populations of neighboring villages; however each village has its particular forest area where villagers are active. This forest space will be defined later as community forest space, characterized by a strong sentiment of collective appropriation. Its resources are the object of exclusive internal tenure(Karsenty, 1996). Internal tenure means that the resources of this space are common to one group or community and that access is determined by membership.

Gouté is located in the Kadei department, north of the Doumé river. It is an isolated area, especially during the rainy season when roads are virtually closed. This isolation is reinforced by the absence of simple techniques of transformation and preservation of gathered products: these products cannot be stored for possible sale (Tchatat et al., 1995). Gouté is made up of about one hundred and forty members of the Boli, a sub-group of the Baya ethnic group.

The twenty households studied have kinship linkages. The main activity is farming followed by hunting, fishing gathering and craft activities. Gathering is practiced by the majority of the population, 113 gatherers out of 139 inhabitants, throughout the year. The busiest period is the rainy season, from September to November. The dry season, December to March, is the off-season. Gathering is primarily a female activity and the most active gatherers are young women and girls. Mature women have the best knowledge of gathered products and collect the widest variety. They are especially knowledgeable about mushrooms. Gathering tends to be individual for adults and collective for children. The biggest food collecting operations take place when the entire family goes to the forest to gather and hunt. Gathering can be done with the village as a base (round trip during the day) or from a forest camp where the gatherer(s) remain(s) several days. The village's entire forest space offers gathering opportunities and the Gouté population fully exploits the area, which can be estimated at about 2500 hectares. Gouté inhabitants rarely go beyond its limits for gathering. Our monetary valuation of NFTPs is based on those collected by the inhabitants of the village of Gouté from the ecosystem of this area of forest activity.

1.3. Modes of NFTP extraction quantification

Since local inhabitants collect a great many different products in the forest, we limited our analysis to products gathered for food, a range of 139 products. They are harvested in the forest or on field edges. Products appearing in cultivated or fallow fields are not included. We have listed edible vegetable products and animals which are not hunted. This list includes fruit, mushrooms, snails, vines, tubers, worms, caterpillars, insects, herbs, honey and bark. A short study enabled us to make up a list of more than 500 forest products[4] used more or less regularly by the Boli. These uses include dye, traditional remedies and crafts. A total economic valuation of NTFPs would therefore be extremely complicated and probably very long. Consequently, our aim is not to determine the biological wealth of gathered forest

[3] According to M. Louis Zaplack, Professor of Vegetable Physiology at the University of Yaoundé I during a botanic field trip.

[4] Game not included: 61 species are hunted by local populations (Takforyan, personal communication).

products for a given forest, but simply the economic value of all forest products collected for food by the villagers.
There are three reasons for choosing to quantity NTFP food extractions rather than natural stock, despite results of studies in Peru showing that local population extract only 3.5% of existing forest stock (Godoy & Lubowski, 1992). First, no villager can even roughly estimate the potential amount of NFTP natural stock available in the villlage's forest space. Second, any effort to valuate a fixed quantity of NFTP is questionable because the natural stock of NFTP food products present in this forest space varies considerably from year to year. Finally, this stock is not destinated to be exploited in the near future; it is in fact unlikely that all the resources will ever be exploited, even in the distant future. On the contrary, extraction valuation enables us to grasp the role, nutritive as well as monetary, of gathered products in the life of a rural community.

The complete census of food products gathered by all the inhabitants of Gouté began in May 1995 and was continued for a whole year: out of 139 products listed, 119 were gathered during this period. The count was done every six weeks for a period of 3 weeks. Every gatherer of the household selected was interviewed. This six-week cycle enabled us to apprehend all seasonal variations of the Eastern Province and to be present during gathering of all NFTP products.
The quantities extracted during the periods when no count was made were estimated as averages based in the preceding and following periods of count. This hypothesis was confirmed during the year of study: the quantities of gathered products collected during the counting periods varied little from one period to another and could be considered valid for the inter-periods. Each of the twenty Gouté households were interviewed every three days, i.e. 6-7 households per day. This interval was selected to avoid tiring the interviewees with too-frequent identical questions. At the same the interval was short enough so that each household member remembered his or her extractions.

Our economic evaluation is based on the data collected during one year of investigation. Fruit and mushrooms make up 55% of the 1873 gathering acts noted during the enumeration periods. These are also the only types of product which enter into the minimal market transactions at Gouté. The volume of products marketed is less than 1% of the total volume collected. Only two NTFPs gathered are currently sold: the wild mango, *Irvingia gabonensis*, a third of which are sold to villagers or itinerant merchants; and the ndanjsan, *Ricinodendron heudelotii*, half of which are marketed. Most of the food products gathered in Gouté are consumed by the gatherers, bartered or given, and therefore do not enter a monetary circulation. These results do not contradict other research in East Cameroon (API, 1995) and are comparable to the situations in other isolated villages in this forest region.
The surveys carried out generally confirm that at least a quarter of the 139 NFTBs considered play an important role in this rural population's nutrition: about 40 products are known to all, gathered in abundance and sought out for their taste qualities. Out of the 139 food NTFPs, only 42 have a real market price.

On the basis of this data, our next step was to see how to calculate an economic value for all NTFPs extracted by the inhabitants of Gouté during one year, whether marketed or not.

1.4. Confrontation and choice of NTFP economic valuation methods

Several monetary valuation methods of NTFPs exist in the literature. We used three:

- when a gathered product is sold on a competitive market, its value is set by the market price. Despite the small amount of forest products marketed between May 1995 and April 1996, 42 NTFPs had a market value, enabling direct economic valuation.

- when a gathered product is not sold but can be replaced by a marketed substitute, the market value of the substitute is used. De Beer and MacDermott (1989) defined two prerequisites for the choice of market substitutes for non-market NTFPs: that these substitutes be determined by the local population and that they be really available. On these bases we drew up a list of 62 market substitutes: these food substitutes supposedly give the same satisfaction as the NTFPs they replace. In general, these substitutes are closely related to the latter in shape and taste. This list of substitutes was checked several times with the villagers,whose corroborating testimonies validated it.

- finally, when a gathered product has no substitute, its value can be estimated through the time gatherers spent collecting it (Chopra, 1993). This leads to the hypothesis that a gathered product requiring twice as much gathering time will have twice the value. The final step is to determine monetary valuation of time spent gathering. This valuation method can be used for the 35 food NTFPs which had neither direct market price nor market substitute.

The goal of this approach is to set a total monetary value of the food NTFPs extracted using simultaneous application of three valuation techniques.

II. Limits to NTFP economic valuation

Application of the three valuation techniques chosen in a little-monetarized economy such as that of the forest villages of East Cameroon, raises many questions as to the validity of the results obtained. The limits of the valuation methods lie in their difficulty in apprehending a complex reality: either agent behavior concerning natural resources cannot be explained by traditional economic variables, or the hypotheses on which these applications are based are arbitrary and can be legitimitely questioned. Our fieldwork has enabled us to criticize application of NTFP economic valuation methods on two levels. First we will examine the specific limits of each method. The difficulty of economic valuation in apprehending a non-market natural resource can be explained by an inadequate adaptation of its techniques to a little-monetarized economic context.
Second, we will question the influence of NTFP monetarization on modes of resource appropriation and use. The economic valuation approach has difficulty appreciating the dynamic and qualitative aspects of gathering. This prevents the economist from defining the modes of managing these natural resources. For instance, conventional economic valuation has difficulty in apprehending long-term stakes, user agents' natural representations or the influence of social context on individual decision-making.

II 1. Specific limits of each valuation method

• *Difficulties in evaluating market price*

One of the key issues in applying this technique is market choice. Prices vary widely according to the place where the gathered product is sold. Our approach was to take the transaction price agreed on by the gatherer and the first intermediary. In most cases the transaction took place in the village upon arrival of an itinerant merchant, Bayam-salam. Several problems appear in generalized application of this valuation method. First of all, market transactions in the village take place in an oligopsone[5] context and in pure perfect competition. Nevertheless purchase and sale of NTFPs does not create dependence for either actor: the seller does not absolutely have to sell the gathered products, which he collected primarily for his own consumption; and the buyer can buy these same products elsewhere in the forest zone. The actors's autonomy during the market transaction has two explanations. First, the low volume of NTFPs marketed at Gouté does not jusitify a special relationship between a merchant and his suppliers. Second, the inhabitants of Gouté do not consider gathered products as a source of monetary revenue. The fact that these forest products are not part of a monetary economy does not incite gatherers to sell whatever the cost (Myers, 1990).
In all of Cameroon, Ndoye (1995) showed that village prices are considerally lower than those of city markets. NTFP economic value is also diminished by the systematic village practice of maintaining the price of the first transaction. In general the valuator is free to set the price. The rule is to maintain the local market price but, in theory, nothing justifies this choice. Similarly, product prices vary according to the season. Often, the valuation use a low price set when supply exceeds demand. This choice is arbitrary and indicates a minimal or conservative NTFP value is sought. Application of this valuation technique implies a preliminary choice of the valuator as to the level of value he wants to set.

A second difficulty of this valuation technique lies in imputing a fixed price to each NTFP with a hypothesis of an increasing supply. According to the law of supply and demand, if all marketable gathered products are sold (and not for the most part consumed) while the number of demanders remains stable, price should drop[6]. This type of phenomenon can be observed for NTFPs on Cameroon urban markets: Ndoye (1995) showed that the prices of five NTFPs common in Cameroon varied by season according to levels of supply and demand. The ideal way to estimate real NTFP price would be to use a demand curve for each marketable NTFP showing the link between level of demand and price of the NTFP. This economic construction cannot be done on our micro-economic level. Furthermore, it has not been done in any of the current studies in the subject. Although this criticism is frequently expressed, no work has, to our knowledge, estimated a large-scale demand curve for NTFPs. Once again, the underlying hypothesis or accepted norm on this issue is not encompassed by the role theoretically given to the valuator.
Contrary to the preceding bias of choosing local price, this bias induces an increase in NTFP economic value.

To sum up, one bias tends to dimish NTFP economic value and another tends to augment it. The impact of these biases depends on the prelininary choice made by the valuator. However,

[5] Market situation characterized by a small number of demanders and a large number of suppliers.
[6] Becker (1993) insists on the fact that demand level of forest products which are little known on a national, and international level cannot easily be considered a fixed datum.

it it is difficult to imagine that NTFP sale prices in the village could further decrease, in view of their current low level. In the case of an increase in the volume of marketed NTFPs, it is more likely that any drop in market prices would be taken out of Bayam-salam's profits. For this reason, we considered the market prices accepted in the village as reasonably correct estimations of food NTFP economic values. This hypothesis may remain debatable, but conventions of this type must be imposed in order to be able to proceed to monetary valuation.

• *Difficulties in evaluating prices of substitute foods*
Using a market substitute to give a value to a gathered product is difficult. Accepting the word of the villagers concerning their food substitutes is one thing; imputing a monetary value to these products is another. Furthermore, they are substitutable as food, but not economically or monetarily. It is not sure that a gatherer is willing to exchange his FTNP harvest against an equivalent non-market substitute harvest, even if he obtains the same satisfaction in consumption. It can be said that, in an economy where currency is rare, values of use do not correspond to values of exchange.

• *Difficulties in evaluating by the transport costs method*
A frequently mentioned limit to this method is the difficulty in applying it in underdeveloped economies, mainly due to the precise statistical data it requires. For NTFPs the first step is to establish a demand curve linking the quantity collected to the time spent gathering. We hoped that the enumeration made over one year would give us enough answers to make a satisfying regression quantity collected/gathering time. This was not the case for the 35 NTFPs concerned. The correlation between gathering time and quantity collected was generally poor for all the 139 Boli food NTFPs. Consequently, it is impossible in our context to use the transport cost method to estimate the economic value of gathered forest products. Similarly, it is difficult to consider gathering time as an opportunity cost because it does not affect the quantity extracted: the same person can collect 200 mangos in one hour or in four without expressing any surprise as to the difference.
There are two explanations for these phenomena: first, gathering is an aleatoric activity. Even for an experienced gatherer, who has a superior knowledge of the effort needed to gather certain products and the quantity he can hope for, the fact remains that his harvest is uncertain. The fruit is already rotten, the mushrooms have already disappeared, someone else has already collected them,...: there are many reasons for uncertainty as to the quantity to be collected.
Second, children (6-13 years old) performed 22% of Gouté gathering acts. They do not at all take into account the time they spend during their gathering "outing." For them, gathering is primarily a play activity, and the quantity collected usually has little to do with the time spent.
To sum up, the aleatoric character of natural NTFP production and the time perception of a substantial part of the gatherers makes it impossible to use the method of transport costs to valuate non-market NTFPs without substitutes.

Data gathered in the field refutes neo-classical hypotheses of a rational individual behavior.

• *Investigation in the field is very instructive as to the application of NTFP valuation methods*
In the case of East Cameroon, it is impossible to use the transport-costs method because its theoretical presuppositions do not correspond to the behavior of Gouté gatherers. The

perception of time of East Cameroon farmers differs from that of the rational individual of neo-classical thought. On the other hand, the two other valuation methods, market price and market substitutes, appear to produce results. But, once again, these two techniques require certain hypotheses in order to calculate a NTFP value. These hypotheses have nothing to do with economic theory and, in most cases, come from an arbitrary valuator's choice. Consequently, their apllication and results are questionable.
We were nontheless able to calculate NTFP extractions in Gouté at FF17,945 for one year. This value represents a large sum of money for this type of village and shows that NTFPs are not a minor resource for the villagers. We were able to show the importance of wild products in the diet of these rural populations. But above all we wanted to determine to what degree this value would be useful in determining a sustainable mode of NTFP use. Can this economic value be used to justify conservation, marketing or any other mode of use of these resources?

II. 2. Economic valuation and durable management of NTFPs

According to the dominant economic theory (Pearce, 1996), a sustainable strategy of renewable resource use has two phases. First the unrevealed value of natural resources has to be "demonstrated." We have done this in calculating the value of NTFP use. Second, it must be ascertained that this resource can be appropriated, i.e. that institutions and markets exist to transform this economic value into a flow of real benefits (which will then be redistributed to local users).
The arbitration to define the mode of durable management is supposed to be made as soon as the benefits resulting from each resource-use scenario are known. The question that then arises is whether the calculated NTFP value contributes to a better appreciation of these resources in an economic arbitration of forest management. We believe that imputing a market value to a wild forest product, i.e. trying to transform its economic value into real monetary benefits, will modify its status for the gatherer and will ultimately disturb his traditional mode of extraction[2].
The final result is the following paradox: the aim is to estimate the economic value of the gathering of an non-market product by using a substitution market value; but in fact if this product was marketed, the levels and modes of extraction would doubtlessly be very different from those practiced today. Consequently the use of market prices, and more generally monetary units, to valuate NTFPs is not neutral and the results do not correspond to reality. It is therefore difficult to compare such monetarized benefits with the profits of timber exploitation, the estimations of which are based directly on the market.
Whether the goal is to justify increased commercial activity (and higher village monetary revenue), or, on the contrary, better local valorization of these products (in order to make better use of the NTFP stock available in the forest), economic valuation does not appear to be an appropriate tool. It cannot determine the key variables of uses to be set up so that forest resources can be allocated efficiently. In these conditions, economic valuation does not enable modes of "good" management to be determined, and even of less "optimal" management. In our view, the reason for this fundamental difficulty in economically defining NTFP

[2] Richards (1993), in the case of the Amazonian forest, also questions the effects of greater commercialization on the durability of traditional extractions.
Godoy & Bawa (1993) show similarly that in general commercialization leads to exhaustion of the resource: it therefore either disappears or is domesticated.

exploitation modes is that gathering activity is not a mainly economic, monetarized activity (i.e. integrated into the market sphere), but rather a socio-cultural activity.

The main problem that economics have in treating forest resources is that they do not belong to standard economic good. One of the definitions of the latter is the fact that private property belongs to he who draws *usus, fructus* and *abusus* from it. Without going into too many details, the concept of property refers to precise definitions of the object appropriated, the proprietary agent and relations between object and agent. Economic theory generally used these definitions as a reference framework. But in East Cameroon these conditions are not verified. In our case, forest resources belong to the village community as a whole. This community of users exercises its activities following implicit, flexible rules which nonetheless distinguish it from neighboring villages. Consequently, the forest does not have free access. However, this does not mean that forest product use can be regulated by assimilating this natural space to a common property. The theory defining the latter requires certain conditions which are not present here (Wade, 1987, Ostrom, 1969): the agents do not define clear rules regulating use, there are no precise limits defining the common property, and the natural product supply is far superior to the village demand...
We consider the village forest and all its resources as a heritage of local populations, rather than a private or common property (Leroy et al., 1996). The term heritage (in French *patrimoine*) implies that a natural space and its resources cannot be assimilated to the market sphere and that these resources are very important for a community of actors. Only these actors are capable of setting up a sustainable mode of management of the resources that surround them. Thus, gathering activity can be defined by the appropriation modes adopted by the community of users towards NTFPs.
Four appropriation levels of these resources can be detected (Weber & Reverêt, 1993):

- appropriation by users' representations of the resource
- appropriation by modes of resource use
- appropriation by modes of access and access control to these resources
- appropriation by modes of redistribution of these goods in the community

Establishment of NTFP management rules should take all these appropriation levels into account. This approach is very different from economic arbitration based on cost-benefit comparison.

The point of the last part of our article is that claiming an economic value by transforming it into real benefits will profoundly change local gathering practice on the levels of modes of access and control of access to forest resources.

II.3 NTFP Commercialization and evolution of access modes to these reources

Our calculation of NTFP economic value made the hypothesis that each gathered product can or cannot be directly assimilated to a market value. The "concretization" of these market values implies a greater commercialization of NTFPs extracted from the forest by the inhabitants of Gouté. In order to find out how Boli modes of forest uses could evolve if the possibilities of commercialization were greatly increased, we compared the situation of Gouté to that of Djemiong, a neighboring village which lies across a major route. Our attention was primarily focused on NTFP access modes observed in the two villages.

• In Gouté, where NTFP sales are very low, gathering is above all considered as a means of satisfying food needs. Commercialization only involves the harvest excess after home use, exchange or gift in the village. Even in years of high natural production, we do not think that the population of Gouté would consider gathered products as a significant source of income. This particular configuration of gathered product exchange corresponds to a precise situation of access modes to these resources.
They can be described on three spatial levels:

- in community forest[3]: no restrictions concerning NTFP extractions. This free access to villagers is probably explained by the very low demographic pressure on the natural environment[4] and by the non-scarcity of forest resources[5]. Since "God created the forest," it belongs to everyone: for the villagers, the uncontested rule is "first come, first served."

- in the fields: access to stems bearing gathered products is reserved to who cleared the fields and members of his household. The same is true when the fields are fallow. The usual justification given is that it is the farmer who cleans the stem bearing the NTFP and therefore it is normal that it "belongs" to him. One can ask the owner authorization to gather products, but this is rarely done. Field NTFPs are appropriated by the farmer and his household, but without any organized mode of verification. The only disputes that arise are when an unauthorized gatherer is caught in the act and the two individuals do not have friendly relations. This situation is very rare in Gouté because all the inhabitants are kinship-related. Up to now, no dispute about NTFPs has ever been brought before the village chief.

- in the forest around a field: this space is generally considered as reserve property of the farmer because it represents a space to be cleared for future farming. This space may extend up to 200 meters around the field. Village members have free access for NTFP extraction: since the field farmer does not maintain the NTFP stems, he has no preeminent right to these resources. This customary rule has never been questioned in Gouté.

This current state of NTFP access rules in Gouté does not seem to have changed for a number of years. The villagers told us that it was the same before and that nothing has happened to disturb this situation. This is not the case in Djémiong, where a heavy-traffic road was opened ten years ago[6].

• Djémiong is a village inhabited by slightly over 200 members of the Mézimé ethnic group. It neighbors Gouté, and Boli and Mézimé often meet in the forest. The NTFPs of the two villages are not fundamentally different. Once again there are no signs of resource scarcity nor of strong demographic pressure on the forest. It is in their commercial possibilities that the two villages clearly differ. It is unusual to see three cars a week go by Gouté, whereas several dozen go through Djémiong every week. A two-lane intersection enables the inhabitants to display their products and easily acquire money.

We wished to see how these considerable commercial possibilities, particularly of NTFPs, affected access modes to forest resources. The goal is to show that imputing a market value to a wild forest product changes its access mode and management.

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[3] By community forest we mean the forest the villagers consider as attached to their village in general and to no individual in particular. It is located far from fields and the village, but normally only village inhabitants have access.

[4] Less than five inhabitants per square kilometer in East Cameroon.

[5] According to interviews with the villagers.

[6] Bruce (1991) indicates that common property regimes can adapt if exogenous changes are slow. This is not the case in Djémiong, where in a few months a logging firm opened a trail for their many trucks.

Contrary to Gouté, in Djémiong NTFPs are a direct means of acquiring monetary resources. This does not means everyone gathers to sell[7], but rather that it is always possible to sell any collected quantity of the most common gathered products. Comparison between the two villages showed that twice as many NTFPs were sold in Djémiong and the quantities were much higher as well. Certain inhabitants of Djémiong even specialized in the sale of NTFPs purchased from their "brothers" in Gouté. Commercialization of NTFPs affected access modes to forest resources.

Our analysis uses the same three spatial levels employed for Gouté.

- in community forest all NTFPs are accessible to village members. However, there are exceptions to the rule. There is a strict individual appropriation of the moabi tree, *Baillonella toxisperma*, a rare, sought-after species in the area. Its fruit produces an oil which is highly appreciated in Cameroon and therefore sold at high price. Three individuals in the village "own" moabi stems. One must ask for authorization to pick the fruit. The owners only allow household members to collect fruit. Nevertheless, there has been no official conflict the last few years.

Young men take the initiative to clean the stems of certain NTFP stems in the community forest to indicate their "ownership": this is the case of the bita cola, *Garcina cola*, cola, *Cola acuminata*, or ndimba, *Afrostyrax lipidophyllus*, which are marketable NTFPs. This practice of individual appropriation of certain forest stems is not very common, because of the difficulty in controlling the access to a resource which is not located near the village. According to the village elders, this type of behavior did not exist in the past.

- in the fields, NTFP extraction is permitted after authorization of the field farmer. He rarely refuses this access to members of his family and generally grants it to all village inhabitants. However, disputes between individuals arise every year about this issue and are arbitrated by the village chief: generally the offender is simply reminded of the right of others to villagers' fields. The higher number of this type of problems indicates that there is a stricter control over resources among the Mézimé than among the Boli.

- in the forest around a field: all stems in this space are appropriated by the farmer. He must grant authorization before NTFPs can be gathered. Until now there has never been an official problem about these stems: nevertheless, the men we interviewed considered that the field farmer should be the first to benefit from NTFPs around his field. This individual appropriation does not result from the farmer's upkeep of the stem. According to us, this forest space indicates an extension of an individual or family appropriation mode to NTFP stems. According to the villagers, this appropriation did not exist twenty years ago: previously, all the forest stems belonged to everyone, whatever their proximity to the fields. And the NTFP stems in this forest space are controlled by the same farmers who supply market products. This transformation of appropriation modes of market NTFP stems probably derives from the increase in commercial possibilities observed in Djémiong over the last ten years. Therefore it is probable that the increasing NTFP market has accelerated the process of strict individual/family appropriation over resources which were not previously marketed[8].

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[7] In Djémiong, gathered products are still primarily destined for home use, because these products are widely appreciated and because there is no market demand for all the NTFPs

[8] Similarly,Ciriacy-Wantrup & Bishop (1975) state that the most frequent disturbance of common appropriation modes comes from contact with market economy, because opening to a market often tends to make resources more profitable than with traditional use

A parallel can be drawn between this evolution of NTFP access modes and modes of control of access to community forests in the two villages. This control mainly concerns hunting products, but it is a sign of the strict village control that Djémiong is exercising over forest products. In Gouté, there is no organized supervision of access to the forest which would prevent "foreigners"[9] from entering. In Djémiong, there is a forest surveillance committee. Its twelve members are supposed to make sure that no uninvited person enters the community forest to practice an improper extraction.

This comparison between two neighboring villages with different commercial outlets shows that the establishment of monetary value for each gathered product modifies the modes of use of the resource: imputing a monetary value to an ever-growing number of food NTFPs triggers or accelerates a process of restrictive appropriation of these resources. We have focused our analysis of modes of access to NTFPs. Similar evolution probably exists on the three other levels of appropriation of these resources. It is difficult to define a sustainable management of forest resources without apprehending the complexity of user-resource relationships. Monetary valuation is limited because it cannot integrate the social, collective and long-term objectives that rural populations need to confront transformation of the natural environment.

Lambert & Sindzingre (1995) show that the introduction of commercial agriculture is one of the reasons for the transition from common land tenure to individual tenure.

[9] The villagers refer to people not from Djémiong or neighboring villages as "foreigners." These are therefore individuals from more distant villages or from the city.

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