CONSERVATION POLICIES AND NON TIMBER FOREST PRODUCTS DEVELOPMENT IN CAMEROON

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DEDICATION

This work is dedicated to our Lord Jesus Christ in whom I trust, to my loving wife Ayi Mbile and to my children, Niyaba, Fese, Boseme, Ayi Jr; to my late father Hon NN Mbile Sr. and to his widow Mrs. Bau Mbile, my dear mother.

ABSTRACT

Non timber forest products (NTFPs) are forms of biodiversity used for food, medicines and income in Cameroon. Government therefore, seeks better conservation policies and innovative mechanisms to fund NTFPs development. Unfortunately, viable mechanisms are untested in Cameroon, making it difficult to envisage what nature of policy is needed and at what scale. To address this gap, research was conducted to assess willingness to accept a conservation tax at a macro level, and understand the NTFPs potential, access, control and benefits sharing, at a micro level in Cameroon.

Quantities of selected NTFPs collected by households in four villages (Abakoum, Djebe, Djenou, Nemeyong) in a Community Forest (CF) in south eastern Cameroon were monitored daily using log books. *Baillonella toxisperma* and *Irvingia gabonensis* were monitored for three years and *Ricinodendron heudelotii* over two. Using questionnaire, information was sourced from 152 household heads (Bantus and Pygmies) nominated by other villagers (based on long-term residency and life-long collection of the NTFPs). Social information was sourced on demography, use and access rights to NTFPs. Participatory mapping corroborated distances to collection points of NTFPs. Furthermore, a random sample of 304 respondents in the city of Yaoundé was interviewed using structured questionnaire, to evaluate willingness and conditions for accepting taxation for forest conservation. Data were analyzed using descriptive statistics, Chi-square, correlation and Kendall coefficient of concordance at $p = 0.05$.

More Pygmies than Bantus collect *Ricinodendron heudelotii* (64.0% and 58.0%). However, both groups collected *Irvingia gabonensis* and *Baillonella toxisperma* to the same degree (100.0%). The furthest distance to collection sites was over 10 km in Abakoum and Djebe with higher Pygmy populations. Djebe is second after Abakoum in 'off-season' collection of *Baillonella toxisperma* and *Irvingia gabonensis.* Positive correlations were observed between mean 'off-season' production of *Baillonella toxisperma* ($r = 0.78$), *Irvingia gabonensis* ($r = 0.89$) and *Ricinodendron heudelotii* ($r = 0.39$), and the Pygmy community populations. A total discounted revenue of over $US 39931, 73261, and 149951 was projected to accrue from sales

of *Baillonella toxisperma*, *Irvingia gabonensis* and *Ricinodendron heudelotii* respectively, over six years. This is however at variance with the local perceptions of the resources' market value, where it is influenced by a demand mix. Use of NTFPs in forests can therefore, generate $US 10.5 per hectare per year, against an estimated $US1.9 per hectare per year in timber fees.

About 78.0% of the city respondents were willing to support biodiversity conservation through taxation, as proxy for sustaining NTFP supply. However, 82.9% were unwilling to reveal amounts they would be willing to pay. Concordance was significant on forest conservation tax being conditional on available, detailed, socially differentiated information on local level benefits sharing, transparency in funds management and freedom of contributors to opt out of the policy process.

Potentially, revenue from non-timber forest products can surpass fees from timber per hectare and targeted fiscal policies can generate additional funds for NTFPs development. However, this scenario requires policies based on detailed understanding of local level social and production dynamics to guarantee equity in sharing of benefits.

Keywords: Non timber forest products, Forest conservation, Forest policy, Sustainable forest management, Community forest

Word Count: 500

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CERTIFICATION

I certify that this work was carried out by Peter Ngembeni MBILE in the Department of Forest Resources Management, University of Ibadan, Ibadan, Nigeria.

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SUPERVISOR

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ACRONYMS (in alphabetical order)

$US	United States Dollars
CARPE	Central Africa Regional Programme for the Environment
C-BSAMS	Community-Based Stocks Assessment and Monitoring System
CDC	Cameroon Development Corporation
CI	Confidence Interval
CL	Confidence Level
CODEVIR	Union of village development Committees
CVM	Contingency Valuation Method
df	Degrees of freedom
ETFN	European Tropical Forest Network
FMU or UFA	Forest Management Unit (Unités Forestière d'Aménagement)
GDP	Gross Domestic Product
GDR	Gross Discounted Revenue
GFR	Gross Forecasted Revenue
GFW	Global Forest Watch
GIS	Geographic Information Systems
GoC	Government of the Republic of Cameroon
Ha	Hectares
IITA	International Institute of Tropical Agriculture
Km	Kilometer
MINEF	Ministry of Environment and Forest
MINFOF	Ministry of Forests and Wildlife
MUE	Metric Unit Equivalent
NPFE	Non Permanent Forest Estates
NTFP	Non Timber Forest Products
OP	One-off Payment option
p	Probability
PFE	Permanent Forest Estates
REDD	Reducing Emissions from Deforestation and Degradation
RP	Recurrent Payment option
SMP	Simple Management Plan
Spp.	Species
TNC	Total Natural Capital
WRI	World Resources Institute
WWF	World Wide for Nature
χ^2	Chi-square

CHAPTER ONE

1. INTRODUCTION

1.1 FORESTS AND LOCAL PEOPLE.

Worldwide, it is estimated that, approximately 350 million people live in or close to forests (World Bank, 2001). Of these, about 85% of the poorest depend at least in part on forest products, especially those from trees, for food, income and medicines (World Bank report, 2001).

In tropical countries, about 1.2 billion people living inside and around forests use tree products to generate food and cash (World Bank, 2001). Some related, global analyses of the geographic distribution of resource-poor communities in forested countries (McNeely and Scherr, 2003) concludes that, considerable proportions of the extreme poor in these countries are concentrated in areas possessing the world's highest forest biodiversity. Therefore, while diverse forest products remain an important part of the livelihoods of forest-dependent communities, these same groups remain the most affected by restrictions imposed by existing forest conservation policies. And therefore, it is a common paradox that numerous communities living in and around forest of high biodiversity value are also some of the poorest and most isolated in the world.

There is a substantial body of analyses linking use of forest biodiversity to livelihoods strategies. Some of these are wholly or in part applicable to the Cameroon context. Some examples are Okafor (1991), Falconer (1990), Leakey and Newton (1994), who in their discussions highlight, the multiple services and products provided by forest biodiversity to surrounding communities. Others such as Paludosi et al, (1999), Brossius and Russell (2003) and Schroth et al, (2004) go further to focus their discussions around the benefits and relevance of policy to support community-based management of forest biodiversity. In these

analyses emphases is made on the use of Non Timber Forest Products (NTFPs) and other diverse forms of forest resources, by surrounding communities.

Forest policies linking communities to the benefits of forests, are also well developed in Cameroon. The framework Law No. 94/01 of 20 January 1994 laying down regulations for the Forest, Wildlife and Fisheries for the Republic of Cameroon has been in application now for close to twenty years. Its application texts comprise of the 1995 Forestry Action Plan laying down modalities and expectations of trade in various forest products. These texts also include the 1996 National Environmental Management Plan, laying down modalities and expectations for managing biodiversity within protected areas and other wildlife reserves. Other policy guidelines in force in Cameroon include frameworks, such as the Yaoundé Declaration (equally applicable to many other Central Africa States), and strives for better commercialization of wood products. This Declaration also facilitates establishment of partnerships, of trans-boundary environmental protection, and of a forestry Trust Fund. In 2002, Cameroon also developed a National Biodiversity Strategy and Action Plan in cooperation with the World Wide Fund for Nature (WWF).

Despite these existing policy frameworks, the forestry sector in Cameroon remains burdened by the legacy of forestry objectives that are not sufficiently adapted to the needs of local people. Just like before independence, forestry has remained largely, one of promoting and securing the wood sector for export of raw timber or semi-processed products. With few exceptions like Community Forests, existing forest policies effectively seek to separate local communities from forests. In some cases indigenous populations are considered persona *non grata* within forests, whose status changed with forest zoning under the 1994 Forestry law, but that remained within customary spheres of influence. As a result of diminished community influence following zoning, much less attention has been paid to diverse uses range of forest products by local people, such as NTFPs.

Some national and international scholars such as Efoua (2001) Mbile et al., (2006), Brossius and Russell (2003) and Paludosi (1999), have demonstrated the conservational benefits of community-based forest management in their works. The main challenge facing the NTFPs

sector to-date remains however, one of lack of innovation and direct investment. Whereas between 2005 and 2010, the timber sector contributed between 12% and 17% of Gross Domestic Product in Cameroon (MINFOF, Department of Statistics, 2010), similar contributions by NTFPs remain very incomplete and rarely updated. Evaluating the monetary contribution of the NTFP sector to the Cameroonian economy has therefore relied on one-off, often externally commissioned surveys, and always at the macro level.

Largely as a result of these factors, the NTFPs sector suffers massive underinvestment. Although recognized as important to forest conservation and livelihoods, few well funded strategies exist in Cameroon aimed specifically towards developing this sector. Consequently, with ineffective attention paid to the NTFPs sector, the full benefits of community contributions to overall sustainable management of forest biodiversity are also not enjoyed.

1.6. PROBLEM STATEMENT

The NTFPs sector need not continue to expect appropriate levels of investment funds from traditional market mechanisms or State budgetary processes. These have traditionally favored and funded support to the timber sector. And the current timber industry has been in some cases mutually exclusive to the NTFPs sector.

Innovative, sustainable financing mechanisms need to be developed or sought to support NTFPs development. Such mechanisms need to be sustainable over time and may depend instead on forest other conservation strategies. There is broad understanding of how NTFPs development can perpetuate multiple values of forest biodiversity (including conservation of forest carbon). Innovative financing strategies can thus be supported by common incentive systems (e.g., voluntary carbon or [1]REDD+). It is more likely that, such mechanisms will be viable, if they directly or indirectly re-enforce forest conservation and NTFPs development at the appropriate micro-level.

[11] Reducing Emissions from Deforestation and forest Degradation

However, major problems that should be addressed prior to instituting such an incentive system pertains to filling knowledge gaps and understanding of critical dynamics at two levels of implementation:

(i) The dynamics of NTFPs use, access and benefits sharing, in a socially complex, micro-level of analyses, within a forest setting in Cameroon are not known in sufficient detail.

(ii) The factors from which deductions can be made to determine conditions for actions and behavior needed for the incentive mechanism to work properly, are unknown and untested in Cameroon

It is successful strategies that promote and strengthen access, use and benefits sharing from NTFPs at micro-level that can serve as incentive to sustain funding at macro level. In order for such a mechanism to continue generating the needed funds, the constraints associated with access, use and benefits sharing from NTFPs must therefore, be analyzed in detail and known.

With understanding of the conditions for supporting biodiversity developed, solutions to access, use and benefits sharing constraints will be used to formulate appropriate forest conservation policies at the macro-level.

1.8 RESEARCH QUESTIONS

Firstly, to generate understanding of the potentials and underlying requirements for effective and equitable development and use of NTFP the following research questions are posed:

i. What is the quantitative relationships and interactions between different social groups and the NTFP resource?

ii. What are the characterization of the spatial relationships of social groups, including power relations, perceptions of customary tenure and access to NTFPs sources?

iii. What are the time-average production possibilities of selected NTFPs, aggregated at product levels and differentiated at ethno-social scale?

iv. What are the effects of the relationship between social groups and physiological characteristics of NTFP resource species on production potentials?
v. What is the discounted revenue potential of NTFPs compared to expected timber fees deducible as opportunity cost of non destructive use of community forests?

To evaluate the willingness of the public to accept forest conservation-related taxation, and evaluate conditions for securing that support as basis for policy development and formulation, the following questions were posed:

i. What are the subject characteristics, and associations between those characteristics and related taxable behavior, in relation to selected products and services?
ii. What are the public's attitudes to the taxation principle and preferences towards revealing taxation amount?
iii. What are the extents of similarities and or divergences in the general perceptions of the importance of forest conservation amongst the public?
iv. What are the extents of divergences and or concordance in public perceptions with respect to conditions for accepting forest conservation-related taxation?

Finally, a synthesis of strategies to address constraints and opportunities for linking NTFP development, to public perceptions and conditions for accepting conservation-related taxation, are made.

1.7 STUDY OBJECTIVES

The general objective of this research is to investigate the dynamics of use of NTFPs at micro level in terms of, production, control and access and make policy recommendation to improve equity and benefits sharing. To help ensure that such policies can be effective this research seeks to understand conditions under which funds can be raised from segments of the public through targeted taxation

The specific objectives are therefore,

(i) To evaluate the potentials and underlying requirements for effective and equitable NTFP development as an off-shoot of forest conservation policy.

(ii) To evaluate subject characteristics, scope and conditions for securing public support for forest conservation through taxation as basis for policy development and formulation

(iii) Synthesize strategies to address constraints and opportunities associated with the development of NTFPs at local level so if forest conservation policies emerge from the process they can be effective in content and scope.

1.9 RESEARCH HYPOTHESES

1.9.1 EVALUATION OF ASSOCIATIONS BETWEEN NTFP USE FACTORS

Ho1: There is no dependence of NFFP collection preference on the racial characteristics of user group

Ho2: There is no dependence of NTFP provenance and distance covered to collection points on racial characteristics of the user group.

Ho3: There is no dependence of NTFP collection on the population size of the user group in the community.

Ho4: There is no association between NTFP collections during 'off-seasons' with the racial characteristics of the user groups.

Ho5: There are no revenue differences, year-to-year, from NTFPs collections and sales under a non extractive use regime.

Ho6: There is no difference between combined revenue from non extractive use, NTFPs and carbon, compared with revenue from timber fees

1.9.2 EVALUATION OF WILLINGNESS AND CONDITIONS FOR ACCEPTING A CONSERVATION TAX

Ho7: Neither indifference nor ignorance exists amongst members of the public regarding currency amounts they would be willing to support as taxation for forest biodiversity conservation

Ho8: No willingness exists amongst members of the public to support the taxation principle to pay for forest biodiversity conservation.

Ho9: No differences exist in the probability of association between the public's characteristics and their expressed preferences for consumption of taxable goods and services.

Ho10: No differences exist amongst the public's perception of different requirements and responsibilities for biodiversity conservation.

Ho11: No differences exist between public's perceptions of conditions for supporting taxation to conserve forest biodiversity.

1.10 JUSTIFICATION OF RESEARCH

At global scale it is widely recognized that the 'pristine parks' or 'isolated park' model of environmental management is yielding disappointing results (Hakizumwami, 2000, Musters et al. 2000, Byers, 1999, Hart et al. 1998). This realization helped usher in the concept of landscapes (CARPE, 2000) in the 90s. The landscape concept has helped improve understanding of the spatial and functional interdependence between man and natural systems such as forest biodiversity (Raskin et al. 2002, Kasperson and Kasperson, 2001b). It has also brought to the fore, understanding of inter-linkages between life-supporting forest ecosystem functions. These functions have helped frame current thinking around forest biodiversity and include, food chains, gene flows, water purification, pollination services, seed dissemination, soil formation, disease regulation and nutrient assimilation, etc (Baskin, 1997, Daily, 1997).

This holistic perspective to ecosystem services conservation is not sufficiently considered as an underlying reason to promote nondestructive uses of forests such as NTFPs management. NTFPs are still viewed within the perspective of extractable resources and not sufficiently as resources which embody non-extractive use of forests. NTFPs are therefore, conceptually at the heart of forest conservation and perpetuation of these ecosystem services and functions.

However, the lack of clear linkages between NTFPs management and forest conservation seems to persist. Despite the landscape approach expected to galvanize action towards non destructive forest uses at large scale, compartmentalization has persisted. An example of this is that, like timber, perceptions and analyses of NTFPs use, and needs for its further development has tended to be conceived along the lines of 'extractive' resource. Proposals for the ex-situ domestication of NTFP are sometimes not seen as additional but as replacement. One reason for lumping of NTFPs with timber (including promotion of classical timber inventory methods for NTFP assessment) has been due to the nature of NTFPs studies carried-out in Cameroon. The bulk of these studies have not been at community-level or micro-scale but at aggregated, macro-economic level, e.g., Godoy et al., (1993), Ndoye, (1998), Tabuna, (1999), Leakey (1999), Cunningham et al., 1997, Tewari, 2000, Ambrose-Oji, 2003, Jensen, 2009). In this way many fine-scale (micro-level) application of such analyses have been diluted with macro-economic level generalizations and attempts to be all things to all people.

And although arguments for management of NTFPs have been made to highlight their links to local people, they have been presented mainly as strategies to support forest conservation linkages (Marshal et al., 2006, Cavendish, 2003). Such strategies have not encouraged in-situ management methods and accompanying policies to support them. Instead, they have promoted separate policies for NTFP management and others, for forest conservation.

In-situ management of NTFPs should be linked to forest conservation and institutionalized as a part of policy. If such is not done community-based assessments and monitoring systems for NTFPs (e.g. C-BSAMS, 2006) will remain of marginal value. Unless such

support is achieved lessons, such as those, developed by J Wong's (2000) assessments and syntheses, suggesting use of indigenous knowledge and locally appropriate practices to re-enforce sustainable forest management are likely to become redundant as forests are lost. Sustainable forest management will also become less relevant to community livelihoods as natural forests become less accessible to local communities. The latter would continue to suffer from lack of involvement as recognition of their role and tenure would persist.

Unless pursued a policy development strategy, continued separation of in-situ management of NTFPs from forest conservation can effectively (though unintentionally) dilute public support for NTFPs development. This can happen through the actions of forest conservation lobbyists who traditionally support forest biodiversity conservation, but fear 'un-regulated' human activity in forests even this is limited to NTFPs harvesting. Current perceptions of NTFP development as a subset (or as an 'alternative' livelihood strategy), rather than an integral part of forest conservation needs to be reversed. There is need to 'mainstream NTFP as an integral strategy of forest management and of benefits sharing with communities. One way to achieve this is through the development of specific policies linking forest conservation and NTFPs development. Based on such links understanding of local level NTFPs dynamics can be used to strengthen governance in overall forest management.

We therefore observe that, the decoupling of NTFPs development from forest biodiversity conservation has often resulted in reductionist analyses. Such analyses have treated NTFPs resource species as individual crops, with very minimal emphases placed on the interrelatedness between them and human cultures, and overall forest function. These have helped cut-off much needed public support to NTFPs required for its development.

There have been some reactions to NTFP development being presented as 'alternative' (rather than an integral part) to broad-based forest use. Important critiques of such 'instrumentalization' of NTFPs in livelihoods-conservation strategies have been Pérez et al., (1999), Belcher & Ruiz-Perez (2001), Schreckenberg et al., (2002), Ros-Tonen and Wiersum, (2003) and Kusters et al., (2006). Their arguments reject the notion that

sustainability is self-evident in NTFP use. Rather, they argue that, sustainability is due, more to the methods employed in exploitation and commercialization of NTFPs. This interpretation supports the solutions implied in the problem statement of this research. It does so by linking understanding of local level dynamics and benefits of NTFPs to targeted policies. This is a more viable means of achieving sustainable forest management, rather than assuming that NTFPs use by itself will ensure sustainability.

Furthermore, Lynch et al., (2004) and McLain et al, (2004), insist that, there needs to be emphases on the balance between short term income, livelihoods and biodiversity conservation. This latter pre-condition can be achieved through the integration of local practices and knowledge systems with scientific, institutional and policy requirements from managing NTFPs.

In summary, public support can play a strong role to ensure that, ecosystems services conservation benefits from NTFPs use. Rather than a passive assumption that NTFP use by itself will lead to sustainable forest management, there is need for more purposeful linkages to be established. Sufficient understanding of the dynamics in use and access to NTFPs is however, needed at micro level. It is this level that dichotomies between forest conservation and NTFP development can be reduced, in other to influence and sustain public support if envisaged.

The development of ex-situ 'conservation of NTFP resource species through use' has highlighted the need to analyze the links to user groups. Traditionally, knowledge of such linkages have been perceived as purely incidental, and therefore considered not to be critical to NTFP management. There is need now to maintain intact forests, and so understanding of the dynamics of in-situ use of NTFPs by indigenous groups is becoming urgent. In an interdependent way, such understanding can better earn public support and in-turn benefit from investments if effective policies can be developed to make community-based management of NTFPs durable.

The main gaps in previous NTFP studies and analyses have thus been their scope as system-wide syntheses, meta-analyses and literature reviews. The findings have not sufficiently differentiated NTFP use at local social and spatial levels to facilitate understanding of differentiated management needs. Studies have only partially succeeded in incorporating the peculiarities of different NTFPs resource species (different life-forms and irregular distribution) into fairly complex social and cultural aspects of local livelihoods. Partly because of these coarse perspectives of NTFPs management public support for the sector has been limited. This support has not gone beyond the view of NTFPs as an extractive resource. The role of NTFPs has not been seen as integral to non destructive use of forests and a way to value of forests.

Evidence now exists of how managing NTFP at micro-level are linked to social perceptions of customary tenure, analyses of fairness and efficiency in benefits sharing, decision-making and even credibility of non-destructive incentive mechanisms like for REDD. In a similar light non-destructive forest use strategies require time-based analyses comparable with other strategies such as agriculture and timber. Such patience is needed if sufficiently effective incentive systems based on opportunity costs are to be analyzed negotiated and linked to broader policy processes.

While detailed knowledge of NTFP use is required, the second pillar of this research is how to secure public support for forest conservation on which NTFP development depends. The main knowledge gap here remains how to deal, in a more pro-active way, with public attitudes that are not fully versed with the ecological processes to be conserved or valued.

According to Costanza et al., (1997), because of a lack of familiarity and of information about ecological processes, distortions are introduced in the understanding of relationships between subject characteristics and their consumption behavior when trying to evaluate public support for conservation. The assumptions made about supply and demand and the interdependences in ecosystems services themselves, all conspire to introduce inaccuracies in people's intuitive valuation of biodiversity. These have traditionally weakened the

usefulness and broad application of the Contingency Valuation Method (CVM) used to assess 'willingness to pay' surveys.

Carson (1998) has challenged some of the basic assumptions of linearity between subject characteristics and their consumption behavior. These challenges have traditionally been supported by the skepticism of Diamond and Hausman (1994). These two have considered applications of CVM as tool for non-market understanding of behavior in an actual public policy situation or real-world market-place to be presumptuous.

Another more fundamental gap in appraising public perception and support for biodiversity using the CVM is dealing with the misconception that environmental damage can be paid for through freedom of choice in a market place. According to Beder (1996) avoiding that damage under a forest conservation regime is primordial and more realistic. Therefore, instead of relying on 'non-market' promises, development of a coercive mechanism, based on potential contributors' willingness or commitment can be more realistic.

A further challenge of the CVM according to Cairns & Dickson, (1995) has been that, most forest ecosystem services on which processes like NTFP development depend, are actually irreplaceable. Ecosystem services can be irretrievably lost through exploitative use of forests, and therefore, innovative and more deterministic mechanisms are justified.

In view of some of these gaps in the traditional structure and application of approaches such as the CVM, Costanza (1997) makes three taxation-based arguments in his brief "Three General Policies to Achieve Sustainability". The adaptations of this may be more appropriate and applicable to new contexts such as in Cameroon. Costanza (1997) argues for (i) a natural capital depletion tax, (ii) a precautionary polluter pays principle tax, and (iii) a system of ecological tariffs. He argues that such three mutually re-enforcing policy instruments will have a higher likelihood of assuring that economic development will be ecologically sustainable.

NTFP s development depends on non extractive use of forest biodiversity. In designing policies and instruments it is critical to maximize the chances of success in conserving that biological diversity, while acknowledging and minimizing the risk of uncertainty. Investigating the scope and conditions for support of conservation policies in new context like Cameroon requires flexibility. This is likely to be more realistic than relying on assumptions of linearity in the relationship between consumers and their unexpressed preferences as is deducible from typical CVMs.

1.11. SCOPE OF RESEARCH

The NTFPs aspects of this work were carried-out within one community forest situated within the DJA multi-functional landscape of south eastern Cameroon. Data collection to assess willingness to accept taxation to support forest biodiversity as basis for public policy, was carried-out in the Capital city of Cameroon, Yaoundé.

The DJA multi-functional landscape of south eastern Cameroon is one of the most researched forest policy and livelihoods contexts in Cameroon. Various analysts have attested to the significance of this site in studying forest resource-livelihoods-policy issues, especially community forestry (Djeumo, 2001, Kleinet al., 2001, Efoua, 2001).

To illustrate the multi-functional nature of this study site, we find in it 397 Bantu and Pygmy settlements, while in terms of proportion by area, the zone comprises, just over 1.0 % community forests, 31.0% protected forest areas, 63.0% timber concessions and 4.0% unclassified forest (Mbile P et al., 2008).

In terms of tree products use, the area is characterized by timber exploitation of hardwoods where, *Baillonella toxisperma* (Moabi), *Afzelia africana* (Doussie), *Entandrophragma cylindricum* (Sapelli), *Entandrophragma utile (*Sipo) and *Pterocarpus soyauxii (*Padouk) are of particular importance. Non-timber forest products occurring here include *Irvingia gabonensis* kernels *(*condiment), *Ricinodendron heudelotii* kernels (spice), *Gnetum africanum* vegetables, *Combretum mucronatum* bark (de-wormer), with seeds of *Baillonella toxisperma* (food/edible oil).

In this zone, socio-economic aspects around NTFPs focus on four village communities of the CODEVIR (comprising 33.0% Pygmy and 67.0% Bantu), approximately 4600 hectares in surface area. Community interactions with three main non timber forest products, *Baillonella toxisperma*, *Irvingia gabonensis* and *Ricinodendron heudelotii* are analyzed. In view of vegetative dormancy in *Baillonella toxisperma* and *Irvingia gabonensis* (Schneemann, 1995), data were collected over three years, 2004, 2007 and 2008. Due to observed heavy production, year-to-year by *Ricinodendron heudelotii* trees, three successive years of data collection was not considered necessary. Data on this third species was thus collected over two years, 2004 and 2008. More details are provided under the methodology. Data collection was limited to this one community forest. Some reasons account for this apparently limited scope.

Despite the constraints which have been associated with the community forest policy, these management units and their associated communities of villages represent to-date important socio-economic, ecological and policy units for analyses. Community forests are policy instruments that confer limited, but enforceable tenure rights to local communities. As an embodiment of this politic, Article III of the 1995 Implementing Decree, of the January 20, 1994 Forests and Wildlife law thus provides the following definition of a Community Forest: "a forest forming part of the non-permanent forest estate, which is covered by a management agreement between a 'village' community and the Forestry Administration. The management of such a forest is the responsibility of the village community concerned, with the help or technical assistance of the Forestry Administration". A community forest may thus only be demarcated on land over which a village community has customary rights.

In order to receive official approval to operate, a community forest must have a Simple Management Plan – SMP (in contrast to open access use regimes). On the basis of this 'contract', the Ministry of Forests and Wildlife (MINFOF) cedes a plot of the national estate to a village community (s), for its management, conservation, and use. The law notes that, a village community wishing to establish a community forest must be organized as a "legal entity" and thus be represented by a group of individuals acting with the legal status of an

"association," "common initiative group," or "cooperative." The legal entity is then known as the "manager" of the community forest—and it is this manager that is given the mandate to exercise the powers transferred to village communities over both the biophysical resource and the resultant financial benefits (Lescuyer 2003).

Secondly, the concept of soliciting public compensation for biodiversity conservation and incentives for ensuring NTFPs equity in small scale forestry are new in Cameroon. No similar, previous studies have been reported for Cameroon. This lack of familiarity by the populace with the subject of public incentives for forest conservation presented an initial challenge of scope of the study.

Furthermore, due to time and budgetary constraints for data collection, the study could only cover three months (January to March, 2008). With time allowed for explanatory discussions with respondents, only a maximum of four questionnaires could be completed per day (including weekends). In view of these challenges, a single location, Yaoundé (Capital city) was retained for the study.

Yaoundé has many positive features as a candidate site. It has an estimated 2.5 million people (out of an estimated total of 18 million for the Country). It has the highest concentration of State Ministries, International and Civil society organizations involved in biodiversity conservation and forest management, and in view of its characteristics as a melting pot for ethnic, regional and social groups, can be described as a representative sub-set of the national population with the characteristics required for this survey.

Still 'the general public' tends to be unsophisticated regarding more utilitarian perceptions of tree biodiversity conservation and NTFPs equity, especially over why these 'values' should be monetized or those generating them rewarded.

The Government of Cameroon nevertheless places high priority on protecting forest biodiversity, aiming to conserve up to 30.0% of all forests biomes. There is thus likelihood that results of such valuation focusing on perceptions discernible from a systematic sample

from the capital city will be useful later-on in formulating policies geared at sustainable management of the nation's forest resources.

1.12 LIMITATIONS OF THE STUDY

The limitations in this study are five-fold. The first has to do with the sampling of households within the CODEVIR community. Ordinarily a random sample would have been appropriate in selecting the households interviewed for the socio-economic survey and monitored for NTFPs quantification. Unfortunately it was made known during the introductory meeting that all four villages contained recent migrants who had not sufficiently taken to collecting NTFPs. For that reason the 152 households sampled were identified by the village community as long-term residents, knowledgeable and those most active in collection of NTFPs.

Secondly, Pygmies, a major target group in NTFPs development are unevenly distributed within the four villages. This made a random sample of respondents risky as insufficient numbers could have been selected bearing in mind that numerous Bantus were recent arrivals. To reduce the overall impact of these limitations on the completeness of the results preferred statistical tests were non parametric and thus no assumptions for normality in the samples were made.

Thirdly, the quantification survey of NTFPs included *Ricinodendron heudelotii*. By its physiology, this species regenerates profusely year-in year-out. This means that tests for association between quantities of *Ricinodendron heudelotii* and user behavior was not expected to produce any significant variations as such associations between two entities would be based on similarities in their variations (considered insignificant with *Ricinodendron heudelotii*). Additionally, collection of *Ricinodendron heudelotii* was carried-out only for two calendar years as it was considered that, in view of the cost of [2]field

[2] *Ricinodendron heudelotii* is most abundant in the forest when the other two considered in this study are out of season. It the requires commitment of field resources

collection, against minimal fluctuations in production, there was little to be gained in time-average potential from a repeated collection over a third year period.

Fourthly, during the assessment of willingness to accept taxation to pay for biodiversity conservation a similar sampling challenge (like that for CODEVIR villages) was encountered. Although the most appropriate city on paper, Yaoundé still had a mixed population with a considerable proportion still largely ignorant of biodiversity questions. Here too a targeted sample was first taken, and based on a 100% completion rate of the questionnaires, a random sample was drawn from the 400 completed questionnaires. In performing statistical tests however, no assumptions were made for normality and non parametric tests were used.

Finally, although Yaoundé met all the criteria for the willingness to accept taxation survey, additional towns could have still added value to study. This option was dropped due to cost and public unrests over fuel prices during the early months of 2008 when the survey was carried-out.

1.13 LAYOUT OF THESES

Chapter one is the introduction. Here a background on the global value of forests, threats to ecosystem services and attempts to combat deforestation through global and national policy responses are presented. The nature and challenge of Cameroon's forest policies including possibilities for linking and leveraging conservational use of forest through policy development are discussed.

The problem is situated to be a combination of an insufficiently researched and contextualized NTFPs development sector on the one hand, and ignorance regarding how coercive policy instruments can work to support conservational use of forests, on the other.
The legitimacy of the problem solving approach proposed by this thesis rests both in the intrinsic and utilitarian values of conservational use of forests, the demonstrated lack of socio-economic detail in previous NTFPs analyses and weaknesses in the underlying

assumptions in classical non-market mechanisms proposed to address conservational use of forests.

Three general areas of objectives are laid-down: (i) To evaluate the potentials and underlying requirements for effective and equitable NTFP development as an off-shoot of forest conservation policy, (ii) To evaluate subject characteristics, scope and conditions for securing public support for forest conservation through fiscal means as basis for policy development and formulation, and (iii) providing syntheses of strategies to address constraints and opportunities inherent to the NTFP development process and make policy recommendations based on the scope and conditions for workable fiscal instruments to support forest conservation. Associated research questions are posed and testable hypotheses, outlined.

The thesis limits the scope of analyses of NTFPs development constraints and opportunities to the production potentials of threee NTFP species *Baillonella toxisperma, Irvingia gabonensis and Ricinodendron heudelotii*, and interactions between the racially mixed and socially complex community forest context of the association of 'CODEVIR' in south eastern Cameroon. Concurrently, the scope of analyses of public willingness and conditions under which support for conservation policies can strengthen NTFPs development is limited to the City of Yaoundé, Cameroon.

Chapter two is the literature review. To support this thesis related works dealing with both intrinsic and utilitarian values of forest biodiversity are reviewed. Additionally, a community-based NTFP stocks assessment and monitoring system developed as a part of this thesis is evaluated as a 'proof-of-concept" in terms of its comparative strengths in generating the kind of information to which targeted policy support can be directed.

Chapter three is the Methodology. Production analyses of NTFPs employ a village log-book approach with three years of data entry. Household demographics, socio-economic surveys and spatial analyses through semi-structured questionnaire survey are used to complete the assessment of NTFP use and equity dynamics at local level. Concurrently, a four part

structured questionnaire comprising of a combination of discrete response solicitations, binary responses and likert scale assessments is used to implement a random survey of conservation policy sector stakeholders, on willingness and conditions for supporting forest conservation via fiscal means. No assumptions are made for normality in the distribution of individuals in both the samples analyzed for NTFPs and for perceptions and attitudes to a conservation tax. Non parametric tests, descriptive statistics, chi-square tests of association, and correlations are used to evaluate relationships between variables and between respondents and their preferences.

Chapter four is the results. Generating the results and explaining what they mean is based on hypotheses evaluated in the null formats and linked to the specific objectives and research questions of the thesis.

Chapter five is the discussions, based on interpretation of the results, and evaluated against similar arguments as discussed in the literature. The significance of hypotheses tested are discussed and interpreted

Finally Chapter six is the conclusions and recommendations for policy. The significance and lessons from the findings on micro-level NTFPs development for policy are presented. The lessons drawn from analyzing willingness and conditions for accepting forest conservation-based taxation, how they may influence policy support for NTFP development, are presented.

CHAPTER TWO

2.0 LITERATURE REVIEW AND THEORETICAL FRAMEWORKS

2.1 LITERATURE REVIEW

2.1.1 GLOBAL AND NATIONAL TRENDS IN FOREST CONSERVATION AND MANAGEMENT POLICIES

2.1.1.1 FOREST LOSS AS THREATS TO ECOSYSTEM SERVICES AND THE NEED FOR POLICY

There is a strong timber exploitation focus in forestry within Central African States. Despite this, there are numerous forest products and ecosystem services derived from non destructive use of forests. According to a report by WRI (1998) some of these products and services are disappearing rapidly. The report (WRI 1998) estimates that, only half the amount of forests originally present under the prevailing climate regime, now exists. The average rate of forest loss in Cameroon over the period 2000 – 2005 has been estimated at approximately 2.0% per annum or between 190,000 – 220,000 hectares (CARPE, 2005). Globally, losses expressed in absolute terms hide the fact that forests have been reduced to a patchwork or mosaic of land uses with varying levels of degradation of floristic biodiversity (Laurance and Bierregaard, 1997; Noss and Cooperrider, 1994), which in combination with lack of local level analyses of people's intricate relationship with forests products and services, are reducing the overall long term value of forests.

Rapid losses of floristic biodiversity have been attributed to breakdown in sustainable livelihoods. These have been confirmed by CARPE (2000, 2005 state of the forest reports), and by Groombridge and Jenkins (2000). Such breakdown has been linked unsustainable practices involving industrial agriculture, livestock rearing, timber and fuel-wood extraction, or driven by rapid and extensive land use changes including rapid population growth.

Negative impacts have also been attributed to the absence of targeted forest conservation and management policies to inform practices at local levels. Local level analyses have the advantage of explicitly recognizing and valuing multiple cultural and social relationships between forests and communities, often absent in macro-economic level analyses of forests. Consequently, in areas where natural forests have been lost or replaced through unsustainable use, benefits of re-grown or planted forests have been found to be less promising on both the social and economic side and usually inferior to the previous natural forests in providing services and long-term support to human systems (WRI, 1998). In view of such widely held recognition of the importance of conserving forest biodiversity to perpetuate ecosystem services, authoritative global arguments have been evolving in favor of conservational use of forests as opposed to purely extractive ones. Thus as argued by (Gunderson, 1999) similar standards for tools, instruments and guidelines – or policies to frame the philosophical, methodological and practical challenges associated with the use and management of forest resources at global and national levels become a matter of urgency

2.1.1.2 EFFORTS AND CHALLENGES IN SHAPING GLOBAL FOREST CONSERVATION POLICY

There are a number of concepts which argue for pro-active conservational use of forests. Noteworthy amongst these is Costanza and Daly's concept of strong sustainability (1992). The concept of sustainability as a strategy to perpetuate forest products and services has supported by Pearce and Turner (1989), Costanza and Daly (1992); to mean 'the maintenance of the total natural capital (TNC) stock of tropical forests, at or above current levels'. This is the condition sometimes referred-to as strong sustainability (Costanza and Daly, 1992).

Few global efforts to influence national forest conservation policies along these conceptual contours have been as far reaching as the Rio Declaration of 1992. Subsequent national

forest conservation policies, such as that of the Republic of Cameroon, came to be crafted in response to what was termed “Agenda 21” or the declaration on Sustainable Development.

As a basis for such sustainability in forest management ecologically friendly and non destructive use of forests are practiced. This approach has been supported by Cotton (1999). Sustainably managed forests should thereafter be viewed as reservoirs of biological diversity. They are important in supporting sustainable livelihoods of associated human populations and in maintaining other values like carbon balance of the biosphere. They also help regulate global energy changes and transfers, providing watershed protection, and helping to regulate nutrient and hydrological cycles (Costanza et al., 1997). However, policies which maintain forest health by perpetuating non-extractive uses like NTFPs (in places like Cameroon and central Africa) and other services, to replace extractive uses like timber also face important challenges. Foremost amongst this is that such policies bear important opportunity costs which must be taken into account in the development and formulation of such forest conservation policies.

As example, Table 1 compares some approximate monetary values per hectare, for different services and products which can be derived from forests under destructive, extractive and non-destructive uses.

Table 1: Estimated monetary benefits from destructive and non destructive uses of forest ecosystems

Potential revenue per hectare of frontier forest	*Estimated $US returns per hectare*
[1]Ecosystem services (composite)	4007
[2]Cocoa	4000
[3]Oil Palm monoculture	1200
[3]Rubber monoculture	1200
[4]Timber fees payable to the State (Cameroon)	1.9
[5]Carbon (250 tons/ha)	750

Sources:

[1]Costanza et al, (1997)

[2]Unpublished farmer field school field Report, Cameroon (IITA, 2009)

[3]Cameroon Development Corporation--CDC (pers. comm., with Palm/Rubber estate manager, 2009)

[4]*The Economist*, February 14th 2008

[5] http://news.mongabay.com/2008/0215-cameroon.html

Table 1 depicts how destructive uses of forest lands like industrial agriculture provide great opportunity. Incidentally, timber fees, a current popular use of forests appears to generate only minimal benefits. The combined benefits from valuing ecosystem services appears however to be potentially more advantageous, yet due to absence of ready markets, as opposed to agriculture and timber options, the opportunity cost remains correspondingly very substantial. Still with new opportunities being opened at the level of global forest policy negotiations (e.g. REDD+) the potentials for conservational use of forests cannot be ignored for too long.

2.1.1.3 CAMEROON'S FOREST POLICIES: A SYNOPSIS

Against external pressures and internal calls for change, after Rio 1992, the Republic of Cameroon enshrined its local Agenda 21 within its forest policy reform process ushered in by the Law N° 94/01 of 20 January 1994 laying down regulations for the Forest, Wildlife and Fisheries for the Republic of Cameroon.

This Law frames Cameroon's forest management activities. It defines ownership, use and access rights to forests. It further clarifies how the State intends to share benefits from timber exploitation, as well lay down modalities for forest conservation. In less specific ways the law provides guidelines for community access to forests to harvest timber and non timber forest products (NTFPs).

Modalities for Forest Management, the official euphemism for timber concession forestry are contained in the 1995 National Forestry Action Plan; while the forest conservation strategy modeled along the lines of the exclusive model (West and Brechin, 1991) are contained in the 1996 National Environmental Management Plan. Both policy implementation instruments however, have as intent, to contribute to social and economic development of neighboring populations, either indirectly through their contributions to the State's investment budget or directly, through payments to local communities and councils,

managing community forests or stimulation of entrepreneurial activities, to include activities like the collection and marketing of diverse forest products, such as NTFPs.

In addition to the National Environmental Management of 1996, a number of other forest conservation policy instruments exist, building off from the initial 1994 law, such as the Yaoundé Declaration (March, 1999), which strives for better commercialization of wood products, sustainable partnerships, trans-boundary environmental protection, and Trust Fund establishment. Cameroon further strengthened its environmental policies by adopting a National Biodiversity Strategy and Action Plan in collaboration with the World Wide Fund for Nature (WWF). There are other laws, ordinances and official texts dealing with specific issues of conservation in the forestry sector. These national and regional policy frameworks all remain linked to the 1994 framework laws on forests and wildlife.

To facilitate productive aspects of forestry (timber concession forestry), conservational aspects (creation of a protected areas network), community empowerment and benefits sharing strategies (legal community access and use of forest resources), the 1994 forest and wildlife laws, categorizes all forests in to two broad regimes or estates: the Permanent Forest Estate (or PFE) and non-permanent forest estates (or NPFE).

2.1.1.3.1 THE PERMANENT FOREST ESTATES (PFE)

These comprise

i. *State forests:* (private property of the State), comprising of national parks and forest reserves, buffer zones, and logging concessions. Logging 'concessions' are also referred-to as 'forest management units' (FMU or [3]UFAs in French). Lately forest 'licenses' which should be considered as *de jure* timber concessions have been phased out.

ii. *Council forests*

[3] Forest Management Units

2.1.1.3.2 THE NON PERMANENT FOREST ESTATES

These comprise

i. *State domains* (national forest domains or all other forests for which no licenses are held or which are not under any official management plan – community, council or otherwise),
ii. *Community forests* (community forests), and
iii. *Private forests* (private forest plantations)
iv. *Recoveries (*forest patches earmarked for roads, mines or other development which necessitates the cutting down of trees)
v. *Sale-by standing volume* (these often occur in "national forest domains") but would require a temporary license. This could involve from a single tree to a specified surface area). This category is also being phased out.

Table 2 is the summary of quantitative characteristics of these forest entities as they stood in 2007 using a combination of sources and their different appellations.

Table 2: Allocation of Forested Lands in 2007 (Ministry of Forest and Wildlife, Cameroon)

	Forested Tenure Regime	Area (ha)	Percentage of total
1	Council forests	413,622	2.1
2	Community forests	380,765	1.9
3	*Forest Licenses	6,063,457	30.9
4	Forest reserves	1,541,111	7.9
5	*Forest Management Units	7,066,647	36.0
6	*Sales by Standing volume	379,745	1.9
7	Protected areas	3,785,653	19.3
	Total estimated	19,631,000	100

Data sources: Ministry of Forest and Wildlife (2007), CARPE (2005), * *de jure* timber concession

General strengths and weaknesses of these articles of the 1994 forest policies as they relate to community access to forests are discussed in works like Ekoko (1998) and Egbe (1997). These laws, which ushered in the 'Community Forest' politic, can be considered more or less, to be one of the most important post independence policy actions in relation to improving the legality of, local access rights to forest resources, always a burning issue since independence (Oyono 2004, Bigombe 2003). The laws re-enforce common knowledge that the state is the principal owner of all forest domains (Barume 2004; Diaw and Njomkap 1998). It also sets a legal precedent, for communities to exercise traditional control over forest resource use and by implication re-kindling notions of traditional ownership (Bigombe 1996; Bomba 2004). With the authority largely in favor of the State 'Community Forestry' quickly became a cross-roads of policies; put in place by the State on the one hand, and legitimate community aspirations on the other, impacting diverse use of forest products, especially in the area of NTFPs managements.

However, under the current 1994 forestry and wildlife laws, communities wishing to manage forests legally are restricted under agreement to a maximum of 5000 hectares of forests. This often differs in scope and type of activities with their customary sphere of influence. The State retains the right to break that agreement and reduce community freedoms in the use of the forest, if it feels that prevailing management practices are unsustainable or disorderly (Oyono, 2004). Thus the domain of tenure, access and control of diverse forest products appear to be a major area of weakness conspiring to undermine the original policy intents of local empowerment and benefits sharing with communities.

3.1.1.3.3 TENURE AS BARRIER TO BENEFITS SHARING FROM FORESTS

Under the current forest tenure polices, all permanent forests are the property of the State, therefore collection of diverse products like NTFPs from them is technically, 'trespassing' and can be punishable should the State wish to press charges. This is partly so because, most rural forest zone communities do not own titles to customary lands (van den Berg and Biesbrock, 2000). There are also important contradictions between the substantive content

of laws enabling diverse use of forest products by different forest-dependent groups; each according to its relationship with the resource and each according to need; in a bid to promote equitable sharing of benefits from forests.

The stipulations by the 1994 forest and wildlife laws regarding access and use of Permanent and Non Permanent forest Estates (NPFE) in Cameroon does not favor local communities. According to the official texts, the PFE is designated to remain forested in the long-term and includes State forest, Production forest (for timber extraction), protected areas, forest reserves, and Council forest. The NPFE includes Communal forest (mostly managed according to local "traditional" rules), community forests (leased to community organizations under agreement), and privately owned forests. Within the PFE, shifting cultivation is forbidden, and the use of all forest resources is restricted. The NPFE is land that may be converted to non-forest uses, and so it is in this category that all agricultural activities must take place. Within this category, communities can apply for community forests of up to 5,000 ha, under 25 year leases, to be reviewed every 5 years. Communities can exploit these forests for timber extraction or other purposes, on the basis of a management plan. Hunting territories, of up to 5000 ha, can also be established within the NPFE

For communities living near permanent forests estates much of the NTFPs they need for food, medicine and income are derived from these State forests. This reality is underlined both by the continued physical relationship between village community settlements and forest estates as well as continued market potential for these products, necessitating even urban communities to periodically enter forests to collect NTFPS. Table 3 is a summary of the actual number of villages inside or on the border of different permanent and managed forest blocks (WRI/GFW/MINEF Electronic Atlas of Cameroon, 2007); and therefore maintaining an existential, legitimate, if sometimes illegal relationship with the forest products therein.

Table 3: Resident communities in forest blocks in Cameroon

	Forested Land Use Category	Number of village communities on or within forest block borders
	PFE	
1	Council forests	11
2	Protected areas	99
4	Forest reserves	84
5	Forest Management Units	72
	NPFE	
6	Sales by Standing volume	68
7	Community forests	93
	Total	**161**

Source: Mbile et al. 2009b

In addition to these, more than 2000 villages have been mapped (Mbile et al, 2009a) to be within four (4) km of permanent forest estates, thereby not only using products like NTFPs from them on a regular basis, but co-existing in a permanent state of conflict of interests with the State. Despite this the realities or *de facto* ownership, access, use and trade with respect to NTFPs and other resources occurring in the PFE or NPFE, are represented in Table 4.

Table 4: Property rights uncertainties in different forest blocks in Cameroon

Forest Zone	Ownership		Access/Use Rights		Trade Rights	
	State	Cty/IN	State	Cty/IN	State	Cty/IN
PFE:						
Council forests	YES	NO	YES	YES	YES	YES/NO
Forest reserves	YES	NO	YES	NO	NO	NO
Forest Management Units	YES	NO	YES	YES	YES	NO
Sales by Standing volume	YES	YES	YES	YES	YES	NO
Protected areas	YES	NO	YES	YES	YES	NO
NPFE						
Community forests	YES	NO	YES	YES	YES	YES/NO
Private forests	NO	YES	YES	YES	NO	YES

C'ty/IN = Communities and Individuals

Source: Source: Mbile et al. 2009b

Table 4 shows variations between the 'letter' of the law (Statement Box 1) and 'realities' in the field whereby there is continued exercise of local level legitimacy in access to forests to collect NTFPs and other products largely due to physical relationship, social and cultural peculiarities of communities; whereas by the letter of the law such activities are not legal.

These discrepancies between legitimacy and legality in the use of especially NTFPs means that there is simultaneous ineffectiveness in forestry law enforcement governance as well as lack of understanding by policy processes of the realities in forest resources use; especially of NTFPs with which some local communities have had existential relationships for centuries.

2.1.2 VALUATION OF FOREST BIODIVERSITY; CONCEPTS, PRACTICES AND CONTROVERSIES

2.1.2.1 INTRINSIC VALUATION OF BIODIVERSITY

Supporting works on the intrinsic values of conserving forest biodiversity have considered philosophers of environmental ethics like Van De Veer and Pierce (1994), Desjardins (1999) and others who propose strengthening the case for forest biodiversity conservation for more intrinsic and or altruistic reasons. It should be noted that proponents of intrinsic use of biodiversity belong to the school of thought with proofound understanding of why biodiversity should be conserved. Therefore, such views would be applicable when using Contingent Valuation Methods to evaluate nonmarket conditions.

As illustration works by Krustilla and Fisher (1975) even seek to decouple the utilitarian values of biodiversity conservation with responsibility for their conservation. Such works further strengthen the supposition that 'use-based' CVM may not be appropriate for pro-active conservation policy development processes. These arguments consider the need to prevent environmental damage and consider free market approaches to conserving biodiversity to constitute fundamental weaknesses in CVM methods and refer to them as

"misconceptions" that should be addressed through alternative policy mechanisms. Critiques of the CVM approach argue for the need to confront such concepts through pro-active and evidence-based policy development. This position is further supported by Beder (1996), who like Cairns and Dickson (1995) advocate methods that seek avoidance of ecological damage in the first place.

2.1.2.2 UTILITARIAN CONCEPTS OF VALUING BIODIVERSITY

Scholars who argue for intrinsic valuation of biodiversity are opposed by other who seek more utilitarian values of biodiversity, such as McConnell (1983) and Freeman, (2003). This school of thought seeks justifications for the monetization of biodiversity under purely market-driven circumstances. Despite their utilitarian orientation, this group still remains skeptical of the application of study approaches such as the classical CVM. Proponents of conserving biodiversity for its intrinsic values would readily support fiscal policy processes to reward the action. Irrespective of whether such benefits where shown to be equitably distributed at local levels, those arguing for proof of utilitarian values of biodiversity (such as McConnell, 1983 and Freeman, 1993) may be more inclined to seek proof of local economic and social benefits, especially if there is insufficient proof that the market is deriving any direct profits.

Hanemann and Kanninen, (1998) also argue for utilitarian values of biodiversity. They however, focus on analyses of discretely expressed monetary amounts to reward biodiversity conservation; Ajewole, (2000), Popoola and Ajewole, (2002), Dixon et al., (1994), Cooksey and Howard, (1995), Portney, (1994) and Carson, (1998) who similarly argue for aspects of utilitarian values of ecosystem services conservation. Utilitarian proponents are neither ignorant nor opposed to biodiversity conservation for its sake. They tend to be strong proponents of the "polluter pays principle"; thus would subscribe to the rational argument of shifting responsibility for biodiversity conservation to those who benefit the most from its services or whose actions most lead to its depletion.

2.1.2.3 VALUING BIODIVERSITY THROUGH INCENTIVE MECHANISMS

By their arguments, proponents of intrinsic valuation of biodiversity, support incentive mechanisms to conserve forest ecosystem services. Good examples include Stirlings (1999) and Sandin (1999) who hold consensus on the 'Precautionary principle'. This point of view, considers biodiversity worth conserving, not based on utilitarian values or necessarily known intrinsic values, but instead, based on respect for scientific uncertainty. This group recognizes that a mitigation tax may be justified, mainly because there is likelihood that, there may be other products and services not yet characterized; or that, dire consequences to unsustainable use may exist which are not yet evaluated.

Proponents of incentive systems to conserve biodiversity are precautionary and are most likely to support policy mechanisms that buy time for biodiversity to become useful. This may include mechanisms that establish linkages with non destructive uses of forests. Support for forest biodiversity conservation is also a precaution against incurring catastrophic ecological harm. Knowledge of how such biodiversity is used, or benefits, shared at local level, such as by resource poor communities, may be of much less importance. Ironically however, proponents of more utilitarian approaches to valuing biodiversity may seem capitalistic and therefore less psychologically disposed to conserving biodiversity for its sake. This group may also agree more with the rational choice theory, requiring proof of individual utility as precursor to providing support for biodiversity conservation.

2.1.2.4 UTILITARIAN VERSUS INTRINSIC PERCEPTIONS OF VALUING BIODIVERSITY.

Classical economists (Smith, Malthus, and Ricardo) have positively linked natural resources constraints to economic growth. Over many decades, environmental and ecological economists had recognized natural resources from tropical forests as ultimately important to national economic growth and eventually to human well-being (Daly, 1968, Page, 1977,

Randall 1987, Pearce and Turner, 1989). More specifically, Costanza (1991) and Young (1992) have proposed that, by focusing on specific policies and instruments which address the essential changes in societal attitudes and behaviors towards renewable resources, broad enough consensus can be reached to ensure that change is sustained and ecological systems such as forests can function optimally.

Different parts of these proposals have been supported by other scholars and in other works (Cropper and Oates 1990; Perrings 1991, Costanza and Daly 1992, Costanza and Cornwell 1992, Young 1992). The underlying arguments here represent what Rawls (1987) termed an "overlapping consensus." According to Rawls, a consensus that is affirmed by opposing theoretical, religious, philosophical, and moral doctrines is most likely to be fair and just, and is also most likely to be resilient and to survive over time. This overlapping consensus refers to the goal of sustainable development, the form of economic development that maintains the ecological processes and functions that underpin it, with benefits for today's and tomorrow's generations (WCED 1987; Young 1992; Agenda 21 1992).

Applied to forest biodiversity Pagiola et al, (2004) argues for both a healthy respect of scientific uncertainty about limits in our knowledge of the value of forest biodiversity; as well as presenting such natural ecosystems as the very basis of economic and social development. To strengthen this proposition for economic and social sustenance Costanza (1997), in his suggestion on how to make Rawl's (1987) "overlapping consensus" into a reality advocates three policy actions: (i) A natural capital depletion tax to assure that resource inputs from the environment to the economy are sustainable (Costanza and Daly 1992), yet giving strong incentives to develop new technologies and processes to minimize impacts; (ii) a precautionary polluter pays principle (4Ps) to assure that the full costs of outputs from the economy to the environment are charged to the polluter in a way that adequately deals with the huge uncertainty about the impacts of pollution, depletion and degradation and to encourage technological innovation (Costanza and Cornwell 1992), and (iii) a system of ecological tariffs (short of difficult-to-negotiate-and-enforce global agreements) to allow countries to implement the first two proposals without putting

themselves at undue disadvantage relative to countries that do not. In this way both intrinsic and utilitarian values of renewable natural resources like forest biodiversity are considered. Such balanced perspectives for valuing natural resources remain optimal. Yet, there are similarly worthy, though less holistic examples of valuing natural resources such as forests, that need to be considered in the conservation policy – forest resources development discourse.

2.1.2.5 CONTROVERSIES WITH CLASSICAL METHODS OF VALUING BIODIVERSITY

Still, in some of these collections of works considerable bodies of controversy existing in the use of valuation methods such as the CVM can be observed. Much of these controversies lie with the underlying assumptions of linearity in some CVM regressions. In some of the arguments, the controversies arise over what kinds of consumers are considered appropriate to CVMs. Instances of criticism of CVM are observed in Popoola and Ajewole, (2002) in their work on valuing forest services around Ibadan, Nigeria. Particularly strong skepticisms have also been observed by Diamond and Hausman, (1994). The latter remain unconvinced that promises made in applications of classical CVMs can be upheld if demand circumstances change in the real market place. In view of such challenges and limitations of CVM, Carson, (1998), argues for proactive and coercive policy processes, rather than 'passive' free market behavior, may be a plausible course of action to ensure public commitments to methods of forest use which conserve forest ecosystem services.

In summary therefore, the approach of three taxes linked to the precautionary principle to environmental conservation, proposed by Pagiola et al, (2004) would seem like a good compromise. It may be assumed that both believers in the intrinsic value of biodiversity conservation and or proponents of utilitarian, even market-driven approaches to supporting biodiversity (e.g., through NTFPs valorization) may conditionally, be willing to support a reward system for non destructive forest use, through taxation. While the intrinsic group

may be susceptible to ecological conditions, the utilitarian ones may tilt towards social and economic incentives.

There are possibilities for consensus on the ecological economics side. Work on conservational values of NTFPs poses different challenges of a different nature, often at national level.

2.2.2 NON TIMBER FOREST PRODUCTS DEVELOPMENT IN THE CONTEXT OF NATIONAL FOREST POLICY; AN OVERVIEW

2.2.2.1 STATE OF DEVELOPMENT OF THE NTFPs SECTOR

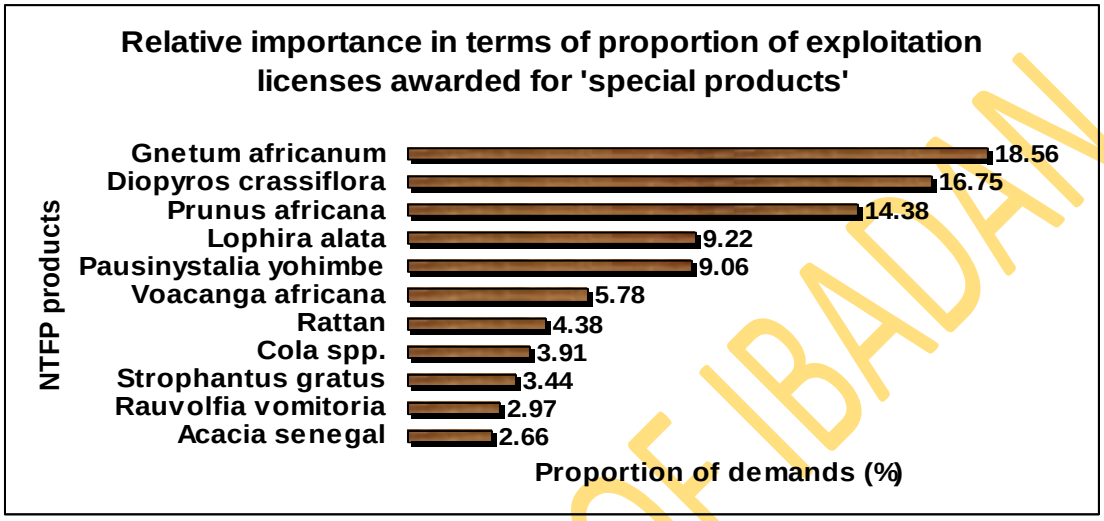
It is estimated that there are 8500 plant species in Cameroon, 3000 of them with reported uses (Vivien et Faure 1985).

Different methods have been used in studying these plants with most of the works remaining unpublished and therefore not available to an international audience. About 181 species are reported to have been fully classified and distributed within 139 genera. Fifty-two of the families have been reported, being sold in local markets of Cameroon (Betti, 2002).

There are three groups of Non-Timber Forest Products (NTFPs) considered 'special products' and classified by the Cameroon forestry administration. These comprise of; (i) 'Minor products' with exploitation titles allocated on a case-by-case basis; (ii) products of 'special interest' whose exploitation is based on recommendations from commissions set-up on an ad-hoc basis, and (iii) threatened species whose exploitation requires the intervention of the [4]CITES . Figure 1 depicts the relative importance of all groups of NTFPs ('special products') for which official (formal) exploitation licenses where requested between 2004 and 2007.

[4] International Convention on the Protection of Endangered Species

Figure 1: Relative importance of NTFPs traded in the formal sector in Cameroon



Source: Ministry of Forest and Environment, Department of Statistics, 2007.

The formal exploitation procedures require that the 'operator' or 'exploiter' possesses the following documentation:

- An agreement authorizing the 'exploiter' to operate in the NTFPs sector
- A title recognizing the operator as operating within the sector
- An authorization to transport the products around the country
- A certificate authorizing the exploiter to export the product

During the 2004 – 2007 'open seasons' for NTFPs exploitation, 59 active agreements were recorded and 143 titles or exploitation permits. 28 'special products' were exploited with approximately 7 showing evidence of having been exploited in successive years from Cameroon (Mbile et al., 2009b).

Despite such evidence of organization, the trade sector in NTFPs remains fragmented with statistics differing, depending on which source one uses. In order to get a near complete picture of the sector, it is desirable to use a variety of sources of information despites likelihood of wide variations in their statistics Consistent statistics on production at country level are not only difficult to come by but tend generally to be out of date with numerous gaps; both spatial and temporal. Much of available NTFPs data are overlapping and repetitive. Much of the data available in Government Ministries have been collated from irregular records from trans-frontier forestry border posts, mainly with Nigeria to the west, and with Gabon, Congo and Equatorial Guinea to the south and with the Republic of Central Africa to the east.

These problems with statistics are largely due to the non-formal nature of this sector. Thus until a sustained network of producers and marketers is identified backed by 'farm-gate' data collection and synthesis credible statistics on NTFPs will remain difficult to acquire.

Table 5

is a depiction of the limited nature of NTFPs statistics for some major products traded nationally and regionally from Cameroon. Such data is generally compiled by the Ministry of Forests and Wildlife, and which can be used to complement the information in Figure 1.

Table 5: Exports of NTFP from Douala, Yaoundé and Idenau ports of exit, Cameroon, to regional and international destinations (2004)

Products	Volumes exported (tons)	Principal destinations
Gnetum africanum	3000	Nigeria
Pausinystalia yohimbe	440	China, India, France, Belgium, USA
Cola spp.	410	Nigeria
Rattan	45	Belgium
Irvingia spp.	51	France, Belgium, Nigeria
Chlorophora excelsa (Ebony)	2500	USA, Costa Rica, France, Germany
Prunus africana	1080	France, Spain, Madagascar, Morocco, USA
Voacanga	770	France
Rauvolfia	455	France
Karite	20	France

Source: Ministry of Forests and Wildlife, Department of Statistics, Cameroon, 2007

To underline the incompleteness of the national statistics even in Cameroon, products like Gum Arabic (*Acacia Senegal*) covered in Figure 1 and with a current national production level of between 1000 and 1,500 tons per year (Betti, 2002) does not appear on the National Statistics Table (Table 5).

Much more information is found at sub national levels that may be available in the Ministry. A major NTFP like *Dacryodes edulis* (African plum), very widely consumed in Cameroon is entirely absent from Government statistics. Despite available records (Ndoye et al., 1998, Tabuna, 1999) suggesting upwards of 650 tons of this species being exported annually from Cameroon to Nigeria, Gabon and the Republic of Congo, for lack of official interest, little or none of these are recorded in official Ministry Statistics.

The entry into the Cameroon forest products market of countries like China and India may mean increases in exported volumes of timber to those countries. Also, opportunities and threats abound, as new uses are found for previously 'locally exploited species. Three key NTFP resource species, namely *Baillonella toxisperma (Moabi), Irvingia spp. (Andok) and Ricinodendron heudelotii (Essessang)* continue to be useful at local level but have not until recently (coinciding roughly with the interest of China in the forestry sector) occurred on the official list of species extracted by concession managers.

Table 6 are official forest extraction statistics (MINEF/DF 2005, 2006, 2007) for 2005, 2006 and 2007 showing the three traditional NTFP resource species appearing on the 'extraction' list by concessionaires and other licensed exploiters ([5]FMUs, [6]Licenses, [7]*ventes de coupes*)

[5] Forest Management Units
[66] Forestry Licenses for timber exploitation
[7] Sales of timber by standing volume

Table 6: Traditional and non-traditional Species of Timber and Non-timber value extracted

Commercial Names	Species	Total Volume Extracted (m3) by Year		
	code	2005	2006	2007
Baillonella toxisperma (Moabi)	1121	25,182	18,700	9,114
Irvingia spp. (Andok)	1312	12	9	8
Ricinodendron heudelotii (Essessang).	1449	3152	73	130

Source: Ministry of Forests and Wildlife, Directorate of Forestry, Cameroon, 2008

For *Irvingia spp. (Andok)* and *Ricinodendron heudelotii (Essessang)*, this represents an almost insignificant quantity considering their natural abundance. As this represent both opportunities for revenue and threats to local usages further investigation is required in this sector.

2.2.2.2 SOCIO-CULTURAL ARGUMENTS FOR MICRO-LEVEL NTFPs DEVELOPMENT

In view of the generalized nature of NTFPs data at the macro level it is unlikely that a good understanding of use dynamics can be acquired at that level. A central element in sustainable development of NTFPs therefore should be about understanding of socio-ecological, cultural relationships between local people and their use of NTFPs. Through such analyses, not only will proposals for NTFPs development be more realistic, but emergent policies are likely to resonate with both local socio-economic opportunities and problems; conservation of biodiversity of NTFPs resource species, and therefore command greater legitimacy, especially in this sector notorious for statutory-customary conflicts. To support these arguments, Ingram and Bongers, (2009), Sunderland et al., (1998), Ros-Tonen and Wiersum, (2003) have later attributed the various extents of stagnation in NTFPs development on the failure of classical approaches to their development, that include assessment methods of NTFPs that do little to highlight the existentialist relationships between communities and NTFPs. Here, the criticisms have focused on the superficiality in understanding of NTFPs use based on these methods of assessment and analyses. Of particular importance in promoting such superficial analyses have been the coarse or often macro-level analyses unable to bring out the true depth and value of human-NTFPs relationships, critical in linking livelihoods and forest conservation on which NTFPs supply ultimately depends.

The conservation-livelihoods linkage in NTFPs development has been especially taken-up by Perez et al., (1999), Belcher et al., (2001), Schreckenberg et al., (2002), Ros-Tonen and Wiersum, (2003), Ruiz-Perez et al., (2004), and Musters et al., (2006). Arguments here

emphasize disconnects, between NTFPs development and the 'exclusivists' approach to forest biodiversity conservation. Exclusivists argue that, NTFPs development has the potential of taking-off or reducing exploitation pressure on forests and therefore assists forest conservation. These neo-exclusivist thinkers however argue that, it is *not* the use of NTFPs per se that has the potential of aiding forest conservation, but that, it is the manner in which NTFPs are assessed and used, based on micro-level understanding of the underlying social and ecological dynamics, that has the potential of enhancing forest conservation. They argue therefore that, only policies that are informed by such analyses can both lead to NTFPs development and to the associated forest conservation.

2.2.2.2.1 LIMITATIONS IN CLASSICAL METHODS FOR ASSESSING NTFPs

In descriptions of some notable NTFP assessment works carried out in Cameroon, e.g. Sunderland et al., (2003), LBZG (2002), both modeled along previous works (such as by Sunderland and Tchouto, 1999) important departures from Wong's (2000) comments are worthy of note. Both these examples are transect-based assessments, more along the lines of extractive timber products assessments, and less of the socio-sensitive type involving local people as advised by Wong (2000). In these examples, and many others in use around Cameroon and in the Congo Basin, local people are used mainly as guides and laborers, not as actors, or co-owners of the process. Thus, there is little, if any local input and minimal long-term empowerment, as objectives are neither geared to non-extractive conservational use of forest resources nor towards community empowerment for later use.

Finally, the incorporation of social, cultural and technical arguments in NTFP assessment, such as in C-BSAMS (Mbile, 2006) have been further supported by consensus processes such as reported in the proceedings of the World Forestry Congress, (1998), by Dorp et al., 1998 and Brown, (1999) in their assessment of the contributions of NTFPs to livelihoods; on why NTFP assessments must have community relevance. These works argue for an NTFP development process based on the conservational use of forests, and supported by

policy which goes beyond the examination of NTFPS as an extractible resource but one that is used to both promote forest conservation and social empowerment.

2.2.2.2.2 CASE FOR AN ALTENATIVE PPROACH TO NTFPs ASSESSMENTS

Within and outside Cameroon, few reviews of the current state of use-based assessment of NTFPs in terms of difficulties and research needs can equal the exhaustive work published by Wong (2000). Wong's work was the product of a workshop organized by the European Tropical Forest Research Network in the spring of 2000, to review the biometric quality of use-based assessment of NTFP. The presentations reveal that despite the focus on more 'scientific' approaches as opposed to 'local knowledge-based' ones there was a disturbing lack of statistical rigor in many studies already carried out. Wong (2000) reviewed close to 400 references of which 97 described quantitative assessments. Of these, only 38.0% were considered to have used biometrically sound methods. The review observed that, traditional forest inventory methods cannot be easily adapted to NTFPs. To do so would require separately researched and adapted sampling designs, mensuration and monitoring techniques, including theoretical models, if sustainability issues are to be adequately addressed. The review also stressed the need for novel sampling designs and cross-disciplinary efforts. Wong (2000) stressed the need for extensive use of local technical knowledge and an emphasis on the empowerment of local resource users. The review thereafter to made some recommendations amongst which is the need to always consider sound assessment of NTFPs populations and use dynamics when considering utilitarian value of these resources. In addition, a message in Wong's (2000) analyses for field workers is that, in determination of stocks and harvest levels, simple and easy to use methods as opposed to focus on statistical designs should be preferred.

Similarly, Walker et al (1999) observed that local ecological knowledge has been shown to provide important insights into sustainable harvesting practices and there is a need to evaluate and use this type of information. Methods therefore need to be identified and

developed to better represent local knowledge so they can be systematically compared with, and linked to scientific knowledge.

In dealing with the multiplicity of life forms always encountered in NTFP assessments, Wong (2000) proposes that it may be more efficient to provide advice based on local indigenous knowledge and in a form that assists the practitioner to design case-by-case protocols that fit the peculiarities of particular NTFP resource species, product, local capacity, objectives and even the land use mosaic as they may occur in the field.

2.2.2.3 RELEVANCE OF MICRO-LEVEL ANALYSES OF NTFPs DYNAMCS, TO MACRO-LEVEL POLICY DEVELOPMENT

It is important to capitalizing both the existential and socially differentiated relationship between forest communities and non destructive forest use. These include technical packages built on community knowledge, their local application constraints as well as aspirations for benefits. When these practices and knowledge systems are linked to diverse use of forests, they generally serve as basis for crafting sound forest management and conservational policies. Issues of forest governance, institutional reform and forest services remain important at national and global levels. Despite this, local community empowerment and up-take of the reform processes remains a key to effective translation of forest policies to national economic growth. It is hypothesized that, the most effective way to achieve such a marriage of local realities with forest policy development, is to develop understanding of these realities through micro-level empirical research and to negotiate mechanisms by which such knowledge can form the basis of new forest management policies. Substantial bodies of work have been carried-out to support these positions.

According to Gunderson (1999), incorporating technical packages in local level social and economic realities helps develop the management process. They help frame the philosophical, methodological and practical challenges associated with on-going use and 'management' of forest resources. This can add value to forest policy reform processes. When this happens Gunderson (1999) argues, the management premise then becomes policy

experiments within the specific local, socio-cultural and economic context, from which all stakeholders are expected to learn.

Similarly, Paludosi et al, (1999), argues that, sustainable management of forests depends on, recognition by local populations of the relationship between conserving genetic diversity while ensuring fullest use, then developing techniques for scientific and sustained management.

Abbot et al., 2000, Hackel 1999, Wild and Mutebi 1996, argue that, communities are more likely to meet goals for which forestry policies are intended if understanding of local needs re-enforcement technical partnerships, collaborative approaches and capacity development in forest management methods. According to them, it is only under such conditions of mutual benefits and informed partnership that, the hypothesis that, community-based forest management can increase equity, enhance resource sustainability and empower communities technically and materially, can be fully tested.

Where there have been observed incompatibilities and conflicts between communities and implementation of forest policies, it has been realized that, these are often the result of the absence of a system of valorization of local knowledge; a lack of integration of local practices, and lack of solving common forest management problems.

One way to link understanding of local level forest use to national forest policy can therefore be, through robust analyses of local level use of NTFPs.

There is a predominance of diversified uses of forests in almost every discourse on valuing forests through sustainable management. These discourses are founded on the interconnection between forest and different aspects of livelihoods. On this basis management of Non Timber Forest Products (NTFPs), comprising forest resources other than wood; i.e., raisins, fruits, nuts, bark, medicines, fodder, food, stimulants, dyes, spices, sweeteners, etc remains the one area of forest management which can bring together these different aspects. If this can benefit from direct links with targeted policy development, NTFPs development can include other forms of forest management like tourism, carbon

trading, etc. This premise is especially relevant today, due to the broadening importance of non destructive uses of forests. Over the past decade NTFPs existing in west and central Africa's forests have been documented regarding the roles they play as food, medicine and in terms of other services they provide to indigenous peoples (Okafor 1991, Falconer 1990, Leakey and Newton 1994). Their exploitation, use and commercialization constitute important livelihoods activities of people living in permanent and non permanent forests in Cameroon (Ndoye et al, 1998). For some of the species, such as *Ricinodendron heudelotii, Irvingia gabonensis, Baillonella toxisperma, Prunus africana, Dacryodes edulis, Pentaclethra macrophylla, Gnetum africanum, Piper guinensis, Pausinystalia yohimbe, Cola spp*., to name these few, existing markets have expanded within and outside their wide ecological range (Cunningham et al, 1997, Tabuna 1999).

In addition, great potentials for their further development at industrial level exists (Leakey 1999). Market expansion for these products would increase the value and benefits of forest to forest dependent communities (Peter et al, 1989). Nevertheless, growing poverty and insufficiently developed technical packages, lack of investments in products development and policy support for the sector have all conspired to hinder their full development.

In view of these direct marketing challenges facing NTFPs various linked strategies have been used to leverage the opportunities provided by NTFPs. Leakey and Newton (1994), Sanchez and Leakey (1997) have presented NTFPs development as one of the most viable approaches that reconcile both improvement in welfare of local populations, and forest conservation by increasing aggregate non destructive supply of forest products to markets. Similarly, a number of scientists are offering new strategies that promote use of NTFPs as a means of improving local livelihoods while conserving important plant species and ensuring essential environmental functions. Brossius and Russell (2003) propose to "reinvent" community-based conservation by suggesting the principle of "building natural, social and economic assets across generations". Leakey and Tchoundjeu (2001) have made progress in concepts and practices of domestication and marketing of NTFPs in the humid tropics of West and Central Africa. Schroth et al, (2004) recently authored a synthesis of the benefits

that NTFPs management can offer biodiversity conservation in tropical landscapes. By emphasizing composite conservation-through-use programs including ex-situ domestication of NTFP resource species, they identified three hypotheses on how NTFPs management can contribute to conservation:

(i) that, non destructive use of forests through NTFPs promotion can protect nature by reducing pressure to deforest land,

(ii) promoting NTFPs development and perpetuating forests and woodlands as habitat for native plant and animal species, and

(iii) careful and integrated ex-situ development of NTFPs resource species to serve as a benign matrix land use for fragmented landscapes. However, they all agree that, integrating and promoting use of diverse NTFPs and resource species as part of conservation remains a major policy, institutional and technical challenge.

Unfortunately, the aggregate market value of NTFPs as a distinct forest products and fiscal revenue source for the State has been proven insufficient to ensure adequate policy and institutional support for NTFPs.

In summary, therefore, to contribute towards addressing this policy and institutional challenge requires both empirical investigations of quantitative and qualitative of NTFPs. Such analyses should then facilitate incorporation of the knowledge into effective, targeted policies.

Secondly, to ensure that effective linkages exist between these aspects of NTFPs and policies, it is reasonable that the forest policy development process directly impact NTFPs development by influencing supply, valorization of knowledge, access and benefits sharing, amongst its main user groups. However, NTFPs supply depends almost entirely on forest conservation. Iterative and deliberative public support for such forest conservation policies in the long-term would depend on continued evidence of good governance, especially at local level, in managing forests and NTFPs. Therefore to effectively establish a NTFPs development – policy linkage may require *a priori*, evaluation of basic public awareness of

forest conservation, the public's willingness to support forest conservation in innovative ways, thereby perpetuating NTFPs, and analyses of the conditions under which such support can be secured, sustained and quantified.

2.2 CONCEPTUAL FRAMEWORKS

2.2.1 THE COMMUNITY-BASED STOCKS ASSESSEMENT AND MONITORING SYSTEM (C-BSAMS): A GUIDE TO NTFP ANALYSES AT MICRO-LEVEL.

This concept draws from work on NTFPs above, but especially from the conclusions by Wong (2000) in her analyses of the biometric rigor of NTFPS assessments.

A thesis focused on strengthening forest conserving policy at macro level to create livelihoods impact at micro level requires a method of forest resourcees assessment that makes no assumptions of destructive uses. Thus, the Community-based Stocks Assessments and Monitoring System, C-BSAMS (Mbile et al, 2006) developed and employed during this research is presented here as a "proof-of-concept".

The C-BSAMS (Mbile et al., 2006) is a progressive methodology that seeks to achieve total and continuous monitoring of NTFPs resource species and 'effective quantification' of marketable products from community spheres of forests under a common property regime. As a combination of classical methods of prospecting for forest resources and social characterization of the NTFPs user group, the C-BSAMS (Mbile et al, 2006) does not make any assumptions on the distribution or density of NTFP resource species. In the application of C-BSAMS (Mbile et al, 2006), after participatory spatial analyses (mapping) to ascertain physical incidence and distribution of NTFPs, C-BSAMS (Mbile et al, 2006) immediately assumes a more social character and differs markedly from other (particularly *in situ*) attempts to assess stocks of NTFPs.

C-BSAMS (Mbile et al, 2006) is a purely community-based NTFP assessment methodology designed to link closely to other socio-economic constraints like culture, labor, technology

and especially the local market circumstances. Therefore, C-BSAMS (Mbile et al, 2006) works by bringing out the complicated processes and considerations involved in using and managing NTFPs.

Studies on *Baillonella toxisperma* report production once in three years and *Irvingia spp.*, once every two years (Mpeck, 2006; Plenderleith and Brown, 2004). Only *Ricinodendron heudelotii* has been reported in most areas to produce abundantly year-in, year-out, in the Guinea-Congolian lowland forests of Cameroon where they are naturally distributed (ICRAF Report, 2006). Therefore, the application of the C-BSAMS (Mbile et al, 2006) concept builds its database on NTFP availability (supply potential) by seeking to normalize these irregularities in the production physiology of NTFPs resources species. The approach starts with tree spotters (using binoculars and Global Positioning Systems) who continuously ascertain each year that, particular trees whose histories are known locally, have flowered, are still carrying flowers despite rains and wind, and have borne fruit, they can attempt to forecast production and or enter into supply negotiations to meet buyers' needs.

Secondly, NTFPs are collected from open access sources and sometimes under permission from Licensed Concession 'owners'. These means that for each village-based Community-Forest Management Committee, populations compete with neighboring villagers and with animals for products and thus not all the 'production' will ever reach the village depots. Consequently, actual production figures for NTFP resource species; year by year, as a direct result of these ecological, forest tenure and anthropogenic constraints can only be assessed by measuring products that actually reach the village depots, and not estimates from what different trees can produce while in the forest.

Mathematically, what this means is that, the potential production of a forest area can be Q_0. But due to factors like accessibility problems (including perceptions of customary tenure), labor shortages in the village, fluctuating opportunistic market demand for NTFPs, off-takes by animals, cultural factors, the actual quantity of NTFPs collected and processed within the

village would be $Q_1 - Q_0$. = Q; *where* Q_1 is the 'actual' quantity available to buyers in villages as a result of these mitigating ecological, social and economic factors. And thus Q becomes the real quantity marketable by the community. Once at village level both the Gross Forecasted Revenues (GFR) and Gross Discounted Revenues (GDR) can be computed using [8]standard equations;

$$GFR = Q * P * (1 + pricegrowth)^{n} \text{ ---------- (equation 1)}$$

$$GDR = \frac{GFR}{(1+discount\ \ rate)^{n}} \text{ ---------- (equation 2)}$$

Where Q is quantity, P is price/unit of Q at discount rate = [9]13.0%; *price grow*th = [10]4.0% and *n* = number of years over which the projection is being made.

By working these factors into the methodology, predictive assessments according to the C-BSAMS (Mbile et al, 2006) methodology become increasingly accurate with time and are always based on retrospective data, i.e., on the aggregation and time-averaging of the previous seasons' harvests. Thus all NTFP resource species are monitored initially at the beginning of each 'production season'. Only products that are recorded at the village depot are actually computed as part of production for that season, and eventually entered into the community revenue stream. C-BSAMS (Mbile et al, 2006), therefore does not account for products left behind in the bush, or eaten by animals or collected by neighboring communities. It is therefore not a method of choice when attempting to quantify 'production potential' as would be the case with a timber inventory. This apparent constraint in C-BSAMS (Mbile et al, 2006) should be viewed as a part of its realism because meaningful financial estimates and projections should be based on actual measures of NTFPs actually capable of entering the local markets. Such production levels are also based on the real

[8] These equations are fairly standard compounding and discounting computations used for calculating GFR and GDR. They can be found in most micro-economics textbooks. I was trained in their use by experts of the Conservation Strategy Fund Stanford University, in 2005. www.conservation-strategy.org
[9] African Development Interest rate as at 2008
[10] Rate of Inflation in Cameroon in 2008

social and ecological dynamics of the production system and not on speculation as is common practice in non renewable or extractive resources sector.

2.2.2 THE RANDOM UTILITY MAXIMIZATION MODEL TO EVALUATE PERCEPTIONS OF CONSERVATION POLICY SUPPORT AT MACRO LEVEL.

The conceptual framework sets out to guide deductions from respondents' expressed preferences. The deductions seek to interpret the underlying conditions for willingness to participate in an incentive mechanism to support forest conservation. By understanding the conditions for willingness, effective policy recommendations can be made for sustainable financing, to support NTFPs development. The framework is based on two linked theories; the rational choice theory (RCT) as discussed by Becker (1976), Radnitzky and Bernholz (1987), Hogarth and Reder (1987), Swedberg (1990), and Green and Shapiro (1996), and random utility maximization (RUM) concept of Hanemann and Kanninen (1998).

The rational choice theory attempts to explain all (conforming and deviant) social phenomena in terms of how self-interested individuals make choices under the influence of their preferences. It treats social exchange as similar to economic exchange where all parties try to maximize their advantage or gain, and to minimize their disadvantage or loss. RCT's basic premises are that; (i) human beings base their behavior on rational calculations, (ii) they act with rationality when making choices, and (iii) their choices are aimed at optimization of their pleasure, profit or utility. Rational choice theories therefore, represent preferences with a strong, yet perceived utility function.

In a context like Cameroon there is likely to be high levels of diversity in perceptions of respondents, vis-à-vis the complication of financially supporting forest conservation to raise, manage funds and support NTFPs. This is not a straight forward process of personal gain. Therefore, it is unlikely that a simple linear relationship will exist that can be fully interpreted into macro policies and micro level actions, using the RCT alone. Another concept, to compound subsequent interpretations, especially of more random elements in respondent's preferences is thus needed.

This second option to help examine dispersed and random behavior is the perspective of Hanemann and Kanninen (1998). Within this economic perspective it is assumed that, respondents are confronted with the possibility of securing a change in personal, hypothetical 'utility', from say

- $Q,^{1}$ *to* $Q^{1} > Q^{0}$

Where 'Utility' $Q,^{1}$ can represent perceived (indirect) ecosystem services benefits from forest good conservation policies, good local governance in forest management and knowledge of benefits sharing by local populations through valuing biodiversity (developing NTFPs), as proposed in this research.

The respondents thus regard 'forest conservation', as constituting a 'utility' function for which they would be willing to participate in an incentive mechanism (such as accepting taxation). According to the Hanemann and Kanninen concept, a condition;

- $V(P,Q^{1},Y,S,E) \geq V(P,Q^{0},Y,S,E)$

would exist, where *V*, is the discrete 'Utility' value of knowing that 'conservation' (as a distinct function) will increase; *P*, is the market price of the selected good or service to be consumed by the respondent (on which a tax may be imposed); *Q*, the perception of the associated benefits of maintaining ecosystem health, improved local livelihoods, resulting from maintaining or increasing biodiversity; *Y*, the respondent's income bracket; *S*, some attribute or characteristic of the respondent (e.g., his/her ecological zone of origin, a national/or expatriate or position of responsibility in his/her organization); and ϵ an unobservable or random variable of which the investigator is unaware or unable to measure with certainty and which may represent variations in preferences amongst individuals (or groups) in the sample, or measurement error. Depending on the context, the random variable ϵ may be defined slightly differently. Still, according to Hanemann and Kanninen, (1998), due to the likelihood that ϵ is present, the function is referred-to as the Random Utility Maximization function or RUM.

- $V(P,Q,Y,S,\epsilon)$

And it is this RUM concept which provides the link between the economic model of utility maximization (like with RCT) and a statistical model of observed data. In applying the

model to a real-world situation, if the respondent is told conserving forest biodiversity (including associated benefits) will require her or him to pay $US *X* more on products and services via taxation; and she/he is then asked whether she/he would be willing to pay that new price, by the logic of utility maximization, she/he answers

- "Yes" ONLY if, $V(P,Q^1,Y-X,S, \epsilon) \geq V(P,Q^0,Y, S, \epsilon)$

Otherwise "NO", Hence,

- Pr {response is "YES"} = Pr $\{V(P, Q^1, Y-X, S, \epsilon) \geq V(P, Q^0, Y, S, \epsilon)$

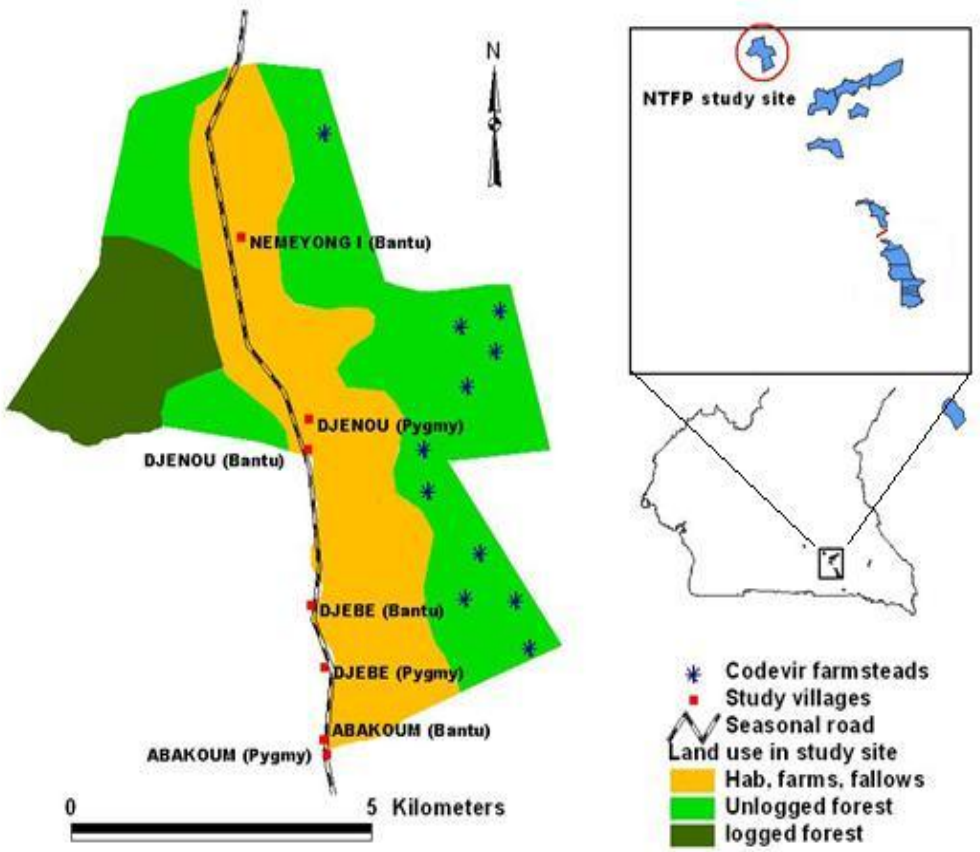
CHAPTER THREE

3. METHODOLOGY

3.1 CHARACTERIZING ACCESS, USE AND PRODUCTION DYNAMICS OF NTFPs

3.1.1 STUDY AREA

The CODEVIR community forest, comprising 4600 hectares of Guinea-Congolian high forest was selected as the NTFPs survey site. CODEVIR (French acronym) signifies "Villages united for community development". The community forest is located in the DJA landscape (15 km from the DJA faunal reserve) in south eastern Cameroon.



Map 1: NTFPs survey villages in the CODEVIR community forest

Source: (Mbile, 2008)

3.1.2 PHYSICAL AND ECOLOGICAL CHARACTERISTICS OF THE STUDY AREA

In terms of situational or geographical significance, there is very wide agreement that this wider study site – the DJA-Cameroon landscape is both a policy laboratory as well as a pace-setter in scientific observations and monitoring, regarding forest management in Cameroon (Djeumo, 2001; Klein et al., 2001; Efoua, 2001; Oyono, 2004)
In its full extent, this Landscape, otherwise referred-to as the DJA-MINKEBE-ODZALA spans Cameroon, Gabon and the Republic of Congo. (See map of landscape in appendix III)

There are very strong conservation interests in the wider zone. The DJA-Cameroon section of the landscape where this study was carried-out comprises four protected areas [the DJA Biosphere Reserve, the NKI National Park, the Mengame sanctuary and the Boumba-Bek National Park) and has an approximate total surface area of 43,485 sq kilometers.

The vegetation of the DJA area is characterized by natural, dense evergreen tropical forest of the equatorial rainforest type. Several sub-vegetation formations appear within the area representing a great diversity of biological species. The vegetation around the villages are however of secondary forest in characteristics largely due to agricultural activities. This vegetation has not undergone strong disturbances largely because of the absence of industrial forestry activities. The known biodiversity (CARPE, 2000) of this dense humid forested landscape comprises 300 woody plant species, 54 mammal species, 90 species of Birds and 120 species of fish. According to White (1993, 1983), this DJA-Cameroon landscape is a part of the wider Guinea-Congolian, Central African regional center of endemism, comprising about 8,000 species, of which about 80.0% are endemic to the region. There are also 9 endemic plant families of which 1/4 of the genera are endemic (White, 1983; 1993).
Except for the eastern parts and along river valleys, which generally range between 200 m and 560 m, the vast majority (>80.0%) of the DJA-Cameroon landscape range between 560

and 830 m above sea level (analyzed from [11]NASA's 90m SRTM digital elevation model for Cameroon).

The rainfall in the area is equatorial, averaging generally from 2500 mm – 3500 mm annually. The distribution in the study site is of the bi-modal type characterized by double maxima, peaking between June and July, and between September and November. The temperature of the area is humid tropical averaging between 23 and 27 degrees centigrade annually. The rainy months are generally cooler than the dry months.

The hydrological network within the area is very dense with the DJA River constituting the main drainage system. Non-industrial type or subsistence fishing is intensively practiced by local populations during the dry season.

3.1.3 APPLICATION OF A CHECKLIST TOOL FOR FOCUSSED GROUP DISCUSSIONS (FGD)

The NTFPs study was in two main parts. The first employed a checklist tool, to guide focused group discussions (FGD) on user-group demographics and the characteristics of their interactions with the NTFPs resources. FGD supported by a checklist was appropriate in this research because, though forest user groups can be sophisticated in their knowledge and relationship with the resources, lack of a common language between them and the investigator provides barriers to effective communications. The rigidity of standard questionnaire is therefore more susceptible than FGD to recording misleading information due to these barriers. FGDs allows for repeated questioning and in-depth interpretation of information before they are recorded. FGD does however require the investigator to always stay within the research question. Its use therefore requires greater experience and preparations than the questionnaire. Thus this research required maintaining locus of control on three elements of a FGD; (i) the research question, guiding the discussion, (ii) the FGD

[11] National Aeronautics and Space Administration (NASA) Shuttle Radar Topographic Mission

sub-topic and (iii) the data. The data is further divided into the data type and the data structure (see Appendix I).

The second part comprised of a log book and datasheet for administering a three-year structured NTFPs quantification exercise.

The checklist for the combined household demographic and NTFPs use survey was divided into three parts A, B and C, while the NTFP quantification survey tool comprised of a single datasheet. Two sets of variables were envisaged for the first part (A, B and C). Set one variables comprised of household demographic characteristics (Part A of checklist); while set two variables comprised; normative and binary response perceptions of access rights, numeric estimates of distances covered to collection sites and likert-scaled perceptions of the frequency and origins of local demand for products (Parts B and C). The checklist structure is presented in Appendix I.

Plate 1: A focused group discussion (FGD) session in Djebe, CODEVIR

(Source: Photo taken during FGD by village resident while collecting data for this research in 2005.)

3.1.4 SAMPLING, DATA AND ANALYSES PROCEDURES

To cover the entire study on NTFPs, four village communities (Nemeyong I, Djebe, Djenou and Abakoum) who are members of CODEVIR association (see map 1) were first prepared through public meetings in 2004/2005. The household demographic survey described above was administered to 152 households nominated by the villages themselves during the each public meeting to be long-term village residents and life-long collectors of the NTFPs.

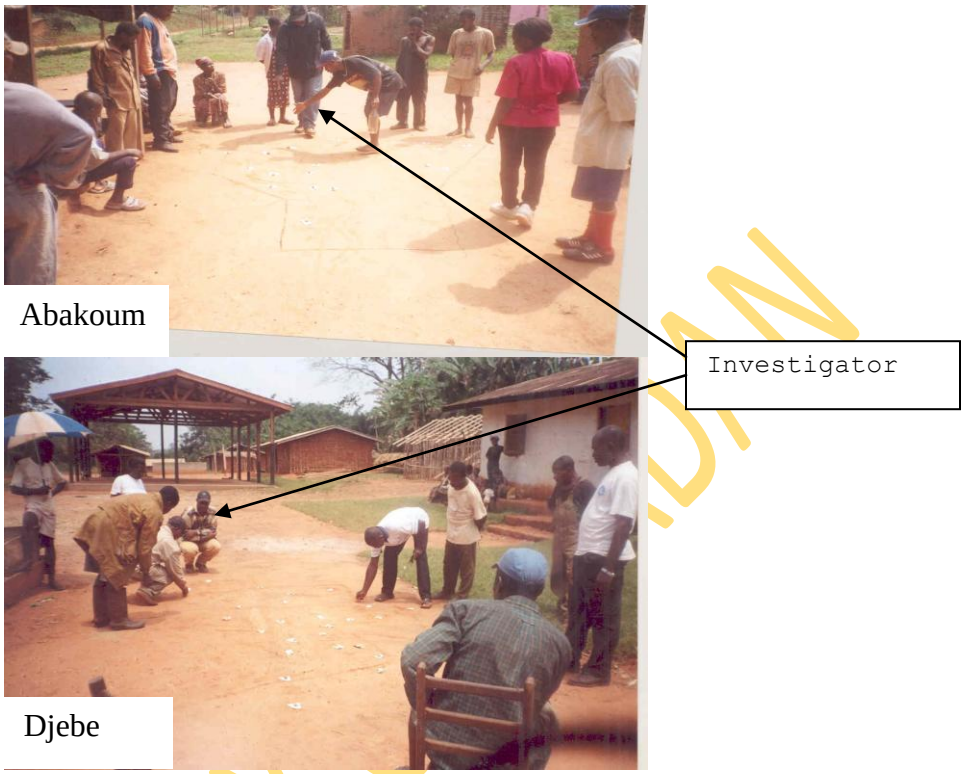


Plate 2: Corroborating NTFPs collection sites through participatory mapping in Abakoum and Djebe.

This composite photo shows the process of participatory resource mapping PRM) in Abakoum and Djebe, of NTFP resource collection sites during data collection for this research. Using this methodology (Mbile et al., 2003), community mapping precedes incorporation into a Geographic Information System. The Photo was taken by a village resident in 2005 during this research. In brief, PRM involves tapping into the spatial, cognitive knowledge of local people who then represent their space, in sketch form. Resource persons knowledgeable about the landscape and distribution of resources being mapped often lead the process. The lead investigator proceeds by asking open questions which bring-in others knowledgeable about the distribution of the resource, while encouraging the main resource person to be as accurate as he or she can be.

This combined household demographic and NTFP use survey included participatory mapping of the NTFP collection sites, estimation and corroboration of collection distances, based on [12]time taken to reach collection sites. Participatory maps were later integrated into a geographic information system (GIS) for easy reproduction and more accurate estimation of distances.

To facilitate simultaneous NTFPs quantification (Part D of the survey) and local empowerment objectives of the study, a team of eight (8) village-based enumerators (2 per village) were trained by the investigator to assist with weighing and daily log book entries of quantities of NTFPs collected per household according to a standardized datasheet format (NTFP quantification data sheet is included in Appendix I of this document). Each month over the years 2004, 2007 and 2008 quantities of products from three main species under investigation; *Baillonella toxisperma*, *Irvingia gabonensis* and *Ricinodendron heudelotii* per household were weighed using purpose-built baskets and scales. The conversion of NTFP resource to marketable product was then performed according to the details in Table 7.

[12] A standard time of four km per hour is used in most of Cameroon

Plate 3: The *Baillonella toxisperma* Pierre resource in CODEVIR

Photo taken by Peter Mbile in 2008 during research

Table 7: Field measures of NTFP resources and conversion into marketable products

	Pre-processed resource			Semi-processed product			
Species	Field measure	Field description	Field Unit	Product measure	Product unit	Product description	Metric Unit Equivalent (MUE) of the field measure
Baillonella toxisperma	11 litres bucket	De-pulped seeds	Volume	1.5 litres Plastic bottles	Litres	Oil	2 (liters)
Irvingia gabonensis	11 litres bucket	Fruits	Volume	Scale	Kilograms	Kernels	3.5 (kilograms)
Ricinodendron heudelotii	11 litres bucket	De-pulped seeds	Volume	Scale	Kilograms	Kernels	*2 (kilograms)

Source: Based on original data collected and analyzed for the purpose of this research

NB: **In both 2004 and 2008 on-the-spot measurements were carried-out for Ricinodendron heudelotii, using targeted trees. Furthermore, in view of the year-to- year regularity in production by same species, 2007 was skipped as it was considered (against cost of data collection) that there was unlikely to be any gains in data quality by adding an extra year of data collection.*

Plate 4: Village enumerators preparing datasheets for the NTFP quantification exercise in Djebe, CODEVIR

Photo taken by Peter Mbile in 2005 during this research

Plate 5: Training of eight village enumerators during NTFP quantification as part of local empowerment..

Photo taken by Peter Mbile in 2005 during research

Plate 6: Pressing out oil from *Baillonella toxisperma* Pierre for product value estimation
Photo taken by Peter Mbile in 2005 during this research

Plate 7: Weighing de-pulped seeds of *Baillonella toxisperma* Pierre in CODEVIR

Photo taken by Gilbert Abanda, ICRAF

Plate 8: Kernels of *Irvingia gabonensis* (Aubry-Lecomte ex O'Rorke) Baill., in an 11 litres measuring bucket, CODEVIR

Photo taken by Peter Mbile in 2008 during this research

Plate 9: Useful parts of *Irvingia gabonensis* (Aubry-Lecomte ex O'Rorke) Baill.

Photo taken by Gilbert Abanda, ICRAF

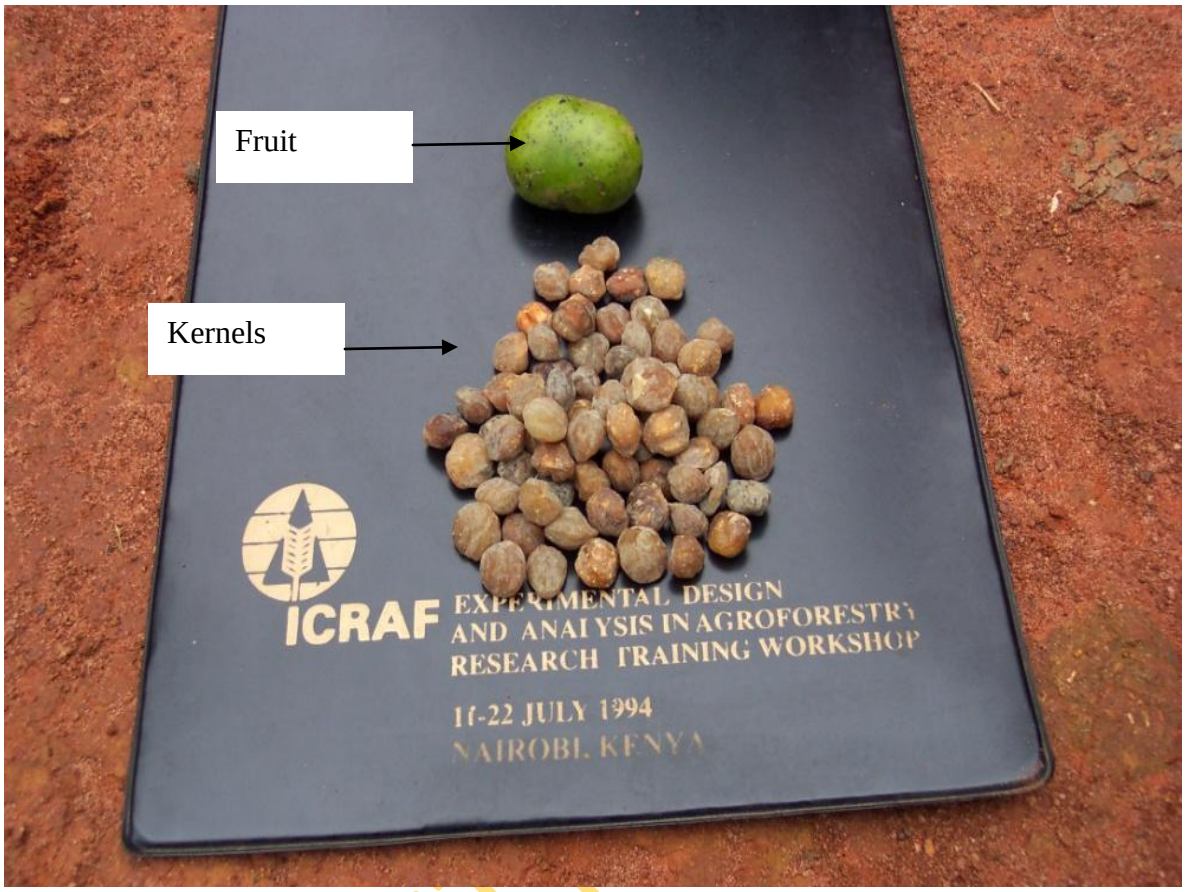


Plate 10: *Ricinodendron heudelotii* (Baill.) Pierre ex Pax Hoffm grains (foreground) and fruit (background)

Photo taken by Alain Tsobeng, ICRAF.

The Metric Unit Equivalents (MUE) of the field measure was monetized as Gross Forecasted Revenues and Gross Discounted Revenues computed using equations 1 and 2 below.

$$\text{GFR} = \text{Q} * \text{P} * (1 + pricegrowth)^{n} \text{ ---------- (equation 1)}$$

$$\text{GDR} = \frac{\text{GFR}}{(1+discount\ \ rate)^{n}} \text{ ---------- (equation 2)}$$

Recall: Where Q is quantity, P is price/unit of Q at discount rate = [13]13.0%; *price growth* = [14]4.0% and *n* = 6 years.

The continuous three-year quantification process also facilitated collection of data on, 'abundant' or 'on-season' and 'lean' or 'off-season' production of NTFP.

3.2 ASSESSING WILLINGNESS, AND CONDITIONS FOR SUPPORTING BIODIVERSITY CONSERVATION THROUGH TAXATION

3.2.1 THE STUDY AREA

This survey was carried out in Yaoundé, the Capital city of Cameroon. Yaoundé is situated in the center of Cameroon, on the forest transition zones separating forests from humid savannah.

3.2.2 CHARACTERISTICS OF YAOUNDÉ, CAMEROON, AS A STUDY SITE.

Yaoundé has a population of over 2 million inhabitants and has the highest concentration of government services dealing with forestry, national and international nongovernmental organizations, diplomatic missions and other related services. These services are manned by

[13] African Development Interest rate as at 2008
[14] Rate of Inflation in Cameroon in 2008

a vastly more informed populace on forest conservation and management questions; nationals as well as expatriates. It is easily the second most metropolitan city (after Douala) in Cameroon. Compared with other cities, Yaoundé is thus more informed of biodiversity conservation questions than any other city in Cameroon, not just by its residents but through its visitors who come to meetings, workshops, and conferences and to carry-out studies often relevant to forest policy.

In terms of information on forest policy, biodiversity conservation and management, Yaoundé is easily a leader in the Central Africa sub-region, which is home to the Congo Basin – the second most extensive, closed canopy forest basin in the world, after the Amazon. For a decade Cameroon has been a leader in forest policy development, research and an easy model for the rest of Central Africa – in many ways, Yaoundé remains at the centre of all that. Perhaps a reason why the Central Africa Commission on Forests (COMIFAC) has its head quarters in Yaoundé, Cameroon.

Still, like most major cities Yaoundé is a magnet for other diverse communities, not necessarily well informed about the values of conserving forest biodiversity, although they may be users of forest products. From a research point of view, and when considered at random, this diversity makes for a very heterogeneous population in terms of awareness of biodiversity conservation issues. From irregular awareness to the perceptions held or not held, by these diverse communities, evaluating awareness as a foundation on which to assess perceptions of whether or not to accept taxation for biodiversity conservation was expected to be very irregular, costly, in time and effort, without corresponding benefits in information. The concept of ‘accepting taxation’ to conserve forest biodiversity, for the underlying reasons given in the conceptual framework of this research was new even to potential respondents of the forest and environment sector in Yaoundé. It was certainly almost ‘alien’ to the unschooled and repeated responses got during the pilot underlined the likely irrelevance of these ‘unschooled’ sector, and were thus considered not to be of significant value to this academic research. This decision could also not be mitigated by experiences from similar studies, as no records were found of any comparable study having

been carried out before in the city of Yaoundé or in any other Cameroonian city for that matter. The risk therefore of a purely random sample given these constraints was too great and other options for sampling were then considered.

3.2.3 SAMPLING, DATA COLLECTION AND ANALYSES PLANS

In view of the novelty of the concept in Yaoundé, including the need for subjects to be prior-informed in order to obtain high enough questionnaire responses a targeted sub sector was decided upon. For the reasons given above, identifying and contacting this targeted sub sector of respondents comprising of government and nongovernmental actors in the forest policy, forest management and environment sector was considered as an initial step. This selection process integrated instances of expert and proportional sampling of respondent categories (see also Trochim W.M.K., 2006) in order to arrive at a sample that was both knowledgeable on the subject and representative of the employer categories considered to possess the minimum required level of awareness.

A pilot survey was carried-out during which potential respondents were contacted in three main types of institutions: International (research, development and conservation); Civil society (mainly national non-governmental organization in the conservation and development sector), and Government/Para-public institutions (dealing mainly with forest management and conservation policy).

The pilot survey helped achieve introduction of the subject; confirmation of appointments for the main survey; identification and agreement on taxable goods and services; discussion of expected levels of indifference and how to prepare for that, and how the questionnaire was to be structured.

After the pilot 400 subjects responded and took the survey. The distribution of the three categories of respondents in the sampled population was thus: International organizations - 26.0%: Civil society – 30.0%; Government/ Para-public institutions – 44.0% was taken. These proportions were purely accidental and represent the respondents who agreed to participate in the survey.

3.2.3.1 THE SEMI PROBABILISTIC SAMPLING PROCEDURE

Table 8: Transitioning from targeted to probabilistic sampling

Categories	Completed, returned questionnaire per category	Completion rate (%)	Random sample for analyses (proportion of total in brackets)	CL	CI (±)
International NGOs	102	100	89 (29.3%)	95%	3.7
Civil society	118	100	97 (31.95)	95%	4.2
Government and Para-public	180	100	118 (38.8%)	95%	5.3
TOTAL	400		304		

CL = Confidence Level; CI = Confidence Interval

Source: Developed by Candidate (Peter Mbile), using On-line Randomizer (Creative Research Systems, 2007-2009) to facilitate transition from targeted to probabilistic sample to analyses willingness to accept taxation in this research.

From the 400 who took the survey, the procedure in Table 8 was used to facilitate transition from a purely targeted to a random selection of 304 questionnaires for analyses – hence the expression "semi-probabilistic sampling procedure".

3.2.4 QUESTIONNAIRE DESIGN

The questionnaire for this survey was divided into four parts. Part one of the questionnaire comprised of respondent characteristics (as independent variables); employer, income range, age, Sex, decision-making position in the organization, nationality, eco-region of origin and regularity of employment. Part two comprised of consumption behavior (or hypothesized dependent variables) towards selected products and services suggested and agreed upon during the pilot phase. These comprised; house ownership, car ownership, inter-city bus usage, air travel (domestic, regional and international), tourism infrastructure - hotel and restaurant usage and usage regularity, audio-visual tax payment, alcohol and tobacco consumption.

Part three of the questionnaire tested the level of respondent's knowledge of specific aspects of forest biodiversity conservation and their levels of agreement with conditions set and levels of personal responsibility for supporting biodiversity through taxation.

The fourth part of the questionnaire was a solicitation of discrete taxation amounts or amounts representing percentages of existing prices, respondents would accept to pay as taxation for conserving forest biodiversity. This part was based on the payment card approach and inspired by the Hanemann and Kanninen, (1998) concepts for statistical analyses of discrete response contingent valuation data.

The survey was completed in two months. The 400 completed questionnaires were each given a unique identification number and subjected to a 'semi-probabilistic' sampling procedure using an On-line Sample Randomizer (Creative Research Systems, 2007-2009)

and sample size calculator (using worst case scenario of 50%, 95% confidence levels and 3.7 – 5.3 Confidence intervals.

3.3 DATA ANALYSES TOOLS AND PROCEDURES

3.3.1 ANALYSES OF NTFPs USE DYNAMICS

These analyses procedures pertain to both data analyses and statistical tests involved in investigating NTFPs use dynamics.

3.3.1.1 CHARACTERIZING NTFP USER GROUPS WITH DESCRIPTIVE STATISTICS

Data were summarized in MS EXCEL 2007 and exported to SPSS version 16.0. Data were arranged in rows (observations) and columns (variables sets one and two). Descriptive statistics of characteristics of respondents were first explored using the ANALYZE > REPORTS > CASE SUMMARIES procedure. Later-on these case summaries were reprocessed into relevant percentages and Figures generated in MS EXCEL 2007.

3.3.1.2 HYPOTHESES TESTS OF ASSOCIATIONS BETWEEN NTFP USER CHARACTERISTICS AND BEHAVIOUR

Hypotheses tests (Chi-square and Fisher's exact test) of associations between sets one and two variables were carried-out in SPSS 16. The procedure comprised importing the data into SPSS into the "CROSSTABS" dialogue Box. In the CROSSTABS: STATISTICS dialogue Box Chi-Square is checked. In the CROSSTABS: CELL DISPLAY, "OBSERVED" COUNTS are checked and in the PERCENTAGE BOX "ROWS" are also checked. There is the option for presentation of output in ascending, descending order or to produce bar Figures. However, all the Figures in this work were later on generated in MS EXCEL using the output results. After these procedures the test is run by clicking OK. The significance of

the relationship depicting possibility for 'association" between the variables tested is then determined by the "asymptotic significance" or the *p-value*, set at 95% confidence level or 0.05 probability. A *p-value* < 0.05 would indicate that the association between the set one and set two variables is unlikely to be a chance event, and therefore, the null hypothesis of no association would be rejected. The degrees of freedom are automatically set by SPSS based on the data analyses Table structure. Where analyses cells are violated, this is indicated at the bottom of the 'test statistic' – the Chi-Square hypothesis test statistic, based on 2x2 Tables will not be valid. In such a case, the fisher's exact test result (an automatic option in SPSS 16), instead of the chi-square asymptotic or *p-value* is used to interpret the relationship.

3.3.1.3 PEARSON'S CORRELATIONS BETWEEN USER GROUP POPULATION SIZE AND 'OFF-SEASON' NTFP PRODUCTION

The three – years (*Baillonella toxisperma* and *Irvingia gabonensis*), and two – years (*R. heudelotii*) all-year round data collection facilitated recording of both 'peak season' and 'lean season' production of NTFPs, referred-to as 'on' and 'off' seasons, respectively. Summary statistics and generation of the Pearson's correlation coefficient (r) of observed data was carried-out to investigate the extent of linearity between the absolute population sizes of user groups by racial group (Bantus and Pygmies) in the study villages, and the aggregated quantities of NTFPs by species, produced per 'lean-season' month over the three and two years periods of monitoring. Many robust coefficients exist for investigating correlation and dependence. Pearson's correlation coefficient was preferred for its simplicity and strong sensitivity to linearity given the limited geographic scope of the study and non normal nature of the sample.

3.3.1.4 ONE SAMPLE *t* -TEST OF SIX-YEAR SIMULATED REVENUE PROFILE FOR NTFPS

To investigate the possible impact of physiology (and therefore seasonality) on potential revenue from NTFP, the yearly sums of the discounted revenue simulated over six years from all three NTFPs was subjected to a one-sample *t*-test in SPSS according to the procedure ANALYZE > COMPARE MEANS > ONE SAMPLE T Test. The Kolmogorov-Smirnov and Shapiro-Wilk test of normality showed the quantitative distribution of NTFP quantities to be non normal. The size of the sample was however, big enough to permit us to make inferences from the significant fluctuation in revenue. Differences in potential benefits, if they are significant, would have significance for policies to support NTFP development or the livelihoods that depended on them. This test is intended to establish if there are significant yearly differences between NTFP quantities.

The assumption in using this test was that, if such significant differences would exist, year-to-year in the expected revenue from NTFP (based on physiology), then the observed ratios between two years $\neq 1$. By using 1 as the Test Value the null hypothesis that the sample mean = 1 is tested.

3.3.1.5 ANALYZING DISCREPANCIES BETWEEN PROJECTED AND LOCAL PERCEPTIONS OF NTFP VALUE

To use local community perceptions about the relative significance of different actors in the NTFP market chain, an improvised 'marketing mix' analyses using a combination of source of demand and preferred location of sale of NTFP products, the perceptions of local market value for NTFPs was evaluated. Despite lack of statistical tests here, graphic representations of analyses of the improvised marketing mix enabled inferences to be made regarding discrepancies between projected revenue possibilities for NTFPs and actual revenue entering the households. These analyses also have significance for envisaged policies to support NTFP development.

3.3.2 ASSESSING WILLINGNESS TO ACCEPT TAXATION FOR BIODIVERSITY CONSERVATION

3.3.2.1 DESCRIPTIVE STATISTICS TO CHARACTERIZE SAMPLE

A similar procedure as used in 3.3.1.1 above (Case Summaries) was carried-out to generate descriptive statistics of the sample whose willingness to accept taxation for biodiversity conservation was being analyzed. Additionally, frequencies were also analyzed using the procedure ANALYZE > DESCRIPTIVE STATISTICS > FREQUENCIES in SPSS 16. With the exception that the DISPLAY FREQUENCY TABLES was "checked" in the SPSS window, all Figures were generated in MS EXCEL 2007.

3.3.2.2 ATTITUDES TOWARDS REVEALING DISCRETE CURRENCY AMOUNTS AS 'TAXATION'

Chi-Square and Fisher's tests were performed following according to the 'Test of Association' procedure (3.3.1.2) to evaluate associations between respondent characteristics and binary responses to the 'principle' to pay or not to pay tax to conserve forest biodiversity.

3.3.2.3 HYPOTHESES TESTS OF ASSOCIATIONS BETWEEN CONSUMER CHARACTERISTICS AND CONSUMPTION PREFERENCES.

To narrow down consumer characteristics most associated with their consumption behavior, Chi-square and Fisher's exact hypotheses tests were carried out on all respondents' characteristics against their expressed consumption preferences.

3.3.2.3 KENDAL W NON PARAMETRIC TEST OF CONCORDAN CE IN AWARENESS, PERCEPTIONS AND CONDITIONS FOR ACCEPTING TAXATION

Despite the semi-probabilistic sampling procedure used, no assumptions were made for normality in the consumer sample. The Kendal non parametric test was thus performed to evaluate levels of similitude within respondent categories in their choices, responses to statements related to awareness of biodiversity issues and perceptions on responsibility for mitigation. Agreement within categories of respondents with conditions for supporting taxation to finance biodiversity conservation were also evaluated and the ranked test of 'Concordance' was evaluated.

3.3.2.5 EXPLAINING RANDOMNESS IN CONSUMER CHARACTERISTICS USING STANDARD DEVIATION

Standard Deviation does not constitute a major area of statistical effort in this work. Summary statistics of how different respondent categories responded to the conditions for supporting a biodiversity tax provided useful insights. The standard deviation was performed in MS EXCEL (STDEV) and it is the squared root of the variance. As the variance is the average of the squared differences (deviations) from the Mean, the standard deviation expressed how far the expressions within these consumer characteristics were spread-out from their own central tendency (statistical mean). Its significance in this study is intended to help point to where variations of agreement or 'disagreement' with conditions being investigated are likely to be found as well as possible existence of sampling errors in measurement.

CHAPTER FOUR

4 RESULTS

4.1 SOCIAL DYNAMICS, PRODUCTION AND REVENUE POTENTIAL OF NTFPS

4.1.1 POPULATION CHARACTERISTICS OF COMMUNITY AND OF NTFP USE

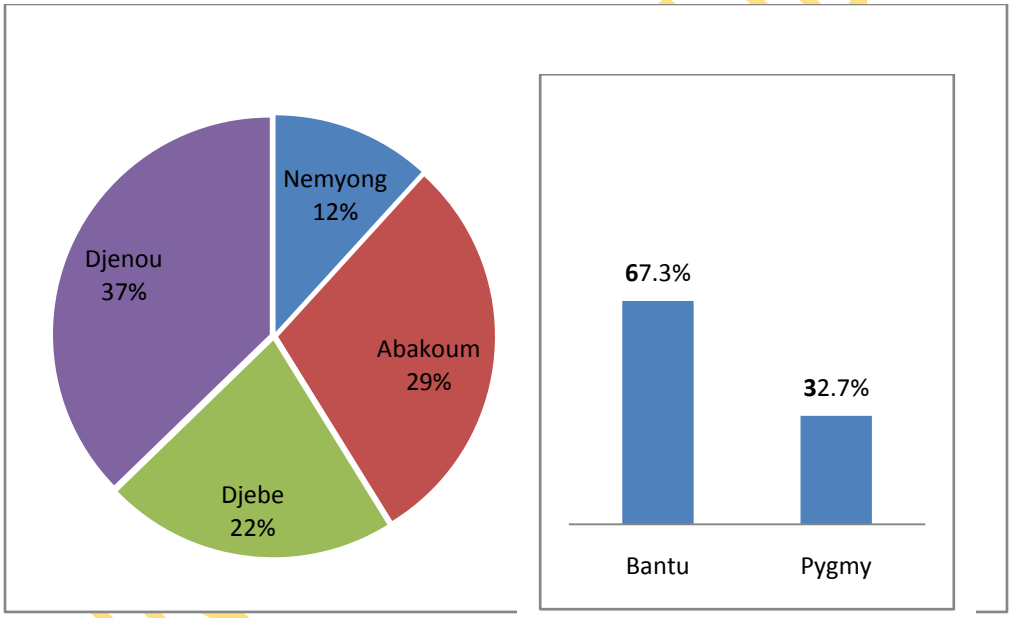


Figure 2: Population characteristics in CODEVIR

Source: Based on original data collected from CODEVIR as a part of this research

Within the study site, Pygmy communities were recorded in three out of the four villages. There were no Pygmy communities in Nemeyong, while Abakoum had the biggest Pygmy population (63.0% of Pygmies). While more Pygmies (64.0%) than Bantus (58.0%) collected *Ricinodendron heudelotii*, both groups (Bantus and Pygmies) collected *Irvingia gabonensis* to the same extent (100%). Simlarly, 100% of all respondents were involved in *Baillonella toxisperma* collection. Still, regarding *Gnetum africanum*, a chance NTFP encountered during the study, almost four times as many Pygmies (74.0%) as Bantus (20.4%) reported activity around collection of this widely eaten forest vegetable.

4.1.2 SOURCES OF NTFPS INDICATIVE OF *DE FACTO* ACCESS 'RIGHTS'

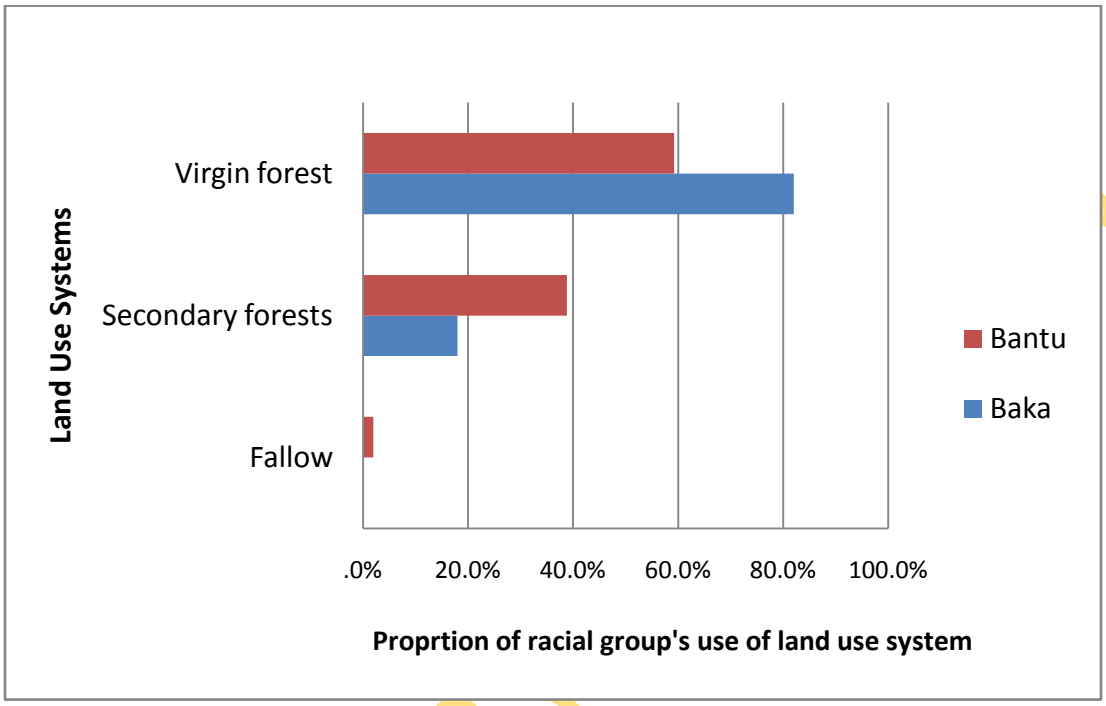


Figure 3: Source of *Baillonella toxisperma* and proportion of access by social group

Source : Based on original data collected from CODEVIR as a part of this research

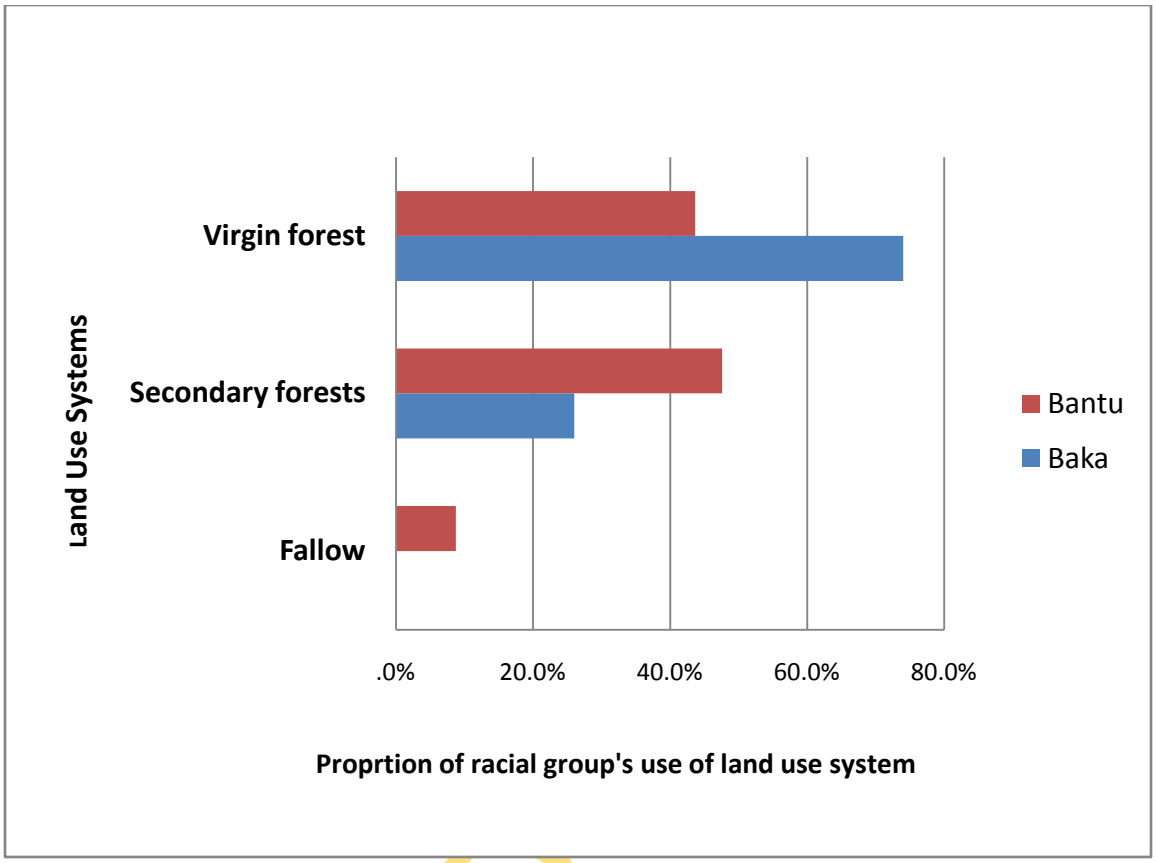


Figure 4: Source of *Irvingia gabonensis* and proportion of social access

Source : Based on original data collected from CODEVIR as a part of this research

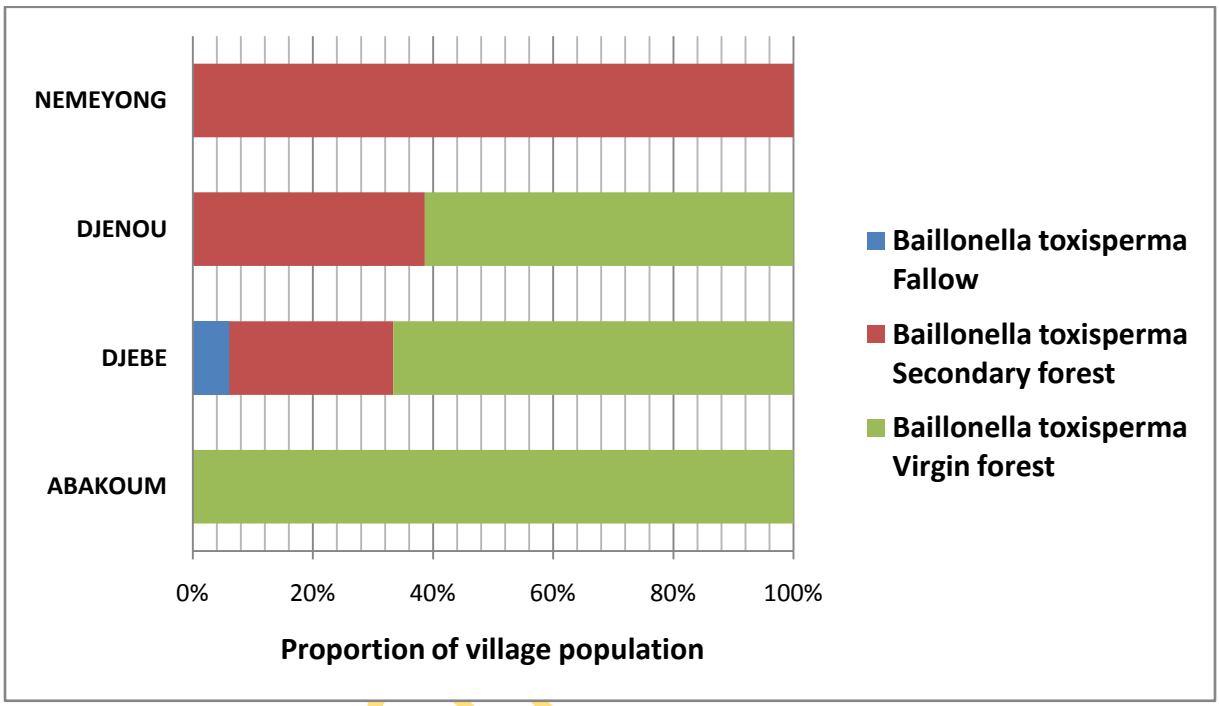


Figure 5: *Baillonella toxisperma* collection by land use system: provenances and access by village community

Source : Based on original data collected from CODEVIR as a part of this research

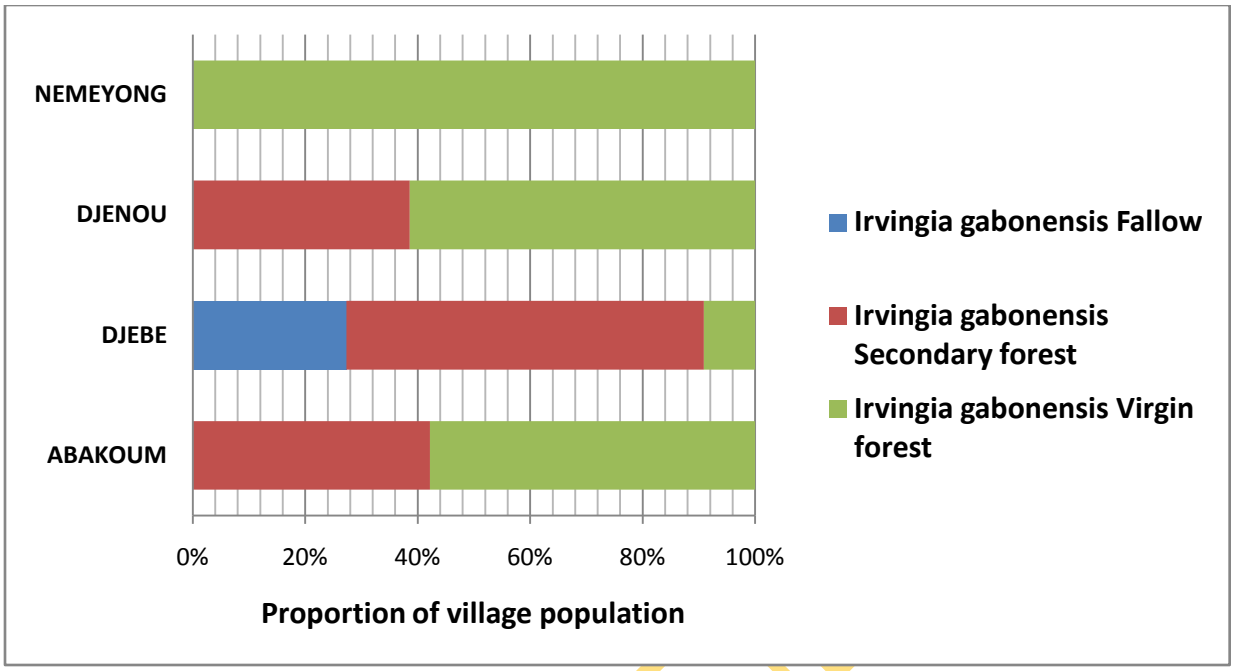


Figure 6: *Irvingia gabonensis* collection: provenances and access by village community

Source : Based on original data collected from CODEVIR as a part of this research

4.1.3 ETHNIC/RACIAL ASSOCIATIONS WITH ACCESS TO NTFPs

Significant associations between racial groups and NTFPs use were observed. Although not specifically targtted as a species, the relationship between racial group and collection of *Gnetum africanum* was significant (Chi-square =41; df =1; $p<0.05$). Here more Pygmies than Bantus collected *Gnetum africanum* mainly for home consumption.

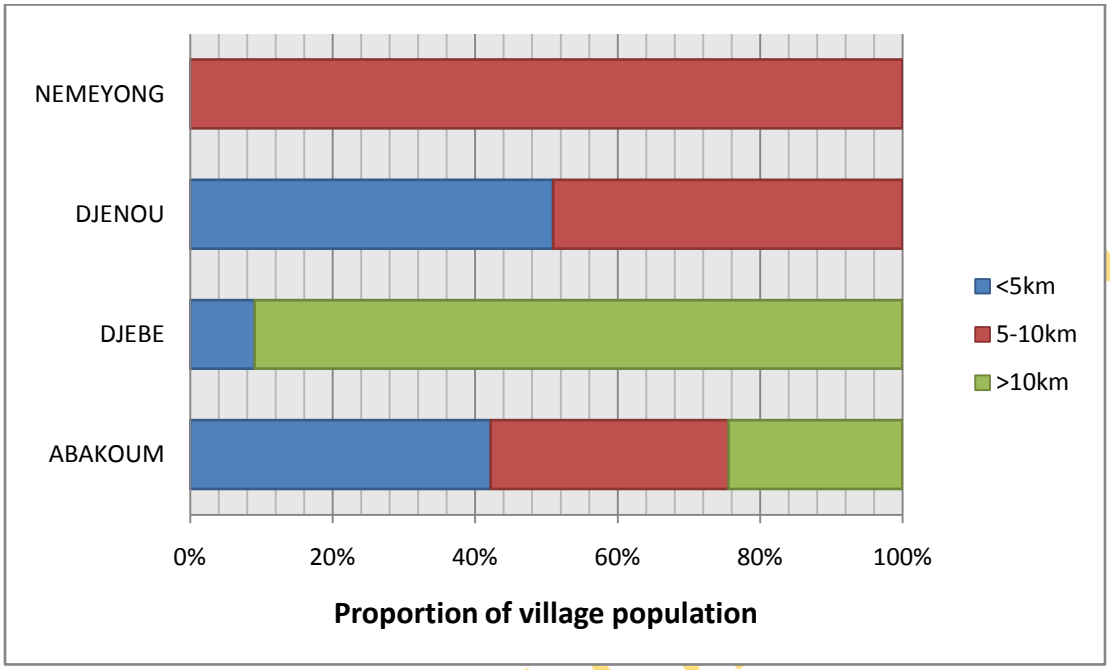
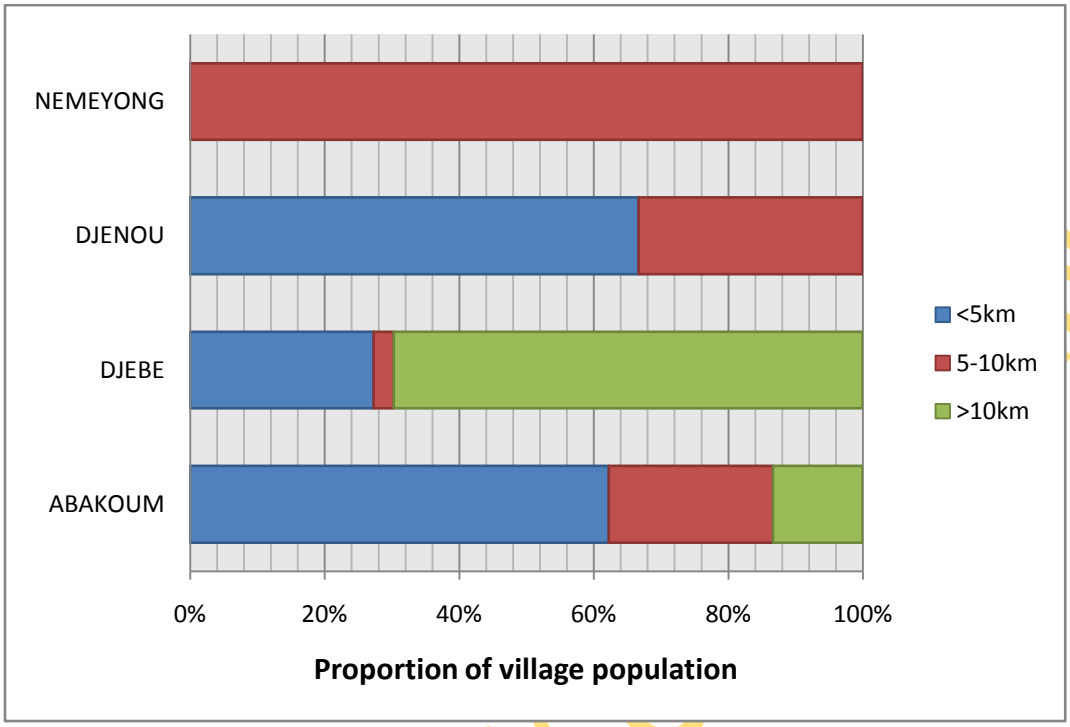


Figure 7: Access and efforts to *Baillonella toxisperma* sources by village community

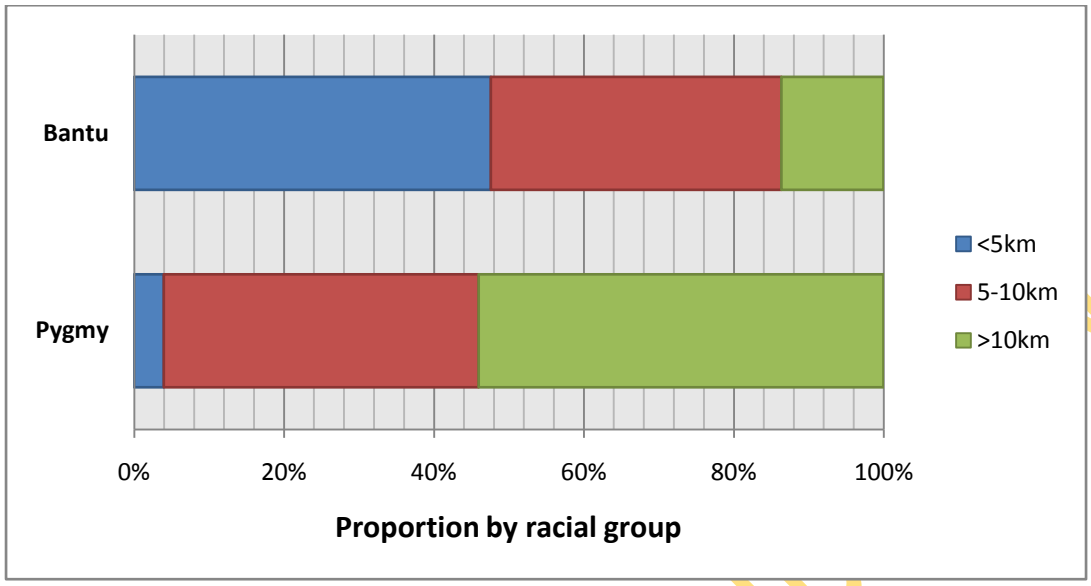
Source : Based on original data collected from CODEVIR as a part of this research



Fisher's exact value = 102; $p<0.05$

Figure 8: Access and efforts to *Irvingia gabonensis* sources by village community

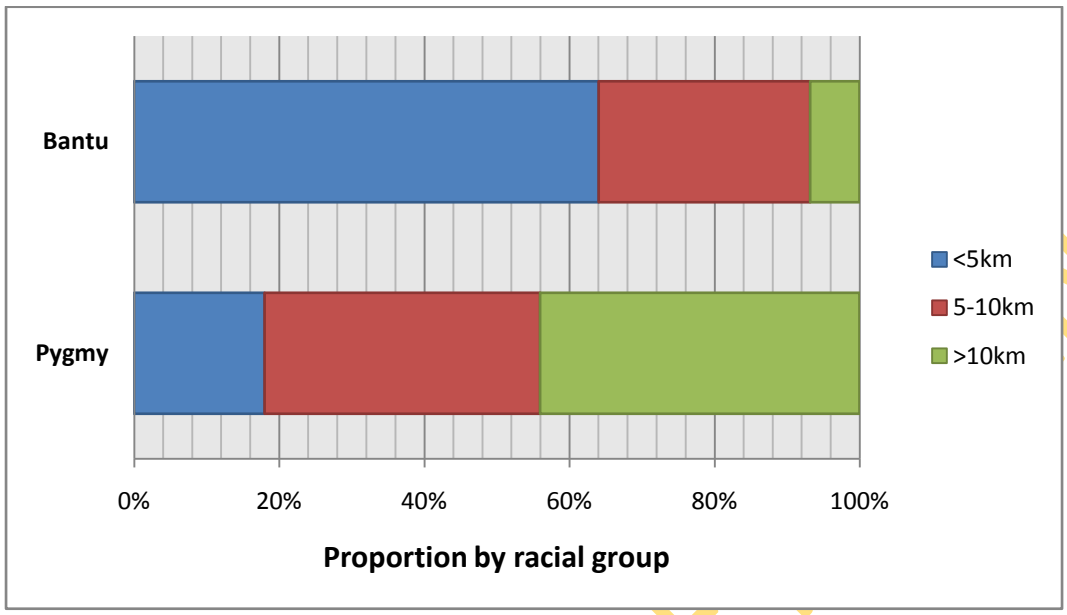
Source : Based on original data collected from CODEVIR as a part of this research



Fisher's exact value = 57; $p<0.05$

Figure 9: Access and efforts to *Baillonella toxisperma* sources by racial group

Source : Based on original data collected from CODEVIR as a part of this research



Chi-square = 40; df = 2; $p<0.05$.

Figure 10: Access and efforts to *Irvingia gabonensis* sources by racial group

Source : Based on original data collected from CODEVIR as a part of this research

4.1.4 SOCIAL/RACIAL GROUP RELATIONSHIPS WITH 'OFF-SEASON' NTFPs PRODUCTION

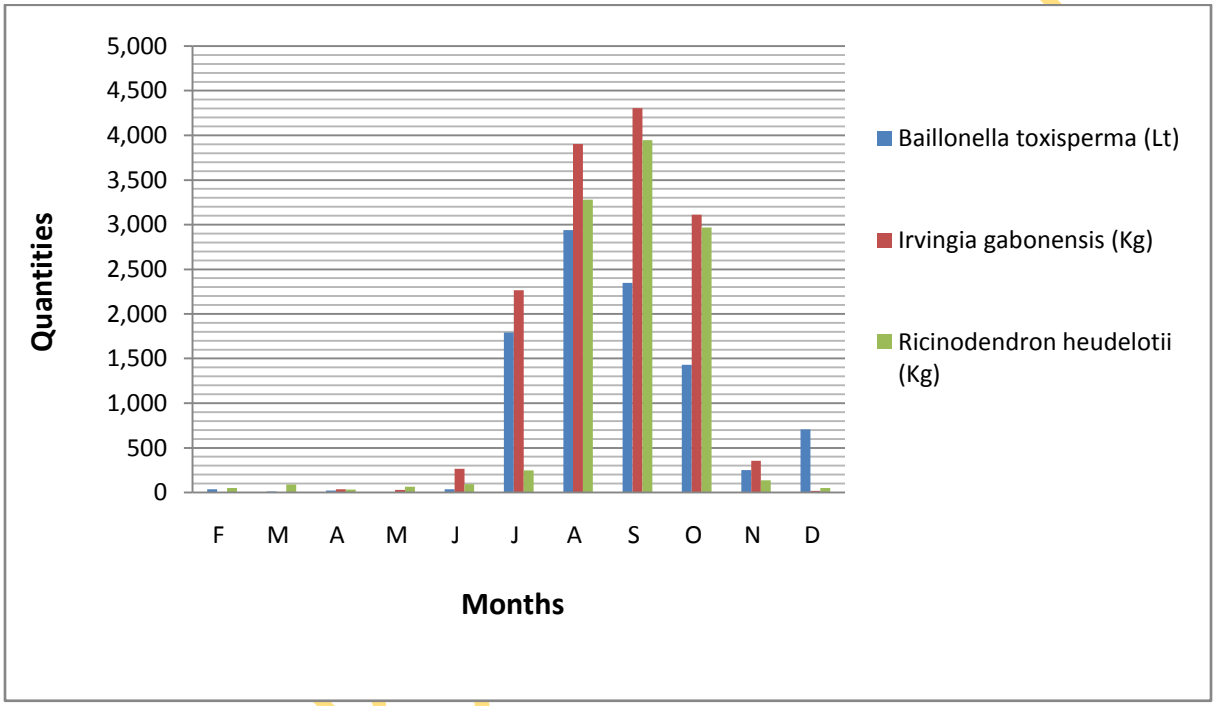


Figure 11: Time averaged NTFP production in CODEVIR (all four villages) showing 'off-season' (November to June) with weak NTFPs production levels.

Source : Based on original data collected from CODEVIR as a part of this research.

Table 9: Pearson's correlations between racial group population sizes and 'off-season' quantities of *Baillonella toxisperma* collected

	Village population		Summary statistics of lean season production				
	Bantu	Pygmy	Minimum	Maximum	Sum	Mean	Std. Error
Abakoum	76	130	.0000	100.0000	463.5399	38.628328	12.5388403
Djebe	564	85	.0000	94.4622	140.7840	11.732002	8.1456276
Nemeyong	184	0	.0000	100.0000	155.1990	12.933252	8.2154970
Djenou	190	28	.0000	29.8246	40.4770	3.373085	2.5620289
Pearson's Correlation (r)	With Bantu Population			0.124682	-0.44304	-0.44304	
	With Pygmy population			0.361977	0.775697	0.775697	

Source: Statistics were generated based on original data collected as a part of this research

Table 10: Pearson's correlations between racial group population sizes and 'off-season' quantities of *Irvingia gabonensis* collected

	Village population		Summary statistics of lean season production				
	Bantu	Pygmy	Minimum	Maximum	Sum	Mean	Std. Error
Abakoum	76	130	.0000	100.0000	283.1623	23.596856	10.8242674
Djebe	564	85	.0000	100.0000	225.7447	18.812057	10.3058711
Nemeyong	184	0	.0000	52.8634	85.8067	7.150558	4.4306908
Djenou	190	28	.0000	5.2863	5.2863	.440529	.4405286
Pearson's	With Bantu Population			0.320003	0.166102	0.166102	
Correlation	With Pygmy population						
(r)				0.754416	0.887627	0.887627	

Source: Statistics were generated based on original data collected as a part of this research

Table 11: Pearson's correlations between racial group population sizes and 'off-season' quantities of *Ricinodendron heudelotii* collected

	Village population		Summary statistics of lean season production				
	Bantu	Pygmy	Minimum	Maximum	Sum	Mean	Std. Error
Abakoum	76	130	.0000	88.5350	366.1709	30.514239	9.2847265
Djebe	564	85	.0000	40.3101	40.3101	3.359173	3.3591731
Nemeyong	184	0	.0000	42.6230	102.0516	8.504298	4.3722540
Djenou	190	28	.0000	73.7705	291.4675	24.288956	8.1369741
Pearson's Correlation	With Bantu Population			-0.71404	-0.79191	-0.79191	
	With Pygmy population			0.508406	0.394333	0.394333	

Source: Statistics were generated based on original data collected as a part of this research

4.1.5 NTFPs REVENUE PROFILES AND PERCEPTIONS OF LOCAL DEMAND

Table 12: One-sample statistics of projected NTFPs revenue over six years

One-Sample Test Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
R	6	43858.833	15819.806	6458.409

Source: Statistics were generated from original data collected and analyzed as a part of this research

Table 13: One-sample t-statistics of projected NTFPs revenue over six years

	Test Value = 1					
					95% Confidence Interval of the Difference	
	T	Df	Sig(2-tailed)	Mean Difference	Lower	Upper
R	6.791	5	.001	4.3857833E4	2.725596E4	6.045970E4

Source: Statistics were generated from original data collected and analyzed as a part of this research

Table 14: Summary discounted revenues from NTFPs projected over six years

CODEVIR species (Six years)	Total discounted value of NTFP ($ US) projected over six years
Baillonella toxisperma	39,931
Irvingia gabonensis	73,261
Ricinodendron heudelotii	149,951
	263,153

Source: Totals were computed using original NTFPs data collected and analyzed as part of this research

4.1.6 DISCREPANCIES BETWEEN PROJECTED REVENUES AND ACTUAL NTFPs PERFORMANCE UNDER LOCAL MARKETING MIX CONDITIONS

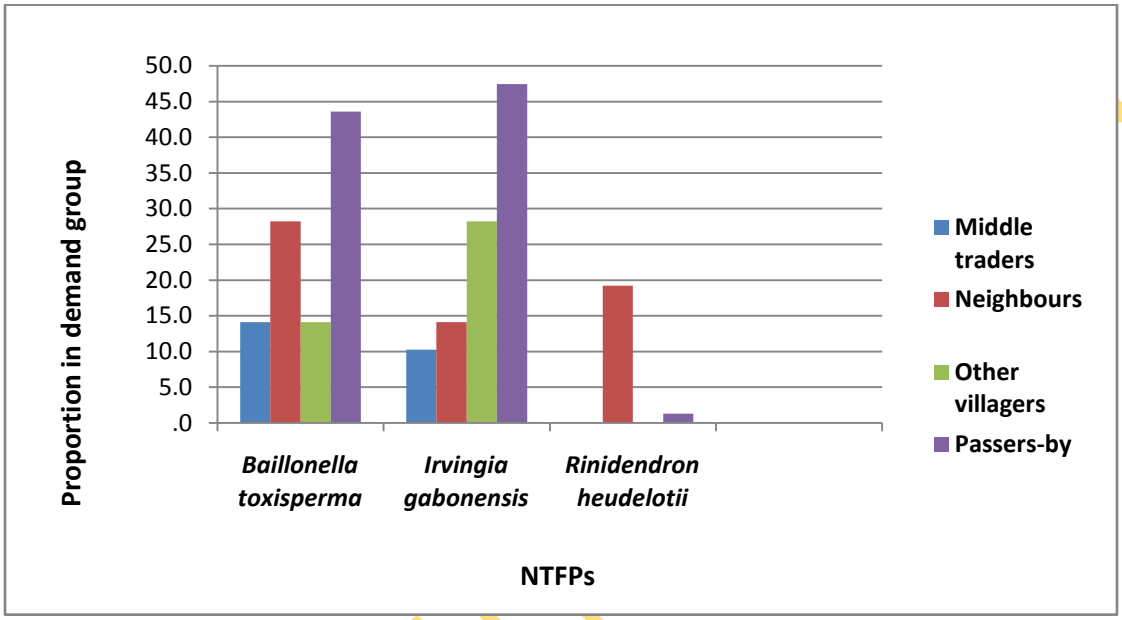
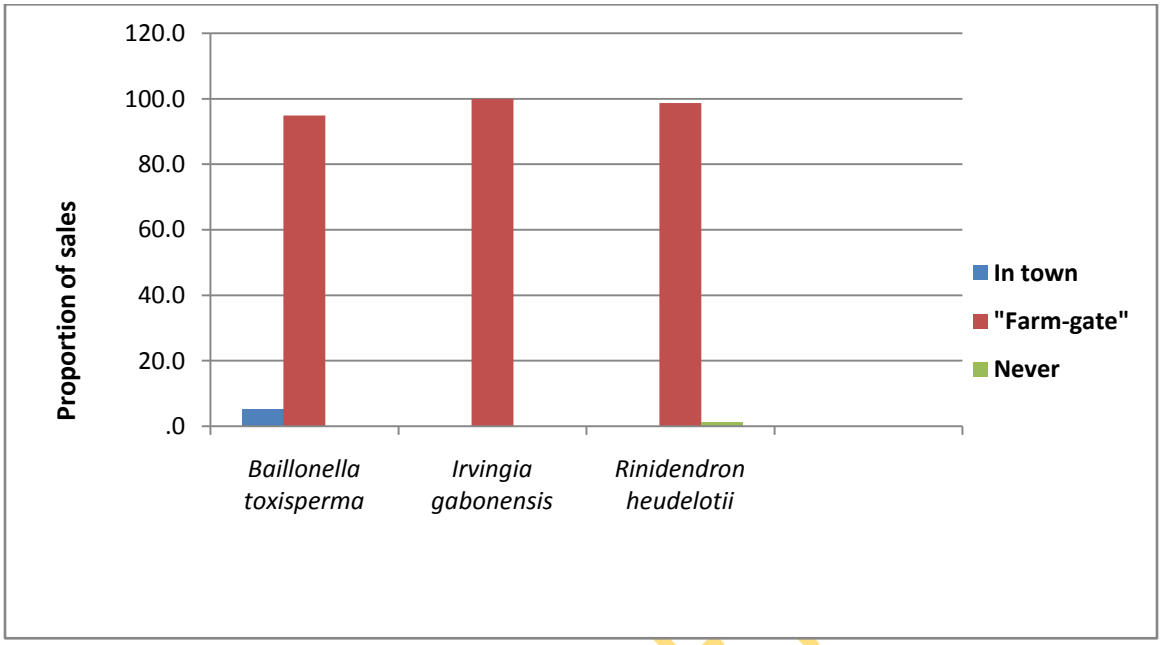


Figure 12: Indicative assessment of local demand potential of NTFP based on type of market actor in the chain

Source: Data analayzed was collected as a part of this theses.



.Figure 13: Preferred places of sale of NTFP as indicative of 'Place of demand'

Source: Data was collected and analyzed as a part of this research.

Plate 11: 'Farm gate' sale of *Baillonella toxisperma* oil CODEVIR

Photo was taken by Gilbert Abanda in 2008

Table 15: Estimates of $US equivalent of some non extractive forest uses

In-put parameters	Time averaged quantity of product
Total *R. heudelotii in kg (averaged over 2 years)*	11,027.75
Total *I. gabonensis in kg (averaged over 3 years)*	14,284.50
Total *B. toxisperma in litres (averaged over 3 years)*	9,594.58
Modeling time-frame	1-6 years
R. heudelotii unit price	$US 3.00
I. gabonensis unit price	$US 2.00
B. toxisperma unit price	$US 3.00
Price growth (4.0%)	0.04
Discount rate (maximum = 13.0%)	0.13

	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
	GFR	GDR	GFR	GDR	GFR	GDR	GFR	GDR	GFR	GDR	GFR	GDR
B. toxisperma ($ US)	0.00	0.00	0.00		32,377.80	22,439.44			0.00	0.00	36,420.63	17,493.50
I. gabonensis ($ US)	0.00	0.00	30,900.23	24,199.41	0.00	0.00	33,421.69	20,498.15	0.00	0.00	36,148.90	28,569.00
R. heudelotii ($ US)	34,406.58	30,448.30	35,782.84	28,023.21	37,214.16	25,791.28	38,702.72	23,737.10	40,250.83	21,846.54	41,860.87	20,106.55
**$US annual carbon off-set payment*		7,790		7,790		7,790		7,790		7,790		7,790
Total revenue(without carbon payments)$US		30,448		52,223		48,231		44,235		21,847		66,169
Total revenue(with carbon payments)$US		38,238		60,013		56,021		52,025		29,637		73,959

*Sources:*Calculation based on annual expected timber fees estimated according to the surface area of the CODEVIR community forests (4600 ha) within which this NTFP study was carried and based on Government of Cameroon's own proposal (The Economist, 2004) for Carbon off-set payments from the Ngoyla-Mintom forests (see Table 1)*

4.2 WILLINGNESS AND CONDITIONS FOR ACCEPTING TAXATION TO SUPPORT BIODIVERSITY CONSERVATION

4.2.1 GENERAL CHARACTERISTICS OF SAMPLE EVALUATED

Relative representation of three employer categories surveyed were, International NGOs: 29.3%; Civil society: 31.9% and Government/Para-public institutions: 38.8%. Almost two times more males than females provided detailed responses (70:30).

Almost half of the respondents (49.3%) were between 30-40 years old. More than 90.0% were of Cameroonian nationality.

The dominant ecological zones of origin of the respondents were savannah (45.0%) and forest zones (43.0%).

75.0% of the respondents were regularly employed, about half (52.3%) receiving monthly salaries of between 200 – 1000 $US with those having less than 200 $US, greater than 1000 $US, being almost evenly distributed.

In terms of decision-making in their organizations about half (55.0%) were of intermediate level with the distribution skewing towards more junior positions (30.0%).

Three times as many respondents did not own houses, and similarly, only a third (37.0%) owned cars.

83.0% were regular intercity bus users while use of air-travel was split 51:48 in favor of those not doing so.

77.0% of respondents used hotel facilities very regularly while frequency of restaurant usage was split fairly evenly between very regular and less regular users.

Three times as many respondents paid their audio-visual taxes compared to those who didn't. A similar proportion (75.0%) consumed alcoholic drinks relative to those who didn't (25.0%). Less than 10.0% of the respondents used tobacco products.

4.2.2 CONSUMPTION CHARACTERISTICS AND WILLINGNESS OF RESPONDENTS TO ACCEPT TAXATION

(i) House ownership: characteristic of respondents

Within the three employer categories, the proportion of those not owning houses was strongest (81.4%) within civil society. Proportionally, more males (29.4%) than females (13.3%) owned houses. 50.6% of the sample over 41 years old, 16.7% between 30 – 40 years and 7.7% under 30 years, owned houses. Despite nationals out-numbering expatriates almost 30:1 in the sample, an almost equal proportion of expatriates (26.1%) to nationals (24.6%) owned houses (although they were not asked if these houses were in Cameroon or abroad). In terms of origin of respondent, the relative proportion within the first three groups (expatriate, Savannah and forest) owning houses was fairly evenly distributed; expatriate (26.1%), Savannah (23.4%), forest zones (26.7%), and lowest level of ownership was with the Sahel group (15.4%). 29.7% of the regularly employed and 9.3% of the irregularly employed owned houses. 38.5% of respondents earning >1000 $US/month owned houses while 26.0% of the intermediate, 200-1000 $US and 10.0% of the < 200 $US/month did.

(ii) **Car ownership:** perception of taxation and characteristics of respondents

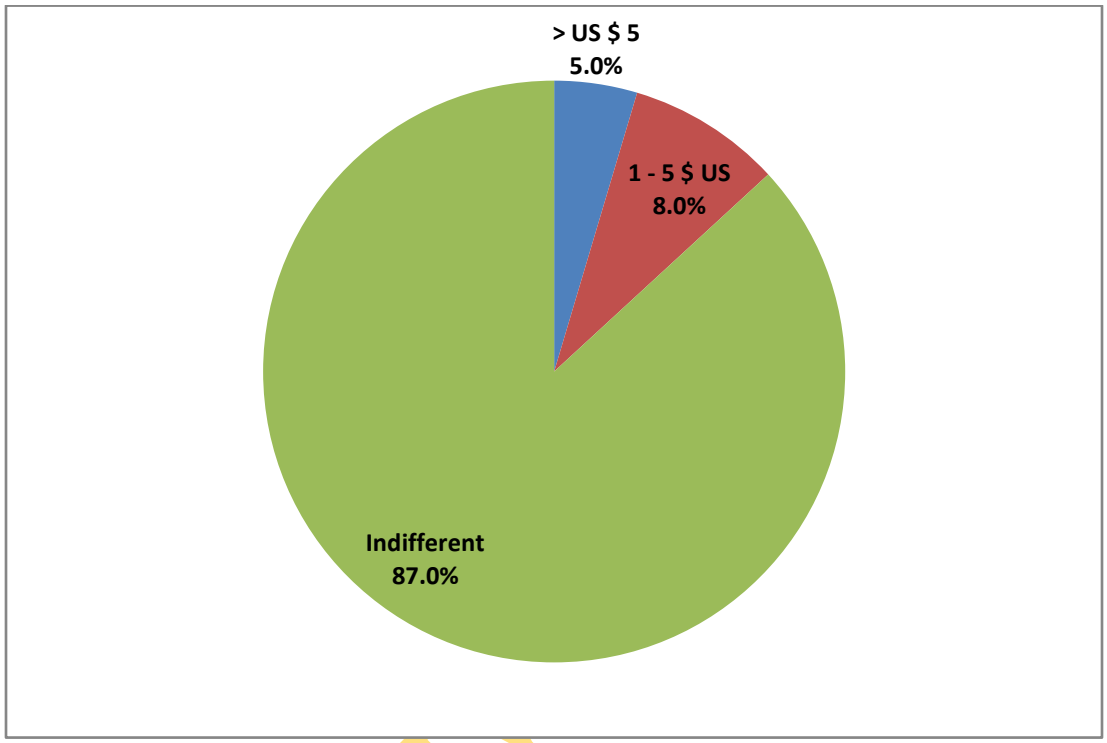


Figure 14: Proportions of respondents able to provide discrete amounts they would accept as taxation on aspects of car ownership

Source: Data was collected and analyzed as a part of this research.

More respondents in international NGOs (50.6%) than in government and para-public institutions (27.1%) and civil society (18.6 %), owned cars. Proportionally more males (33.2%), than females (26.7%) owned cars. The over 41s (61.0%) owning cars were almost 3.5 times more than the under 30s with personal cars. Almost three times as many expatriates, than Cameroonian nationals owned cars. 46.0% of Sahel respondents (making fewer than 5.0% of the sample) owned cars; whereas Savannah (27.0%) and Forest zone (26.0%) respondents were fairly evenly spread. In terms of employment status, 37.1% (regular employees) and 13.3% (irregular employees) owned cars. Between per/month income groups, percentage car ownership was distributed according to the ratio; 9:3:1 with respect to the >1000, 200-1000 and <200 $US/month. A similar ratio in the percentage proportions (9:3:1) was observed when car ownership was applied to respondents in senior, intermediate and junior decision-making positions.

(iii) Inter-city bus users' characteristics and their perception of taxation.

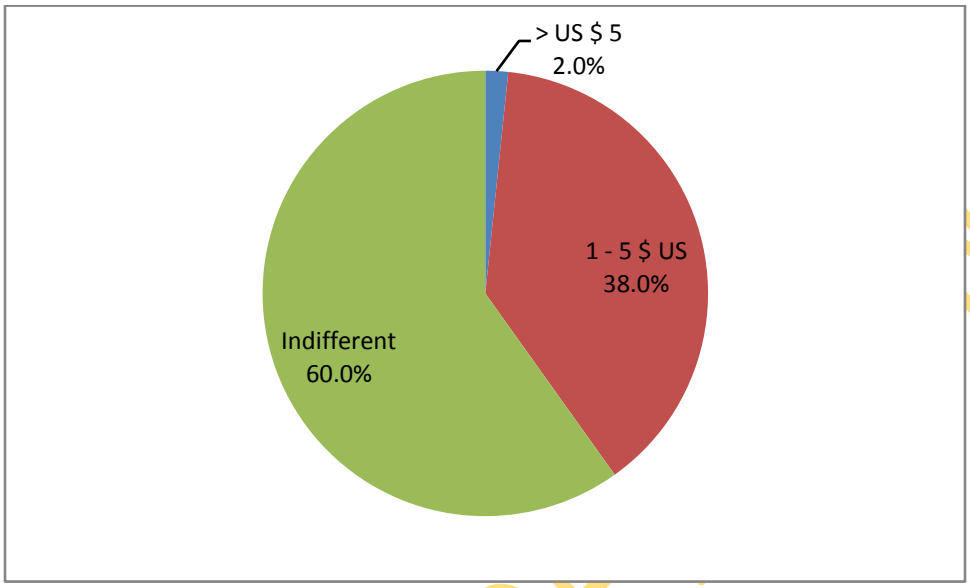


Figure 15: Proportions of respondents able to provide discrete amounts they would accept as taxation on inter-city bus fares

Source: The analyses and statistics are based on original data collected as a part of this research.

Slightly more respondents from civil society (89.7%), than International NGOs (73.0%) and government/para-statals (87.3%) used inter-city buses. The proportion of females (85.6%) and males (83.2%) using intercity buses was statistically similar (at CI =±3.7 - 5.3, 95% CL). In terms of age, use of inter-city buses between all age groups range between 80.0 – 87.0% with the 30-40 year olds being slightly more represented. Proportionally, two times as many Cameroonians (87.2%), compared to expatriates (43.5%) use inter-city buses (although the sample was more than 90.0% Cameroonian). But for exptriates (43.5%), the proportion of respondents from all three ecological zones using inter city bus services were statistically similar (CI =±3.7 – 5.3, 95% CL), i.e., 84.0%, 86.0% and 87.0%, with respect to Sahel, Savanah and Forest zones. Slightly more of the irregularly employed (89.3%) than the regularly employed (82.1%) used inter city buses. There was an inverse relationahip between per month income and use of intercity buses with respect to <200 $US/month (90.0%), 200-1000 $US/month (89.9%) and >1000 $US/month (61.5%). A similar inverse relationship (with slightly lower apparent variability) was observed between use of intercity buses by respondents of different decision-making levels, with respect to senior (62.8%), intermediate (86.3%) and junior positions (98.2%).

(iv) Air travel user's willingness characteristics and perception of taxation

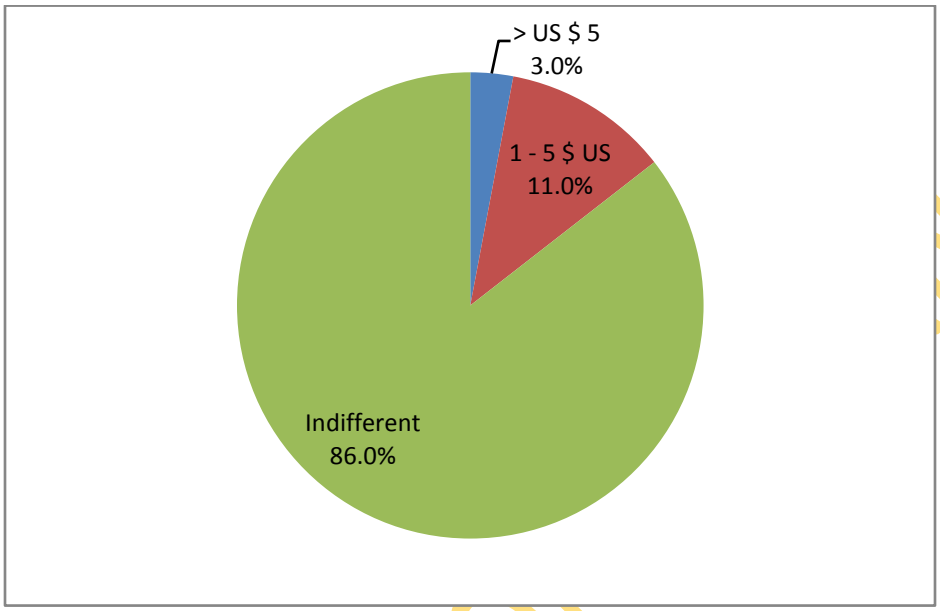


Figure 16a: Proportions of respondents able to provide discrete amounts they would accept as taxation on domestic air travel

Source: These analyses and statistics are based on original data collected as part of this research

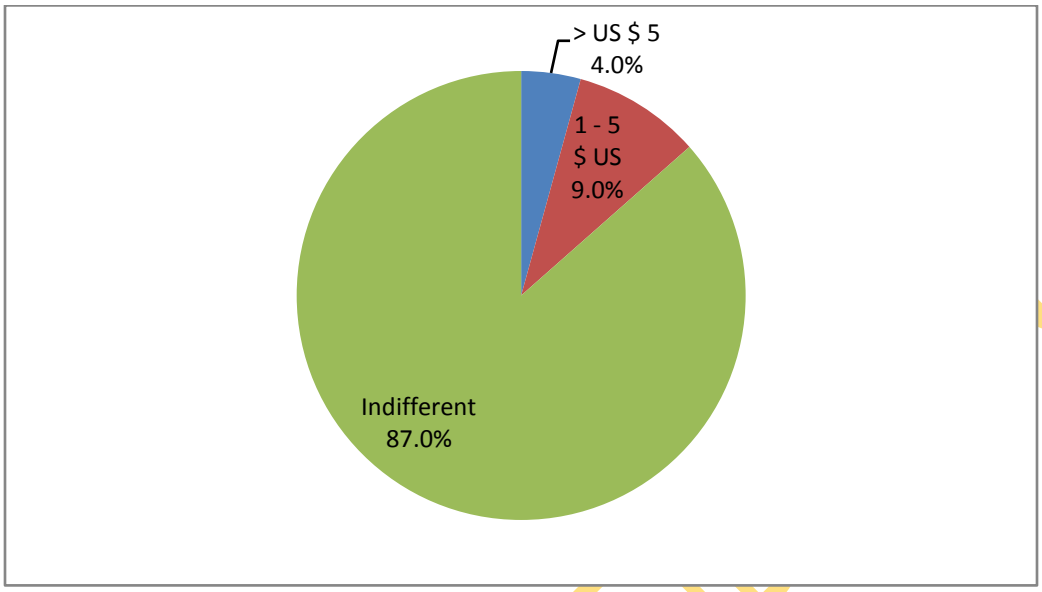


Figure 16b: Proportions of respondents able to provide discrete amounts they would accept as taxation on regional air travel

Source: These analyses and statistics are based on original data collected as part of this research

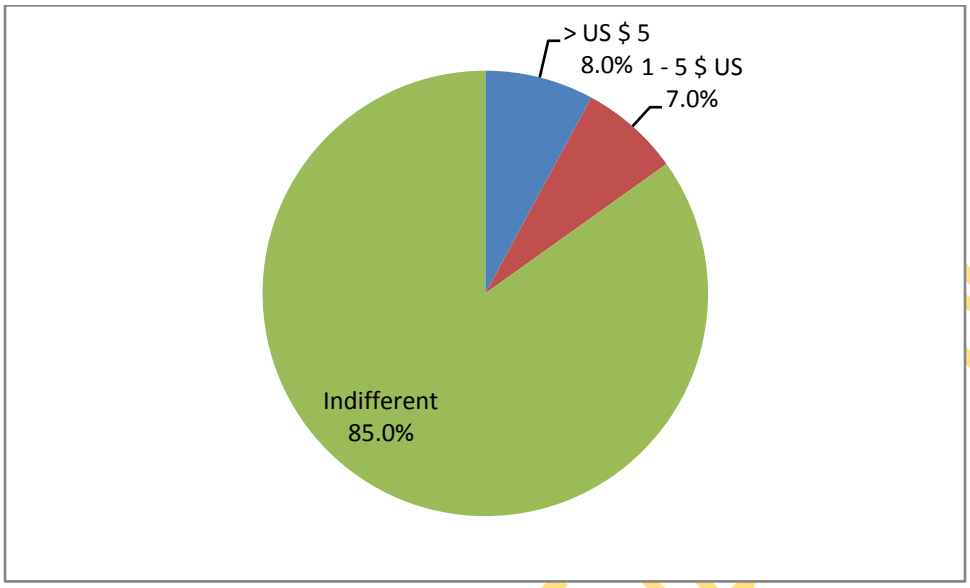


Figure 16c: Proportions of respondents able to provide discrete amounts they would accept as taxation on international air travel

Source: These analyses and statistics are based on original data collected as part of this research

More respondents from international NGOs (75.3%) than government/para-statals (42.4%) and civil society (30.9%) were regular air travellers. Almost as many males (49.5%) as females (45.6%) used air travel. There was an apparent progressive relationship between age and air travel amongst the repondents; > 40 years (66.3%): 30-40 years (48.0%) and <30 years (24.6%) probably due to the positive relationship between income and age within the sample. All (100%) expatriates travelled by air while the proportion of Camerooinans who did was 44.1%. Almost as many respondents from the savannah (40.9%), as from forest zones (45.8%), use air travel while people from the Sahel (61.5%) was higher. This is probably because fairly well-to-do Sahelians based in Yaounde in the south would travel conviniently by air to visit family in the north.

54.1% of regularly employed staff used air travel; over 20 percentage points more than the irregularly employed (30.7%). There was also a progressive relationship between air travel and $ US/month income in the order; >1000 $US (93.8%), 200-1000$US (45.9%) and <200 $US (16.3%). Decision-making seniority also showed a progressive relationship (though with less apparent variability than $ US/month income with air travel in the order; senior (88.4%), intermediate (50.0%) and junior (26.9%).

(v) Characteristics of use of tourism infrastructure (hotel rooms and restaurants) by respondents

Between 73.2% and 83.1% of respondents of all three employer categories used hotel facilities. The proportion for restaurant usage ranged from 92.4% – 95.9% across all categories. More males (83.6%) than females (63.3%) used hotels, while no difference was observed in restaurant usage. In terms of age distribution in hotel usage, an evenly spaced progressive relationship ranging from 61.5% – 93.3% is observed (information was not sought on categories of hotels). While restaurant usage, 92.3% – 94.0% was statistical similar (CI =±3.7 -5.3, 95% CL) for all age classes. More expatriates (95.7%) than nationals (76.2%) used hotels, while statistically similar (CI =±3.7 – 5.3, 95% CL) proportions (93.6%, 95.7%) used restaurants. Similar proportions, 78.6% and 75.9% of respondents from forest and savannah zones respondents, repectively used hotels, while the proportion of sahelian respondents (53.8%) was at least 20 percentage points lower than both of the previous groups. A statistically similar (CI =±3.7-5.3,

95% CL) proportion of all three groups (92.3% – 95.7%), used restaurants. More regularly employed respondents (82.5%) than the irregularly employed (62.7%) used hotels, like restaurants (95.6% to 88.0%). There was a progressive relationship between $ US/month income bracket and hotel usage, in the order 56.3%, 81.1% and 95.4%, with respect to the <200 $US, 200-1000$US and >1000 $US, income classes. This trend repeated itself with restaurant usage, though with lower apparent variability: 87.5%, 95.6%, 96.9% with respect to <200 $US, 200-1000$US and >1000 $US, income classes. There was also a progressive relationship between decision-making positions: junior, intermediate, senior and both hotel (65.6%, 81.0%, 90.7%) and restaurant usages (88.2%, 95.2%, 100%), though in keeping with the apparent general trend, restaurants were used more than hotel accomodation.

(vi) Characteristics of users of audio-visual tax services and their perception of taxation

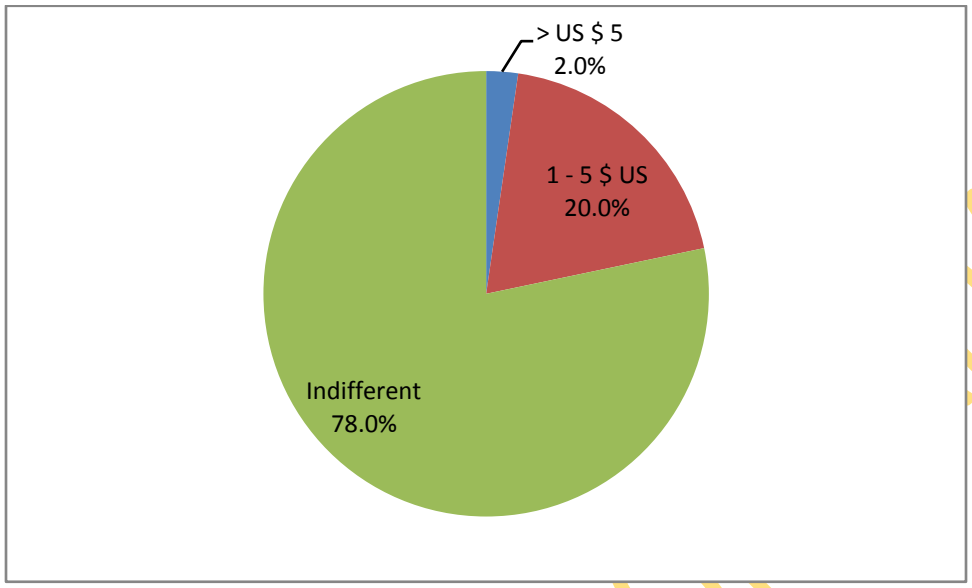


Figure 17: Proportions of respondents able to provide discrete amounts they would accept as taxation on audio-visual services

Source: These analyses and statistics are based on original data collected as part of this research

A greater proportion of respondents in government/para-public institutions 83.9%, than from civil society (69.1%) and international NGOs (59.6%) paid tax on these products and services. Proportionally more males (74.3%) than females (66.7%), paid tax on audio-visual products/services, while for the same products/services a progressive relationship was observed between age class and payment of the taxes: i.e., < 30 years (46.2%), 30-40 years (72.0%) and > 40 years (91.0%). Three times as many Cameroonian nationals (75.1%) than expatriates (34.8%) paid tax on audio-visual products/services. The payment of tax on audio-visual products/services by respondents of ecological origins; forests, savannah and Sahel were statistically similar (CI =±3.7-5.3, 95% CL) and ranged from 74.8% -76.9%. More than twice as many regularly employed respondents (84.7%) than the irregularly employed (33.3%) paid audio visual taxes, i.e., <200 $US (51.3%), 200 – 1000 $US (81.8%) and >1000 $US (73.8%); and with decision-making positions in organisations, the relationship was: junior (48.4%), intermediate (83.3%) and senior (79.1%).

(vii) Characteristics of respondents and perceptions of taxation on alcohol and tobacco products

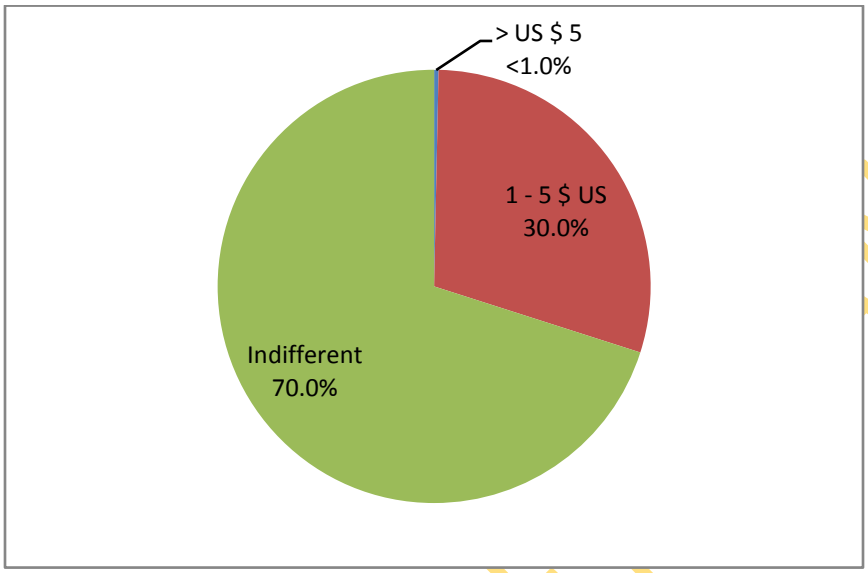


Figure 18a: Proportions of respondents able to provide discrete amounts they would accept as taxation on alcohol

Source: These analyses and statistics are based on original data collected as part of this research

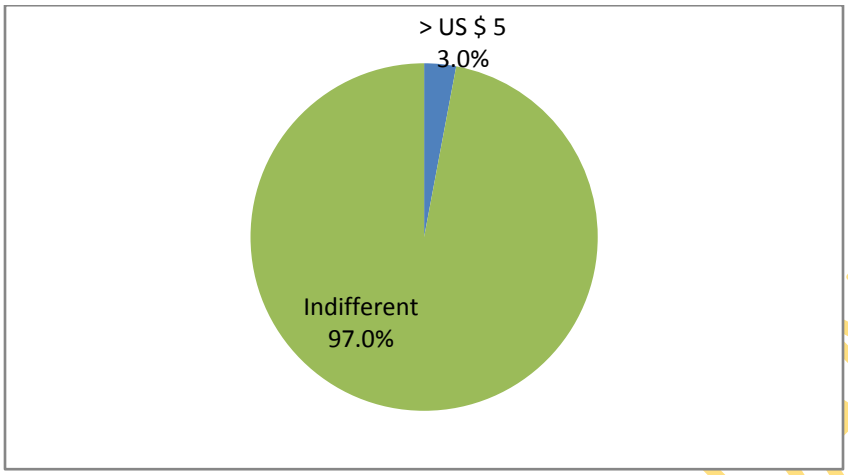


Figure 18b: Proportions of respondents able to provide discrete amounts they would accept as taxation on tobacco products

Source: These analyses and statistics are based on original data collected as part of this research

72.0% of respondents from government/para-public institutions consumed alcohol as compared to 66.3% (international NGO) and 66.0% (civil society). More males (76.6%) than females (50.0%) in the sample consume alcohol. There was a progressive relationship between respondent age and alcohol consumption in the order: <30 years (58.5%), 30-40 years (64.7%) and > 41 years (83.1%). Proportionally more expatriates (78.3%) than nationals (68.0%) reported consuming alcohol. In terms of ecological zones of origin, forest and savannah proportions were statistically similar (CI =±3.7-5.3, 95% CL) at 67.2% and 69.3% respectively, while Sahel was 61.0%.

The regularly employed (72.5%) consume alcohol relatively more than the irregularly employed (57.3%).

Across all employer categories between 4.5% - 8.5% of respondents use tobacco products; cumulatively, 9.8% of males while no females did. In terms of age class distribution 13.0% of the over 41 years use tobacco, 6.2% of the <30 years and just 3.3% of the 30-40 years. More expatriates (13.0%) than Cameronian nationals (6.4%) used tobacco. None from the Sahel, 8.4% from the forest zone and 5.1% from the savannah used tobacco. Although statistically similar (CI =±3.7-5.3, 95% CL), more regularly employed (7.4%), than irregularly employed (5.3%) used tobacco products. Within the income groups alcohol consumption between the 200 – 1000 $US/month and the >1000 $US/month income class was statistically similar (CI =±3.7, 95% CL) at 70.8% and 72.3% repectively, and at least 10 percentage points higher than the <200 $US/month income class. Within the income groups, more respondents of the 200 – 1000 $US/month (8.8%), than the >1000 $US/month (6.2%) and the <200 $US/month used tobaco products. 14.0% of respondents in senior decision-making positions used tobacco products as opposed to 7.5% for junior, and 4.8% for intermediate positions. 86.0% of senior staff responded as alcohol consumers while amongst the junior and intermediate category consumption rate was 65.0%.

4.2.3 REFERANDUM ON TAXATION FOR BIODIVERSITY CONSERVATION

Table 16: Levels of agreement with the biodiversity taxation 'principle'

Respondent Characteristic		YES (%)	NO (%)
Employer type		78.67	21.33
Sex		77.82	20.50
Age		79.67	20.67
Expatriates		82.50	17.50
Ecological zone of origin		75.33	24.67
Employment regularity		79.00	21.00
Income		79.33	21.33
Decision-making levels		79.33	20.67
Statistics	Mean	78.96	20.96
	Std. Deviation	1.99	1.94

Source: These analyses and statistics are based on original data collected as part of this research

4.2.4 WILLINGNESS TO ACCEPT TAXATION AND REVEAL AMOUNTS

Table 17: Frequency and $US amounts respondents would be willing to accept as taxation to conserve forest biodiversity

Products/services ↓	*Taxation* ⟶ *range*	> US $ 5	1 - $ US 5	Reserved
	Forest products	12	22	270
	Vehicle (ownership) tax	14	26	264
	Tax on fuel	1	22	281
	Audio visual products	7	59	238
	Intercity buses	5	117	182
	Domestic air travel	9	35	260
	Regional air travel	13	28	263
	International air travel	24	22	258
	Alcoholic products	1	90	213
	Tobacco products	9	0	295
Summary statistics	Mean	9.5	42.1	251.7
	Std. Deviation	6.8354	36.0292	32.1146

Source: These analyses and statistics are based on original data collected as part of this research

4.2.5 COMPARISON OF RESERVATIONS TO REVEAL TAX AMOUNTS

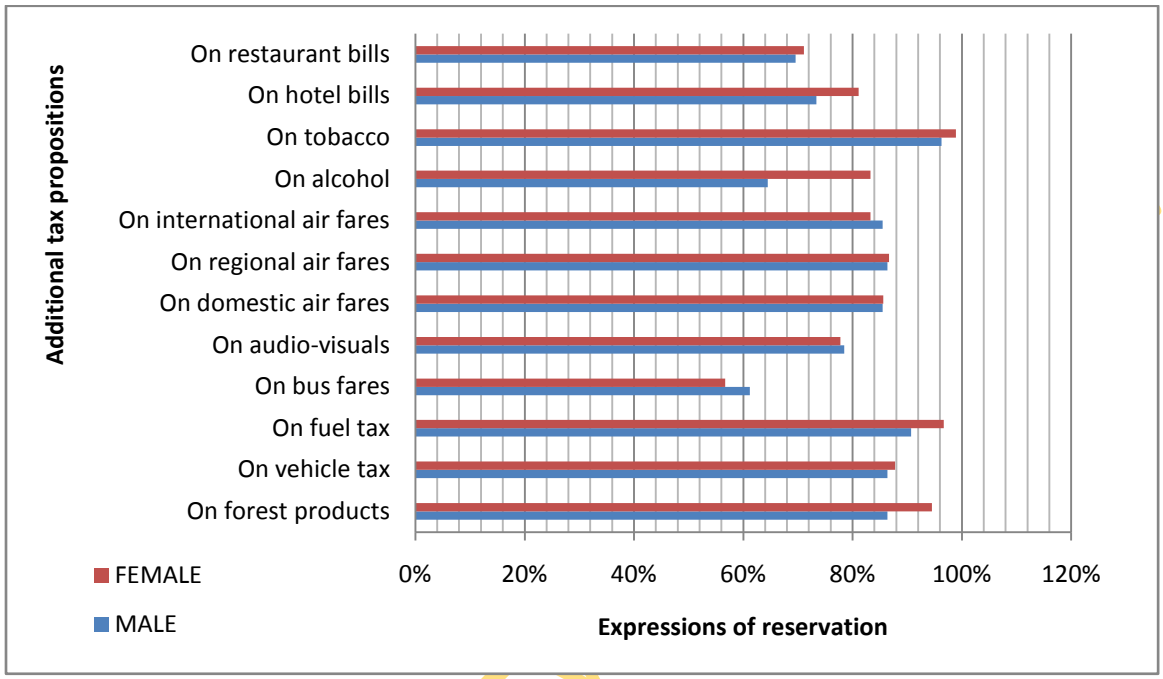


Figure 19: Summary of extents of reservations to reveal acceptable taxation amounts by Gender (Sex)

Source: These analyses are based on original data collected as part of this research

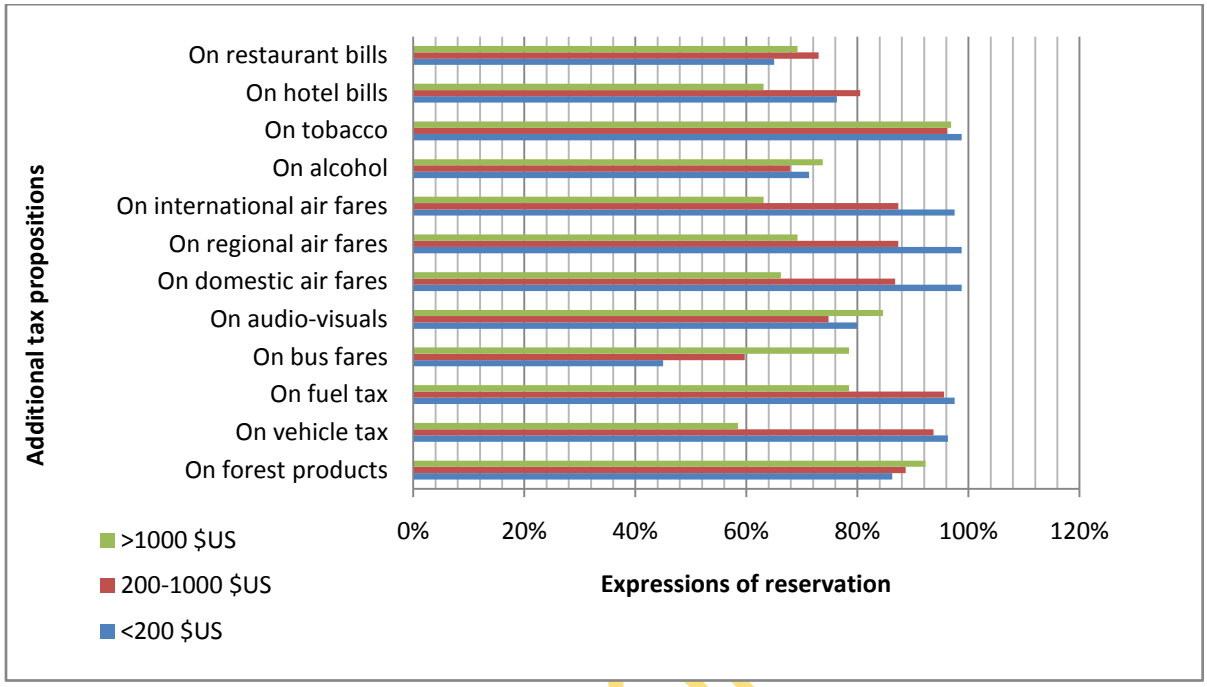


Figure 20: Summary of extent of reservations to reveal acceptable taxation amounts by income bracket

Source: These analyses are based on original data collected as part of this research

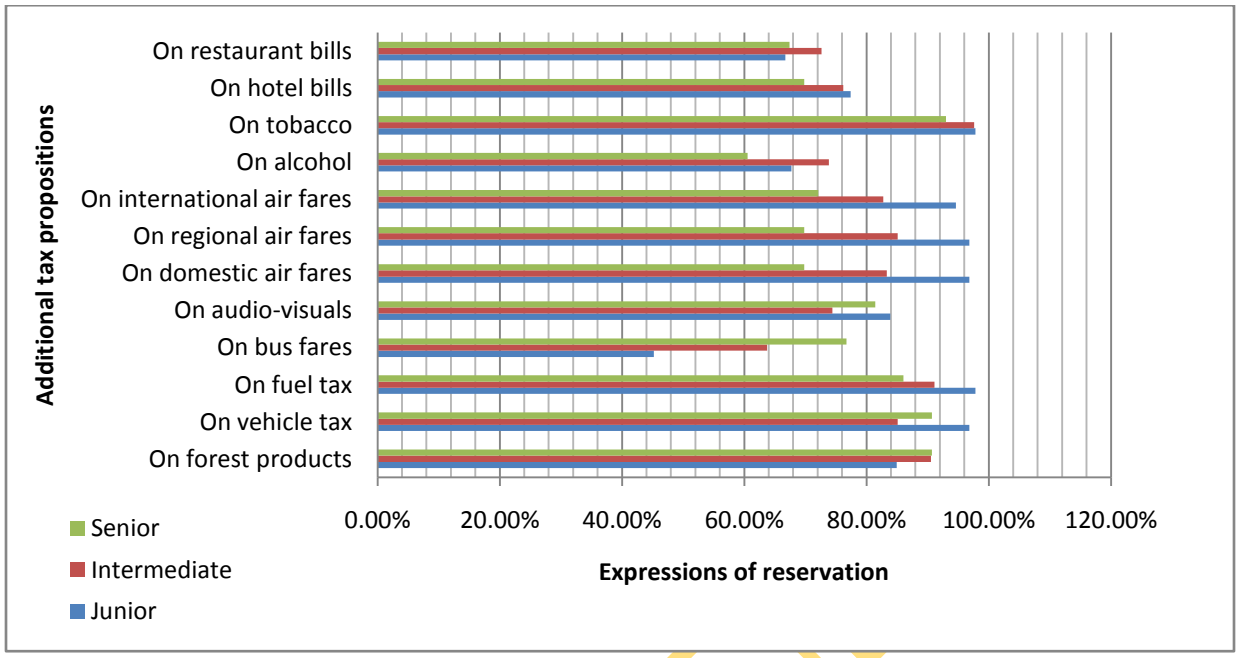


Figure 21: Summary of extent of reservations to reveal acceptable taxation amounts by decision-making position

Source: These analyses are based on original data collected as part of this research

4.2.6 ASSOCIATIONS BETWEEN RESPONDENT CHARACTERISTICS AND CONSUMPTION PREFERENCES

Table 18: Summary of associations between respondent characteristics and their consumption behavior

Respondent Characteristics	House ownership	Car ownership	Inter-city bus use	Air travel	Hotel	Restaurant Usage regularity	Audio-visual tax	Alcohol	Tobacco
Sex	χ^2 = 8.8, df=1, *p<0.05*	None	None	None	Fisher's = 15.3, *p<0.05*	χ^2 = 16, df=2, *p<0.05*	None	χ^2 = 20.9, df=1, *p<0.05*	χ^2 = 9.4, df=1, *p<0.05*
Age	χ^2 = 47.3, df=2, *p<0.05*	χ^2 = 547, df=2, *p<0.05*	None	χ^2 = 26.1, df=2, *p<0.05*	Fisher's=25.5, df=4, *p<0.05*	None	χ^2 = 37.5, df=2, *p<0.05*	χ^2 = 12.9, df=2, *p<0.05*	None
Employer	χ^2 = 23.7 (df=2, *p<0.05*		χ^2 = 11.2 (df=2, *p<0.05.*	χ^2 = 39.3 (df=2, *p<0.05*	None	χ^2 = 19, df=4, *p<0.05*	χ^2 = 15.6, df=2, *p<0.05*	None	None
Decision-making seniority	χ^2 = 26, df=2, *p<0.05*	χ^2 = 44.3, df=2, *p<0.05*	χ^2 = 16.9, df=2, *p<0.05*	χ^2 = 44.9, df=2, *p<0.05*	Fisher's=14.3, *p<0.05*	χ^2 = 20.1, df=4, *p<0.05*	χ^2 = 37.5, df=2, *p<0.05*	None	None
Income	χ^2 = 16.2, df=2, *p<0.05*	χ^2 = 76.5, df=2, *p<0.05*	χ^2 = 30.5, df=2, *p<0.05*	χ^2 = 87.3, df=2, *p<0.05*	Fisher's=35.3, *p<0.05*	None	χ^2 = 24.7, df=2, *p<0.05*	None	None
Nationality	None	χ^2 = 25.6, df=1, *p<0.05*	None	χ^2 = 26.6, df=1, *p<0.05*	None	None	χ^2 = 17.1, df=1, *p<0.05*	None	None
Ecological origin	None	Fisher's =25.5, *p*<0.05	Fisher's =22.3, *p*<0.05	χ^2 = 28.8, df=3, *p<0.05*	None	None	Fisher's=15.1, *p*<0.05	None	None
Regularity of employment	χ^2 = 12.6, df=1, *p<0.05*	χ^2 = 14.8, df=4, df=1, *p<0.05*	None	χ^2 = 12.5, df=1, *p<0.05*	Fisher's = 12.9, *p*<0.05	None	χ^2 = 74.1,, df=1, *p<0.05*	None	None

χ^2 = Chi-square value; df = degrees of freedom; *p* = confidence level of significance of association

Source: These Chi-square tests are based on original data collected as part of this research

4.2.7 TEST OF CONCORDANCE ON RESPONDENT AWARENESS AND PERCEPTION OF RESPONSIBILITY TO MITIGATE BIODIVERSITY LOSS

Table 19: Statements (S) soliciting respondent's perception of biodiversity loss and responsibility for mitigation

ID	Statements
S1	Unwise exploitation of community forests can lead to irreversible biodiversity loss
S2	Loss of plant biodiversity can affect conservation of other types of biodiversity
S3	Cameroon should seek national financial resources to ensure biodiversity conservation
S4	Biodiversity conservation is not just an affair of rich countries but of poorer ones too
S5	Biodiversity conservation in Cameroon requires the participation of all citizens

Source: These statements were developed as a part of this research and inspired by respondents during the pilot.

Table 20a: Kendall W Rank Test of Concordance results

	Mean Rank
Statement 1	3.61
Statement 2	3.45
Statement 3	3.05
Statement 4	1.32
Statement 5	3.57

Source: These results are based on analyses of original data collected as part of this research

Table 20b Kendall's W Ranks Test Statistic

N	**304**
Kendall's W[a]	.588
Chi-Square	715.233
Df	4
Asymp. Sig.	.000

a. Kendall's Coefficient of Concordance

Source: The test statistics are derived from the analyses of original data collected as part of this research.

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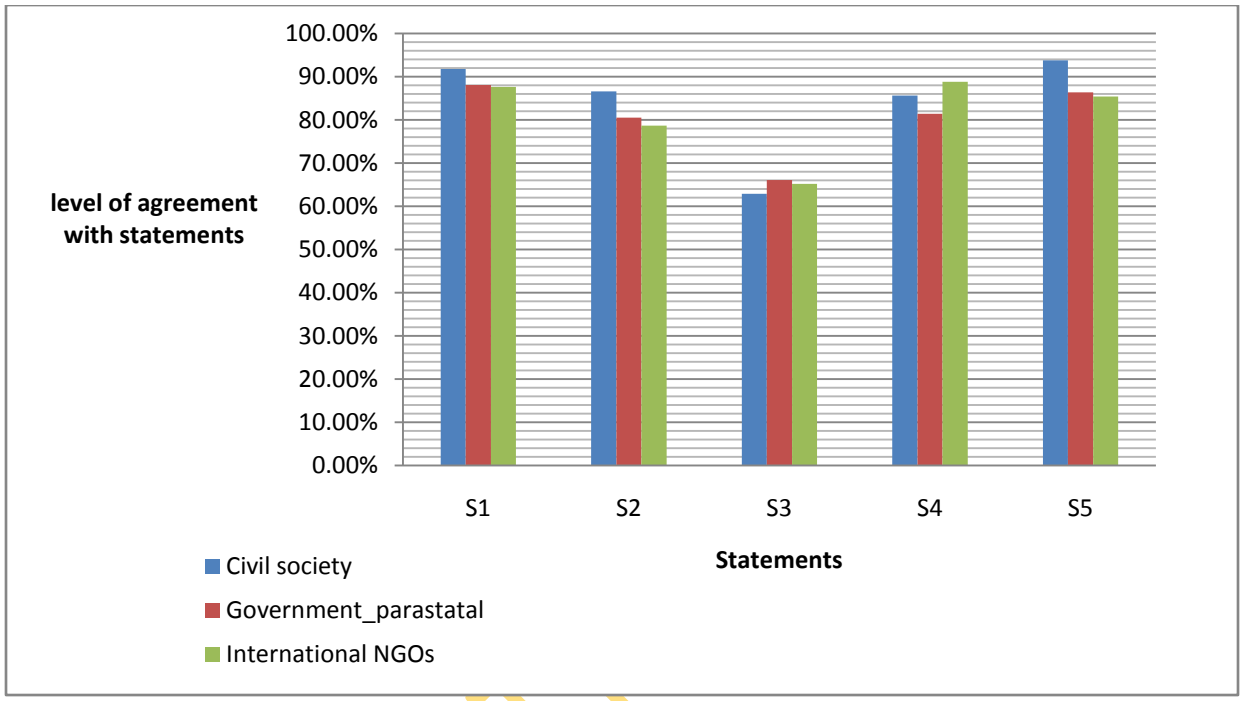

Figure 22: Summary levels of agreement with statements on awareness and perception of responsibility for biodiversity loss mitigation

Source: This analysis was performed using original data collected as part of this research.

4.2.8 TEST OF CONCORDANCE ON CONDITIONS FOR ACCEPTING BIODIVERSITY TAX

Table 21: Statements expressing conditions (C) for accepting taxation to pay for biodiversity conservation

ID	Statements
C1	If it ensured forests and wildlife management
C2	If it secured livelihoods of nearby communities?
C3	If it ensured livelihoods, forest and wildlife management?
C4	If the funds are managed by Nongovernmental Organizations?
C5	If the funds are managed by Government?
C6	If funds are managed collegially by government, NGOs, and local councils?
C7	If tax-payer can opt out if funds were not being transparently managed?
C8	If tax payers are informed regularly about use of funds and progress of projects?

Source: These statements were developed as a part of this research and inspired by respondents during the pilot.

Table 22a: Kendall's W rank test of Concordance on the conditions

Conditionality	Mean Rank
Conditionality 1	5.06
Conditionality 2	4.23
Conditionality 3	5.76
Conditionality 4	4.20
Conditionality 5	2.81
Conditionality 6	3.42
Conditionality 7	5.40
Conditionality 8	5.12

Source: These results are based on original data collected and analyzed as part of this research.

Table 22b: Kendall W Test

N	**304**
Kendall's W[a]	.269
Chi-Square	573.487
Df	7
Asymp. Sig.	.000

a. Kendall's Coefficient of Concordance

Source: The test statistic is based on original data collected and analyzed as part of this research.

4.2.9 LEVEL OF AGREEMENT/DISAGREEMENT WITH CONDITIONS FOR SUPPORTING A BIODIVERSITY TAX

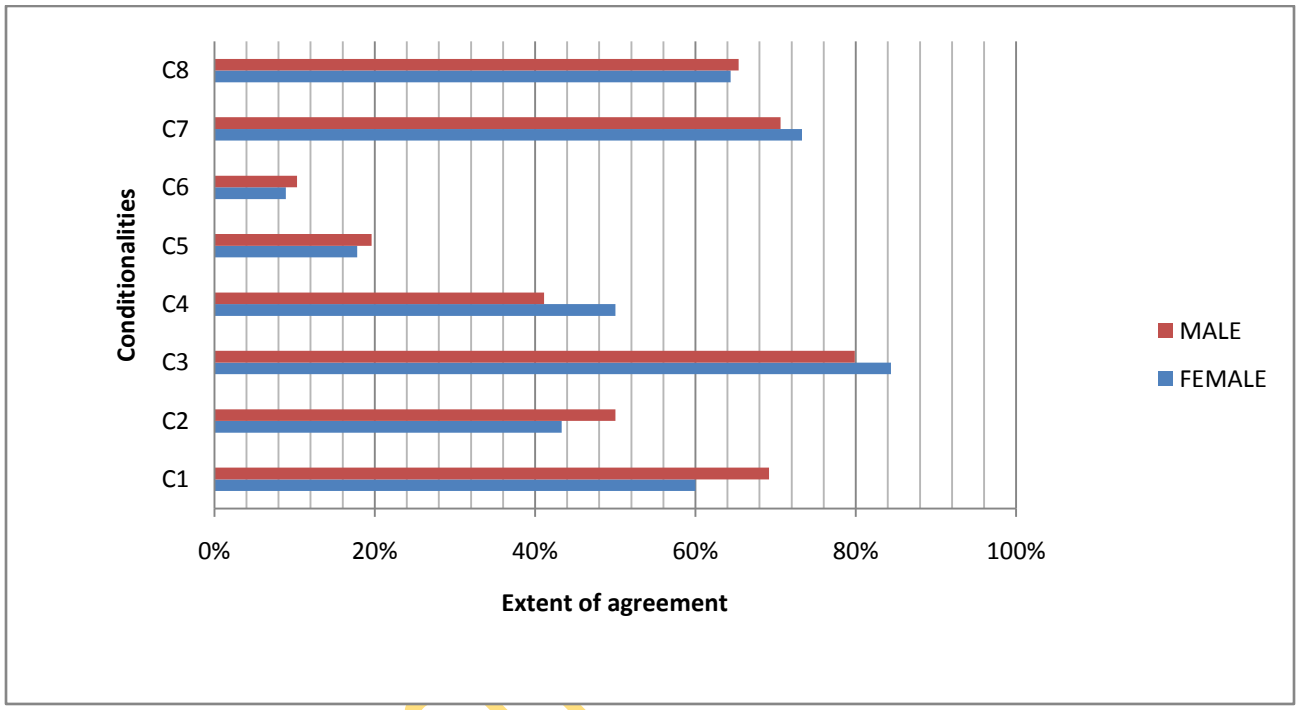

Figure 23a: Summary extent of agreement with conditions by gender (Sex)

Source: These analyses are based on original data collected as part of this research.

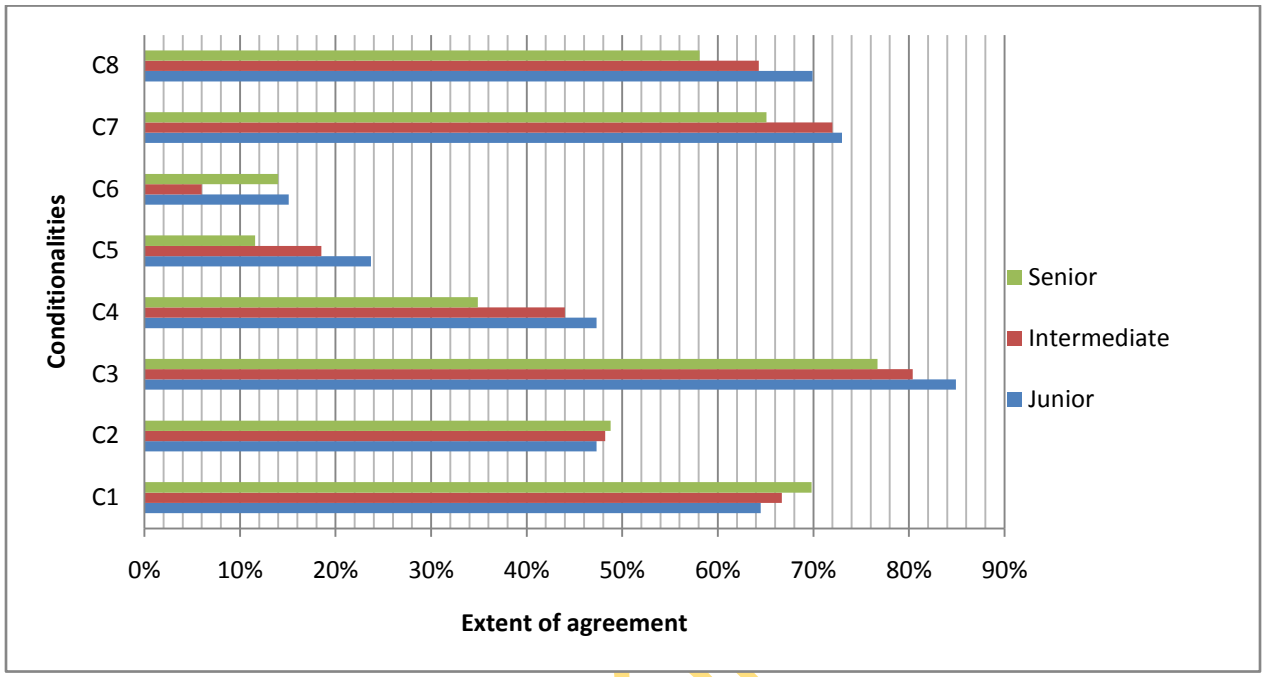

Figure 23b: Summary extent of agreement with conditions by seniority in decision-making

Source: These analyses are based on original data collected as part of this research.

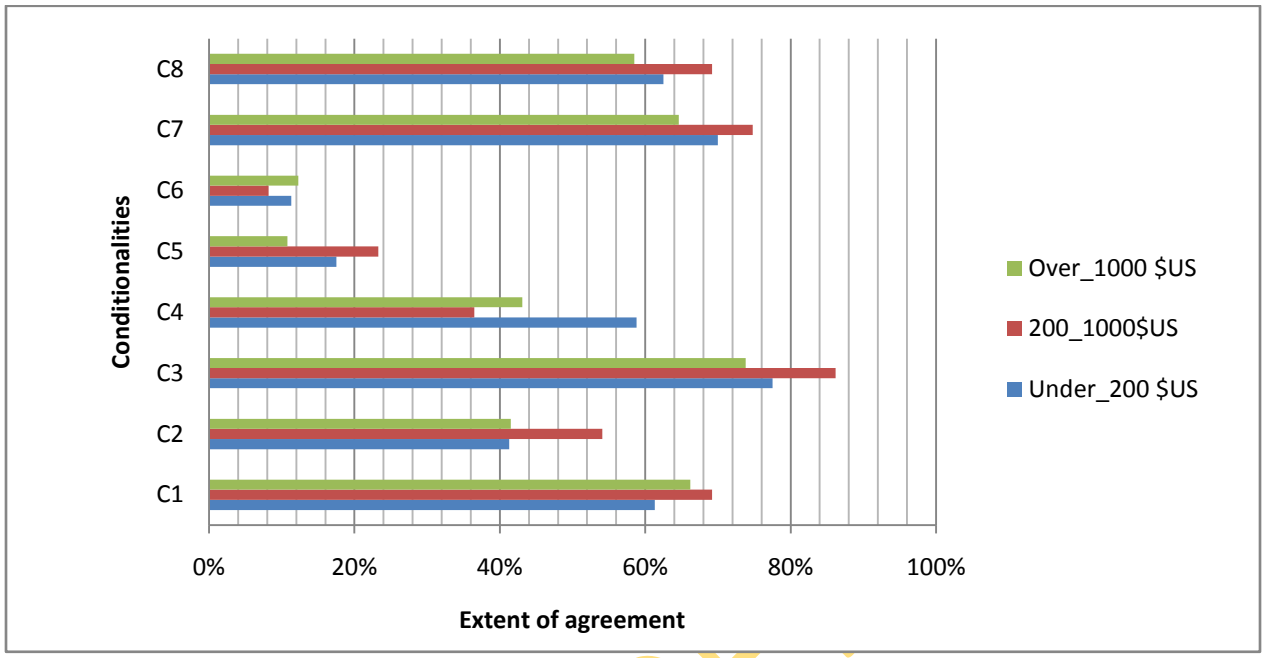

Figure 23c: Summary extent of agreement with conditions by income bracket

Source: These analyses are based on original data collected as part of this research.

4.2.10 ASSESSING DISPERSION WITHIN RESPONDENT CATEGORIES USING STANDARD DEVIATION

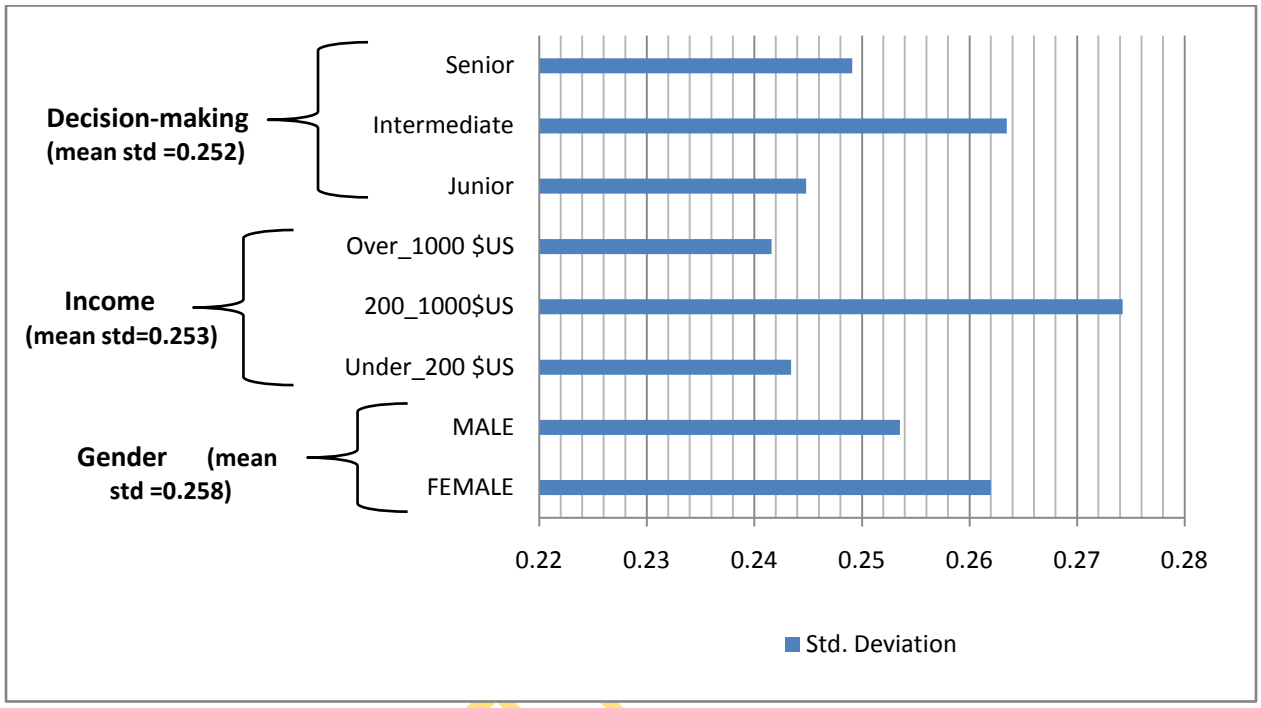

Figure 24: Evaluation of extent of 'dispersion' in agreements with conditions across categories

Source: These analyses are based on original data collected as part of this research.

CHAPTER FIVE

5.0 DISCUSSIONS

5.1 SOCIAL DYNAMICS, PRODUCTION AND REVENUE POTENTIAL OF NTFPS

5.1.1 SIGNIFICANCE OF POPULATION CHARACTERISTICS IN STUDY SITE

Overall, there are almost two times as many Bantus than Pygmies in the study site. There are villages like Abakoum with a dominant Pygmy population, while there are no Pygmies in Nemeyong. Based on the assumptions of comparative advantage or disadvantage in access underlying the research questions, this distribution facilitates interpretations of the effects of dominance or lack thereof, by one racial group over another in the use of NTFPs. There is also a gradation in the size of the Pygmy populations in a decreasing order in Abakoum, Djebe, Djenou and Nemeyong. This permits corroboration with the effect of observed population dominance in one village with NTFP use observations in the next comparable site. Finally, all respondents, irrespective of racial group, use the NTFPs to varying extents. This finally, enables comparisons of trends in NTFP, when performed on a common basis.

5.1.2 SOURCES OF NTFPs INDICATIVE OF *DE FACTO* CONTROL OF ACCESS RIGHTS

There is differentiated access to land use systems to collect two high economic value NTFPs (*Baillonella toxisperma* and *Irvingia gabonensis*) by the two main racial groups in the study site: Bantus and Pygmies. The results are strongly indicative of both higher degrees of access to the land use systems containing these resources by the Bantu communities and thus, of *de facto* stronger, local control of access rights claimed by them as a result, compared with Pygmy groups. In the case of collection of *Baillonella toxisperma* and *Irvingia gabonensis*, no Pygmy respondent reported collection of NTFPs from fallowed lands. This may not mean that they do not. It simply

suggests that the incidence is low. Fallowed lands as were observed in the study site and have been so by others (Degrande, 2005, Gokowski, 2004, Kanmegne and Degrande, 2002), are previous farmlands, left to regain fertility (often after 5-7 years or more in forest zones) and Pygmy populations are only recently starting to cultivate farmland to a significant extent in the villages covered. Fallowed fields are also much closer to village centres, which means Bantus make less effort to collect same species as do Pygmies, though both live in the same village space. Pygmies also face increasing pressure from recent arrivals in the village, many of whom are Bantus.

Pygmy populations on the other hand continue to use virgin forests and to a significant extent secondary forests as sources of both *Baillonella toxisperma* and *Irvingia gabonensis.* Note that, the use of these largely undisturbed forests by Pygmies is both an indication of their existential relationship with forests. For Pygmy families starting to be sedentary, continued disproportionate use of virgin forest is an indication of the greater distances they have to cover to collection points, in comparison with their Bantu neighbors.

In general terms, sourcing of *Baillonella toxisperma* and *Irvingia gabonensis* by village location; results show a predominance of collection from virgin forests in villages like Abakoum with a dominant Pygmy population, with the reverse being the case such as in Nemeyong where no Pygmy groups were recorded. How *Baillonella toxisperma* and *Irvingia gabonensis* are distributed in the area, largely within virgin forests, also helps to re-enforce the knowledge of greater *de facto* access by the less sedentary Pygmies. It also provides an insight to preference for secondary forests by Bantus and possible explaination of the relatively low deforestation rates through slash and burn agriculture, mainly practiced by Bantus. It therefore also underlines how Bantus as a social group using secondary and fallowed forest more, tend to be more associated with agriculture, whearas Pygmies, being more closely linked to virgin forests are pre-dominantly hunters and gatherers.

Riconodendron heudelotii is not represented graphically in the results. This resource species occur in larger quantities (compared with *Baillonella toxisperma* and *Irvingia gabonensis*) within all

land use systems covered; fallows, farmlands, virgin forests and near villages (home gardens), rendering access to its products much less contentious and not significantly variable.

Results show predominant sourcing of *Baillonella toxisperma* from virgin forests in the case of Abakoum (with a majority Pygmy population) and from fallows in Nemeyong (with no Pygmy population). The predominance of secondary forest collection from Nemeyong may also be due to higher levels of Bantu agricultural activities which transform virgin forest, against lower agricultural activities in Abakoum (with a higher non agrarian Pygmy population). Equally, the occurrence of *Baillonella toxisperma* in secondary forests in Nemeyong may also be a reason for not venturing much further afield for collection.

Results also show that, in the case of Nemeyong (no Pygmies) Bantus also collect NTFPs from virgin forests, especialy, if the product is of sufficient economic importance , such as where the species have a strong enough local demand. This result demonstrates that to address the constraint of access, much more than customary rights confered on groups by virtue of their physical location need to be addresed. The economic importance of the product to which they should have access and the relationship of that user group to others at the local level remain as important.
This assertion is corroborated in the case of *Irvingia gabonensis* (with high local market value) where an almost 60.0% collection rate from virgin forests in Abakoum is observed (with a majority Pygmy population) and the rest from secondary forests. This suggests that where access is almost guaranteed and marginalisation, reduced, disfavoured groups can benefit from nearby resources, expending proprortionate effort and collect products from such systems.

5.1.3 SPATIAL ASSOCIATIONS BETWEEN ETHNIC/RACIAL GROUPS AND NTFPs

A strong statistical relationship was observed by chance between Pygmy groups and *Gnetum africanum*. This helped reenforced an emerging lesson. The local market potential for *africanum* remains relatively low and the species constitutes less of a component in local Bantu diets as it does for Pygmy communities. Hence, here again a stronger relationship between a species of low, local economic value is associated with a generally marginalized social group.

The assessment of dependence in the relationships between the population size, their racial composition and distances covered to collect the different NTFPs, showed strong associations largely between Pygmy groups and longer distances to NTFP collection points.

In both Abakouma and Djebe (with relatively large Pygmy population) the largest incidence of distances to collection sites of >10 km is observed. The relationship between racial group size (Pygmy) and greater distances covered to collection site also holds true for access to *Irvingia gabonensis*. Greater distances (>10 km) to collect *Irvingia gabonensis* were thus generaly covered in villages with bigger Pygmy populations.

Pygmies generally used the forest more, though in a context of competition for resources with strong local marklet value. In such sitiations the more marginalized groups, like Pygmies would tend to be pushed further from the village than the dominant ones, to collect the same resource.

In the case of of *Baillonella toxisperma*, almost 80.0% of Bantus cover between 0 and 10 km to collect *Baillonella toxisperma* while almost 60.0% of Pygmies go beyond 10 km from the village center to collect the same resource.

Unsurprisingly, in terms of distances covered by racial group to *Ricinodendron heudelotii* sites; in all four communities 100% of individuals (of both races) had access to *Ricinodendron heudelotii* within less than 5km from villages. At face value, this may be a strong point in favour of indigenous trees domestication (see Leakey and Tchoundjeu, 2001), which seeks to bring abundant quantities of trees of NTFP resources species closer to homestead in order to reduce the need for conflict between social groups. This likelihood however, has to be weighed against the comparative costs of training, multiplication, cultivation and management of domesticated stands,

against the current collection effort and long term market or other values of the domesticated products.

Through both the findings and the proven associations between distances covered to NTFPs sources and racial group, especially for *Baillonella toxisperma and Irvingia gabonensis* the null hypothesis of no association between racial group and access to NTFP is thus rejected.

5.1.4 SOCIAL/RACIAL GROUP RELATIONSHIPS WITH 'OFF-SEASON' NTFPs

Within the NTFP production calendar there is what can be termed 'on-season', peak season, or the main production period of these NTFP resource species, often from July to October and others considered 'off-season' or lean season due to very low production or for some trees, no production at all. There is known physiological dormancy in *Irvingia gabonensis* and *Baillonella toxisperma* or 'off-seasons' (Schneemann, 1995). Nevertheless, not all trees of these species are off fruiting or 'off-season' at the same time and to the same extent each year. Therefore, although technically 'of-season' at an individual tree level, there is production during the months, November to June at a system or 'community forest' level. Only continuous monitoring of activities of social/racial groups with existential relationships with NTFPs is capable of bringing this fact to the surface.

From the results of the colection of NTFPs during 'off-season' months as observed in this study, it is clear that a partern emerges which links *not* the size of the village community, but its user group composition to quantities of NTFPs collected. Thus, it is fair to assert that the scope of NTFPs collection is determined not by the size of the total polpulation in the locality being considered, but by that of the user groups with the strongest relationships, both in space and culture, with that resource.

It is important to recall that Abakoum is 63.0% Pygmy while there are no Pygmies in Nemeyong. Djebe is a consistent second after Abakoum in the ranking of off-season production of *Baillonella toxisperma* and *Irvingia gabonensis* Djebe, similarly has the second largest Pygmy population. At least for *Baillonella toxisperma* (r = 0.88) and *Irvingia gabonensis* (r = 0.88) there are reasonably strong correlations between the size of the Pygmy community and the extent of off-

season NTFP activity. The weak correlations observed between *Ricidodendron heudelotii* and the Pygmy population size (r = 0.39) can be attributed to the product's comparative lower local consumption, low local market value and lack of incentive for competition over it, added to its ubiquitous distribution.

Furthermore, there are cases of even negative correlation between Bantu populations and off-season NTFP activity (especially with respect to *Ricinodendron heudelotii*). This can firstly be explained by Bantu emphasis on other activities during off-season, underlining their relative non-dependence on NTFPs, especially species proven to be problematic in marketing and technological terms. It can be deduced from this negative correlation, an influence from Pygmy groups where a combination of their stronger association with NTFPs despite the comparatively small size of the user group population (compared to Bantus) produces a reverse tendency, or negative correlation, where a lower group size becomes associated with a higher quantity of NTFPs and vice versa in the case of Bantus who in some cases do not collect *Ricinodendron heudelotii*, at all despite being the majority group.

Note that the Chi-square test of association between the 'undifferentiated' village population size and NTFP activity was not significant ($p > 0.05$). This can be partly explained by sample size of village communities (being non normal) which could not sufficiently allow for a pattern to emerge. Though not conclusive it may also support the finding on correlation between user group size and 'off-season' production. This suggests that association between user groups and the NTFP resources has less to do with population size *per se*, of the community, and more to do with the size of the specific user group of that resource.

It may also be noted that 'opportunistic production' where Bantus tend generally to dominate occurs over a maximum of 4-5 months (during peak production seasons, focusing on species with highest local market value), while the more 'existential' or off-season collection (where Pygmies dominate) occurs over an additional seven (7) months. The longer the period of analyses the more likely it is for a pattern to emerge (hence the off-season correlations). It is thus fair to state that strong differences exist regarding how the different racial groups react or relate to NTFP seasonality; and therefore 'circumstantially' rejecting the hypothesis of no relationship between racial group and response to NTFP seasonality.

5.1.5 NTFPs REVENUE PROFILES AND PERCEPTIONS OF LOCAL DEMAND

The revenue profile from NTFPs over a number of years is critical if non destructive uses of forests is to become economically viable and therefore an attractive option. Unlike proposed payments for forest carbon (fixed annual payments per hectare over a commitment period), revenue from NTFP are subject to labor constraints, physiological dormancy, abundance of resource species and observed, competitive relationships between people and with the resource. Thought the revenue profile for NTFPs appears like many others, for physiological and social reasons, the underlying dynamics remains highly complex.

From our *t*-test of the six-year simulated discounted revenue profile there is significant difference year to year ($t = 6.8$, $df = 5$, $p<0.05$) in projected revenue from NTFPs.

The one sample *t*-test statistic is 6.791 and the *p*-value from the statistic was .001 which is less than 0.05 (the level of significance usually used for the test). The *p*-value indicates that it is highly unlikely that the ratio of two yearly mean productions of NTFPs can be 1. The null hypothesis is thus upheld implying that significant ($p<0.05$) differences would occur in discounted NTFPs revenue from year to year.

Furthermore, from the test statistic, there is a mean gross revenue of over $US 43,000, roughly equivalent to the total value of *Baillonella toxisperma* over the six years. Incidentally over the same period, *Irvingia gabonensis* is projected to produce almost twice the monetary value of *Baillonella toxisperma,* with *Ricinodendron heudelotii* projected to be worth almost four times the revenue from *Baillonella toxisperma*. As will be argued later-on discrepancies can exist between the revenue potential of NTFPs and the actual local perceptions of market worth of a species. This has been a constraint, which due to technology has bedeviled the NTFP sector for many decades.

In addition to possibilities of supply instabilities for NTFPs, discrepancies existing between possibilities of projections and what are actually saleable at local level can be strong. Despite the comparatively higher revenue potential of *Ricinodendron heudelotii* on paper, it is observed that, the demand for this NTFP remains exceedingly weak at local levels. The inferred ‘demand mix’,

used in this study assumes a gradation of strong 'market potential' occurring in relation to the type of market actor in the value chain. This trends in a decreasing order, from middle traders (who are entrepreneurs and working to re-sell in bigger markets), to the opportunistic passers-by (who work on a 'take-it-or-leave-it' bases), to other villagers and least, neighbors, who require NTFPs mainly for home consumption or as a gift to a visiting friend or relative.

It can be observed in the demand mix that neighbors, perhaps the actor with the weakest demand in the link remains the main requesters of *Ricinodendron heudelotii*, while *Baillonella toxisperma* and *Irvingia gabonensis* are considerably requested by middle traders – the strongest demand actor in the mix.

All three products surveyed are purchased at 'farm-gate' although *Ricinodendron heudelotii* (in great demand nationally in Cameroon) continues to show weaknesses in terms of its local demand within the study location. So, when products are available they are purchased largely at 'farm-gate'.

Though 'farm gate' demand would ordinarily be indicative of strong potential, it also indicates unwillingess for collectors to incur costs to sell beyond the village. Thus, while *Baillonella toxisperma* is sold in part in nearby towns, there have been incidences of 'no takers' or zero demand for *Ricinodendron heudelotii* even on a 'no transaction cost' basis at 'farm gate'. This is rather unfortunate as this study shows *Ricinodendron heudelotii* to have by far the biggest 'potential' revenue earning possibility in terms of regularity of production and quantities produced.

If a higher scale of economic growth is considered, the role that a developed NTFP sector can play becomes only too apparent. For example, in her offer to sell forest carbon on a voluntary basis (*The Economist*, 2008) and conserve a biodiversity rich forest in the south, the Government of Cameroon (GoC) had estimated an opportunity cost of forest conservation in terms of lost forests fees (from timber exploitation) at a constant annual rate of $US 1.9/ha (*The Economist*, 2008). Table 23 attempts a comparison of this opportunity cost, projected potential returns from NTFPs and other uses that compete for forest lands.

Table 23: Comparison of $US equivalents of destructive uses of forest lands including NTFPs

Potential revenue per hectare of use of *frontier forestland	Potential $US returns per hectare
[1]Cocoa	4000
[2]Oil Palm monoculture	1200
[2]Rubber monoculture	1200
**NTFPs	10.5
[3]Timber fees	1.9

**Frontier forest is defined as in-tact forest*

**Estimated value of NTFPs as developed using that data in this research

Sources:

[1]Unpublished farmer field school field Report, Cameroon (IITA, 2009)

[2]Cameroon Development Corporation--CDC (pers. comm., with Palm/Rubber estate manager, 2009)

[3]*The Economist*, February 14th 2008[5] http://news.mongabay.com/2008/0215-cameroon.html

It seems possible that with the right policies, combined revenue streams from NTFPs and carbon as depicted in Table 23 (not including other ecosystem services of forests), can be quite substantial.

5.2 WILLINGNESS AND CONDITIONS FOR SUPPORTING BIODIVERSITY TAX

5.2.1 PERCEIVING TAX-WORTHINESS IN RESPONDENT CHARACTERISTICS

The sample is unreflective of the percentage male to female ratio (often 48:52) in the general Cameroonian population. However, it fairly reflects the proportion of women in the formal employment sector. Women are generally dominant in the informal enterprise sector. On average, taxation on the formal sector would therefore disproportionately fall on middle-aged, middle-income earning Cameroonian men, generally of intermediate decision-making positions.

This segment does not possess substantial disposable income and public bus system usage is a preferred means of travel. The majority of the respondents are tax-paying individuals, who enjoy using tourism infrastructure (restaurants and hotel facilities), consume recreational products like alcoholic beverages, although tobacco consumption remains relatively, low.

5.2.2 RESPONDENT'S PREFERENCES AND ITS POTENTIAL IMPACT ON A CONSERVATION TAX

The results show that, civil society respondents appear to have the least capability to invest in real estate. Investment in real estate also appears weaker amongst women folk. In aligning a possible taxation policy with the pattern observed in house ownership, willingness is most likely to be achieved using a progressive system.

Car ownership and air travel would not hurt low income groups, women and the young, either. Taxation on hotel rooms and restaurants would hurt, low income groups (who could be women) and generally have other negative effects on the economy. There is an apparent loyalty in paying

audio visual tax even across low income categories. Therefore, mild taxation on audio-visual products could be a workable option. The progressive relationship between income bracket and payment of audio visual taxes showed a dip at the highest income bracket. It is likely that, the relatively low representation of expatriates paying audio-visual taxes, and who earn higher incomes and occupy senior positions in their organizations partly explains these dips. A similar trend and relationship emerged with audio visual tax payment within the decision-making category showing a dip at the highest positions. In the event of a forest conservation tax system, a mechanism has to be found through which the high earning, frequent travelling, car-owning, decision-making, senior expatriate community can be provided with the right incentives to contribute directly and substantially towards mobilizing fiscal revenue with which to support biodiversity conservation.

By all indications from the results, tobacco may remain a candidate for a biodiversity tax though it remains debatable if such taxation should be perceived as punitive. This is so because a considerable proporion of respondents suggesting taxation on tobacco were non smokers. By the limited proportion of people involved in smoking, public participation is unlikely to be substantial even if fiscal revenue is. An important assumption underlying taxation in this study is that it should be associated with an intution of utility on the part of the tax payer and not a perception of purnishment. The situation with alcohol consumption is however, different. A substantial proportion of the respondents comprinsing all or most characteristics of; older, male, senior, expatriate, respondents consumed alcohol most regularly, and taxation here would be aimed at those most able to pay, willing to accept taxation and less likely to perceive it as purnishment, but rather, depending on how it is administered, as utility.

However, alcohol consumption appeared similar across income groups, meaning that taxation would also hurt low and middle income groups. A way around this could be to link the taxation, not to the product but to the facility, or to associate services in ways that target segments able and willing to pay, while avoiding those less able to do so.

5.2.3 PERCEIVED COMMITMENT OF RESPONDENT'S TO THE TAXATION PRINCIPLE

The mean "YES" response rate for all respondents irrespective of their characteristic regarding whether they would be willing to support the 'taxation' principle to pay for biodiversity conservation was 78.96% (CI = ±3.7–5.3 , 95% CL). In this case therefore, the hypothesis of 'indifference' with the principle appears readily rejected. However, despite the 'YES' response on the taxation principle no respondent characteristic produced a statistically significant relationship with the 'YES' trend. Therefore, the null hypothesis of no association between respondent characteristics and the taxation principle was statistically upheld. It thus appeared that, there were hidden but important idiosyncrasies held the respondents which could not be brought to the surface by a simple referendum exercise. A compelling case was therefore made for further, different analyses to better understand respondent's attitudes towards the taxation principle. Finally, it also suggested that assumptions of linearity between respondent's characteristics and their willingness or unwillingness to accept a biodiversity tax would have been challenging.

5.2.4 RESPONSES TO REVEALING TAXATION AMOUNTS

Similarly, without need for a statistical test, the null hypothesis of no 'indifference' in providing discrete currency amounts as taxation was rejected, as 82.9% (CI = ±3.7 - 5.3, 95% CL) declined or were unable to provide discrete currency amounts as taxation they would be willing to pay or accept to support biodiversity conservation. The strongest reservations were on tobacco while the most developed willingness was to accept taxation on inter-city bus fares. Overall, females appeared more reserved than males. The area with the strongest willingness by females to suggest and accept taxation was on inter-city buses. The lowest income bracket appeared most able to provide taxation amounts on inter-city bus fares while the highest (>1000 $US) were most reserved or reluctant. Across all air travel categories unsurprisingly, the lowest income bracket (<200 $US) appeared least able to provide suggestions for taxation amounts. Irrespective of income brackets however, all three sub-groups responded similarly to requested taxation information on alcohol. The earliest (unsurprising) pattern which emerged was that respondents

were more willing and able to provide suggested amounts as taxation in domains where they were most familiar. This was also a positive sign of sincerity in the respondents.

5.2.5 INTERPRETING DISCREPANCIES IN RESPONSES TO THE TAXATION PRINCIPLE VERSUS REVEALING DISCRETE PAYMENT AMOUNTS

Using the Rational Choice Theory (RCT) to explain these discrepancies, there are a number of possible explanations for the 79.0% 'YES' referendum results on accepting taxation and the 83.0% 'indifference' by the same sample to reveal discrete currency amount preferences.
One explanation for the lack of association between the "YES" responses ($p > 0.05$) and the high level of 'indifference' can be attributed to hidden, but important 'idiosyncrasies' held by individual or groups of respondents. This discrepant behavior by respondents according to the RCT can be considered rational because accepting the principle and paying up under prevailing conditions are two separate events.

Part of the interpretation can be the presence of dispersion, variability, even randomness within the respondent categories in expressing or not expressing their payment preferences. Although subtle, these hidden preferences or conditions (for or against accepting taxation and or actually paying) appear to exist in sufficient levels to impact their responses and behavior. Their rationality cannot be doubted. This discrepancy between their acceptances of the taxation principle, versus their indifference to reveal amounts, may represent either evidence of differences within similar respondent categories or hidden conditions under which they may fully express their payment preferences. Therefore, although by RCT respondents remain committed to optimize their pleasure, profit or utility, these cannot be directly predicted from their attributes alone or by their acceptance of the taxation principle. Analyses of a regressive or predictive type would therefore not be sufficient or appropriate to explain this randomness and discrepant behavior.

The second option is to examine the discrepant behavior against the model of random utility maximization. Recall the equation and the probability of willingness, were a condition;

- Pr {response is "YES"} = $V(P,Q^1,Y\text{-}X,S, \epsilon) \geq V(P,Q^0,Y, S, \epsilon)$

Otherwise, "NO"

In this research, for purposes of assessing the level of randomness, the price expected for goods and services are held constant on both sides of the equations. Following one-to-one discussions during the pilot phase, respondents were made to understand that 'accepting the taxation principle' and actually 'revealing currency' amounts, were separate events and that, their willingness to accept both were being evaluated as support forest biodiversity conservation. Hence opportunity was provided for them to express both in the questionnaire.

According to the RCT and under the instinct of utility maximization respondents perceive intuitive utility gain for themselves of $Q^1 > Q^0$, where Q^1 represents a positive change from a hypothetical status quo (Q^0) of forest conservation and local level NTFPs governance. So under the referendum conditions their preferences were largely based on assumptions of a positive change in that 'utility' from Q^1 *to* $Q^1 > Q^0$, and 79.0% said 'YES'.

According to the argument, the probability of a "YES" response to taxation should be associated with *Y* (income). From the analyses it can be observed that this association was not statistically significant ($p > 0.05$). Secondly, according to the RUM concept of Hanemann and Kanninen (1998), ϵ is the unobservable or random variable of which are unaware and which may represent variations in preferences amongst the respondent population. In the research, *S* is the respondent characteristics and from the analyses, the 'YES' response was also not statistically associated ($p > 0.05$) with any of the *S* variables. Yet it was observed later that *S* variables; Income, Seniority in decision making and to some extent Gender (Sex) all had significant impacts on respondent's consumption behavior. It appeared obvious that the factor ϵ, was partly responsible for these discrepancies, was distributed randomly within the respondents, but was not directly associated with any particular attribute of the respondent (otherwise these may have come up in the significance of the Chi square tests).

Considering that there is certainty about intuitive perceptions of utility maximization in the transition from Q^1 *to* $Q^1 > Q^0$ it then becomes necessary to reduce the room for dispersion or

variability, narrow down the respondent attributes to better understand the expression of the random factor. Narrowing down respondent attributes is achieved by identifying and eliminating those attributes which may be implicit in others and thereby reduce the scope within which to test for randomness and understand the discrepancies.

Senior decision-makers earned higher incomes and were generally more advanced in age. However not all older respondents earned higher incomes, or were in senior decision making positions. Therefore, higher income earners and holders of senior decision making positions were more likely than not to be older. So age as a respondent attribute was eliminated from analyses without losing the possibility that age may help explain randomness. Income, Seniority and to a lesser extent Gender were thus considered as fairly distinct and determinant components in respondent characteristics. The main assumption here is that, the random variable – ϵ, possibly responsible for discrepant relationship between accepting the taxation principle while declining to reveal payment amounts may be explained through analyses of these three - *S* attributes; Income, Seniority and Gender (Sex).

Having narrowed down these determinant components, results of statistical tests for the more deductive Concordance (as opposed to predictive regressions) in both specific perceptions and conditions for accepting taxation was expected to help focus understanding to where respondents resembled or differed. It was also expected to understand how randomness expressed itself and how it can be used to understand the form that policy implementation will take.

5.2.6 CONCORDANCE IN RESPONDENT AGREEMENTS WITH PERCEPTIONS OF BIODIVERSITY

Statement 4 (Statement Box 2) is ranked first indicating strongest Concordance amongst consumer/respondents with the notion that, *"Biodiversity conservation is not just an affair of rich countries but of poorer ones too*". At $p<0.005$, df = 4, Kendall's $W^a = 0.588$, and a Chi-square as large as 715.2 the probability that agreement is a chance event is highly unlikely. There are thus clearly stronger agreements with some of the statement and less with others. The null hypothesis of no differences in perceptions between consumers regarding the statements is thus rejected.

Respondent's perception of biodiversity loss and responsibility for mitigation as the first 'random' area underlying differences in willingness to support taxation show, civil society respondents demonstrating both higher levels of familiarity with biodiversity conservation and stronger willingness to take responsibility for mitigation. There was also a stronger feeling amongst international organizations that recipient countries of conservation support should start considering local sources of finance. Despite this, there was reservation across all categories that, it may be too early to expect AID-recipient countries to take full responsibility for financing biodiversity conservation. All these have significance for how conservation policies can be administered.

5.2.7 CONCORDANCE IN RESPONDENT AGREEMENTS WITH CONDITIONS FOR ACCEPTING TAXATION.

In Statement Box 3, Conditionality 5 (State management of funds), is ranked in first position; closely followed by conditionality 6 (collegial management). Next in line are 2 (community livelihoods) and 4 (fund management by nongovernmental organizations).

The test statistic is highly significant and the Chi-square value of 573.5 suggests that it is highly unlikely that the result obtained is a chance occurrence. However, Concordance signifies aggreement and does not explain whether it is agreement in favour or against the conditionality. Simple interpretation thus remains problematic without an assessment of the comparative extents of conditional agreement with the eight 'considitionalities' limited to the 'stand-alone' *S* variables (Income, Seniority and Sex) considered as the more determinant respondent attributes.

5.2.8 PERCEPTIONS OF CONDITIONS FOR SUPPORTING CONSERVATION THROUGH TAXATION

By comparing the graphic representation of Concordance in attitudes and perceptions towards a possible biodiversity conservation 'fund' being managed by the State with test statistics of the same Concordance, it can be denoted that, the agreement with condition 5 (*If the funds are*

managed by Government) and 6 (*If the funds are managed collegially by government, NGOs, and local councils*) are of disfavour. The same applies with collegial management of funds arising from taxation. Participation by government in managing the taxation funds as well as collegial management are actually perceived with a lot of apprehension. There is however wide agreement with conditions 1 (*If it ensured forests and wildlife management*), 3 (*If it ensured livelihoods, forest and wildlife management*), 8 (*If respondents are informed regularly about use of funds and progress of projects*) and 7 (*If respondents can opt out if funds were not being transparently managed*). Here therefore, the null hypothesis of no differences between consumer perceptions of conditions for supporting taxation is just rejected.

The aggregated ranking across consumer categories provides a comparative summary of Concordance with respect to all eight conditions (irrespective of consumer characteristics). It does not however, provide sufficient insight into each of the three consumer categories, distinguishing how sub-groups within categories perceive things. Recall that, variations within categories of respondents was advanced as a possible explanation for the discrepancies between the results of the referandum and broad unwillingness to reveal currency amounts respondents would pay as tax. Variations within these *S* variables are discussed below.

5.2.9 POSSIBLE SOURCES AND DETERMINANTS OF RANDOMNESS INRESPONDENT PREFERENCES

The relatively dominant intermediate decision-making category (55.0% of the sample) and of the intermediate income brackets (52.0% of the sample) appeared to explain a significant part of the trends observed in the randomness observed in respondent's willingness to support taxation. More than other categories these two also showed strong 'dispersion' in their perceptions of the conditions. In addition to the relatively high variability (dispersion) in the perceptions of females (only 30.0% of the sample), it is fair to say that between these three; intermediate decision-makers, intermediate income earners and females, much of the randomness in the dynamics of willingness or unwillingness to support taxation to pay for biodiversity conservation can be explained.

By aggregating Sex, seniority in decision making and income brackets categories, analyses of standard deviations in mean Concordance suggests that intermediate categories in seniority and income bracket accounted for a considerable proportion of the perceived randomeness in the behaviour of these sub-groups. This level of internal variation is normal as these intermediate categories constituted the biggest proportions of those sub-groups.

Without doubt therefore, both differences in awareness of biodiversity issues, differences in perceptions of responsibilities for mitigation; and individual conditions for accepting taxation within these bigger sub-sets of the *S* categories constitute the random factors--ϵ referred-to in the Random Utility Maximization function – RUM of Hanemann and Kanninen (1998).

CHAPTER SIX

6.0 CONCLUSIONS

6.1 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Over more than three decades, various studies have emphasized the value of forests to global, national and local communities. Although many of these studies have stressed the value of timber resources, equally vociferous advocates have highlighted the intrinsic value of forest ecosystem services, especially those represented by biodiversity.

Promoters of ecosystem services of forests have largely focused on the interrelatedness of forest biodiversity and human systems and their importance as reasons for forest conservation through non destructive use. These powerful lobbies have however, succeeded mainly in encouraging the State, such as in Cameroon to develop strong biodiversity conservation policies. Thus, although very successful in States like Cameroon such forest conservation has mainly pertained to national parks and faunal reserves; forest domains from which local communities are often systematically excluded.

With the advent of the landscape concept, seeking to value biodiversity even outside such protected areas attention has been drawn to the holistic value of tropical forest biodiversity, even outside parks. Arguments for valuing biodiversity have thus focused on use, bequeath, option and even intrinsic values of forests.

Unfortunately, monetization of tropical forest ecosystem services beyond timber (with few exceptions, such as tourism, until the carbon option) has been problematic to say the least. Instead tropical forests have experienced steady loss and degradation giving way to agricultural plantations, mines and settlement. Over this same period, the most widely promoted approach to non destructive use of forests has been through the exploitation of non timber forest products (NTFPs). Various schools of thought have presented NTFPs use as alternative to timber, as a means to support forest conservation and also a means to increase the gross domestic product of the State. These studies have thus used NTFPs management as a complementary forest use

strategy to achieve another more important objective—such as conservation, or additional, such as in economic growth and local livelihoods. In view of these coarse approaches to NTFPs most of the analyses have either been opportunistic or carried-out at the macro-economic scale. The results have therefore been that of highlighting the potentials of NTFPs. Partly for these 'subsidiarization' of NTFPs, public policy support for it has over the past three decades been lukewarm, unpredictable and relying mainly on the associated services; not the stand alone value that NTFPs management can possess. Reasons such as the wide diversity of NTFPs, its different life forms, problems of technology and markets have partly contributed to this marginalization of NTFPs. But the world has changed since three decades ago and the single most important environmental challenge today is no longer biodiversity conservation per se but climate change.

The need to conserve carbon (its release being the main driver of climate change) in tropical forests today, by reducing forest degradation and loss has gone beyond preserving hitherto abstract ecosystem values, but one of evaluating opportunity costs of conservation in social and economic terms. The question of non destructive use of tropical forest biodiversity through mechanisms like NTFPs use has now become urgent, especially as the economic benefits of destructive uses of forests are becoming increasingly difficult to justify. Mitigating climate also involves national and global policy processes. Therefore, more than ever, there is need for linkages between micro-level analyses of differentiated economic opportunities, social and cultural interactions of local populations with non destructive uses of forests; and public policy. To improve the credibility of national and international policies to conserve tropical forest ecosystems, understanding of the processes and equity; mechanisms, opportunities and threats in non-destructive forest use (e.g. NTFPs management) is critical. And to better link non destructive forest uses to policy development, there is need to understand the scope and conditions under which such public support can be harnessed.

Incidentally, non destructive use of forests, as means to value its ecosystem services, directly conserves non timber forest products resource species. Therefore, strengthening policies and lobbies that conserve biodiversity inadvertently but directly promotes the development and use of NTFPs. However, equally challenging has been how to inspire policies based on public perceptions of the need to conserve forest biodiversity. Previous studies based on the CVM though developing and useful in specific contexts have also been criticized for either being too

pre-sumptuous of actual consumer behavior, not based on user familiarity with services being conserved; and not sufficiently cognizant of the disruptive effects of uncertainties or for placing a monetary value on a resource with uncertain intrinsic value. Therefore, a policy approach based on conditional willingness to support taxation; where the State possesses considerable leverage was preferred as a realistic option.

In broad terms therefore, the work set-out to achieve three main objectives:
(i) To evaluate the potentials and underlying requirements for effective and equitable NTFPs development as an off-shoot of forest conservation policy; (ii) To evaluate subject characteristics, scope and conditions for securing public support for forest conservation through taxation as basis for policy formulation and development, and (iii) make recommendations for policy and practice to address constraints and opportunities inherent to the NTFP development process based on the scope and conditions for supporting taxation that contributes towards forest conservation.

The scope of the NTFPs analyses was limited to a community forest context, which provided all necessary conditions and interactions required by the objectives. The combination of household demographic surveys, semi-structured interviews, focused grouped discussions; participatory mapping and computer-based spatial analyses provided comprehensive information on NTFPs use, social and cultural interactions between user groups, essential to the conclusions on achieving equity as a part of conservation policies for NTFP resource species. The NTFPs survey also included a three year community-based quantification of marketable products. The Community Based Stocks Assessment and Monitoring System-- C-BSAMS (Mbile et al, 2006) as the name applies emerged from the study as a progressive, down-to earth, purely community-based tool for monitoring and preparing NTFPs for the market.

Secondly, the scope of the willingness to support taxation appraisal was the Capital city of Yaoundé, which equally provided sufficient diversity in respondent categories from which a representative perspective on such willingness was gleaned. The analyses covered the willingness to support the taxation principle, willingness to reveal preferences for discrete tax amounts, agreements and perceptions of forest biodiversity conservation. It finally explored possible random factors in consumer characteristics such as conditions for supporting taxation to conserve

forest biodiversity, on which NTFPs-dependent livelihoods ultimately depends. To facilitate syntheses of findings on NTFPs use dynamics as basis for supportive policy development for non-use of forest biodiversity, a number of hypotheses were tested under each of the two main objectives.

6.2 CONCLUSIONS RELEVANT TO NTFPs DEVELOPMENT

Findings in NTFPs analyses show significantly strong relationships between racial groups and use of specific NTFPs. Pygmies generally use NTFPs on a more regular basis than their Bantu neighbors. There is also in these findings evidence of unequal power relationships wherein under competitive access to NTFPs, marginalized groups like Pygmies, are pushed further from the village than Bantus to collect the same resource. This unequal relationship favouring Bantus over Pygmies is enhanced by the slightly different settlement and land use practices of both racial groups and their different perceptions of land tenure.

Bantus in their predominant access to home gardens, crop farms, fallow fields and young secondary forests near to villages, demonstrated that they have since evolved more sedentary agricultural practices while Pygmies remains semi-nomadic. Nevetherless, even the semi-nomadic Pygmy populations remained connected to other groups that are beginning to practice sedentarization (such as the Pygmy communities in Abakoum, Djebe and Djenou covered in this survey). The relationship between the racial groups and the NTFPs is strongest for *Bailonella toxisperma* and *Irvingia gabonensis* and weakest for *Ricinodendron heudelotii.* Where the distribution of the NTFPs is varied across the land use systems; especially where the NTFPs showed a relatively strong local market value, there was significant relationship between user groups and the NTFP resource, and invariably in favour of the 'more powerful' group - Bantus. Additionally, where the population of an NTFP resource species was sufficiently large and widely distributed within the systems, there was no evidence of exclusion of one racial group by another. Thus 'less powerful' groups - Pygmies, expended greater effort in terms of the distances covered to collect NTFPs, especially when such NTFPs had strong local market potential. The control of forest lands on which previous agricultural activities had taken place also remains in favour of

Bantus, with Pygmies (including those beginning to be sedentary) constrained to cover great distances to collect NTFPs.

The relationship between Bantus and NTFPs also shows strong opportunism. Due to vegetative dormancy in many NTFPs resource species, peak production occurs between the months of July to October. These dynamics of exclusion of Pygmy groups to more accessible and locally marketable NTFPs species tends to occur mainly within these months. There is however sufficiently strong correlations between the incidence and size of Pygmy populations and off-season production of NTFPs species. This finding shows a forest-dependent (even existential) relationship (as opposed 'opportunistic') between Pygmies and NTFPs and a more opportunistic one with Bantu groups. For some species with low local market demand, such as *Ricinodendron heudelotii*, there is even a negative correlation between NTFPs activity and population size of Bantus, further emphasizing the preference for agriculture and other off-forest activities by Bantus during NTFPs 'off-season', while Pygmies continue relentlessly to collect NTFPs. This finding also demonstrates that, Pygmy groups in their forest dependency, especially on non-extractive forest use, demonstrate that NTFP potentials continue to exist even during during what was traditionally considered as off-season for NTFPs. Basically, to Pygmy groups there are only 'lean seasons', and no 'off-seasons'.

Finally, there are significant variations in the revenue profile of NTFPs. For a community forest of approximately 4000 hectares and human population of approximately 1000 (70.0% Bantu; 30.0% with Pygmies being more ardent users of NTFPs), there is a mean gross revenue of just over $US 43,000. This average amount approximately corresponds to the possibility for *Baillonella toxisperma*, about half the value of *Irvingia gabonensis* and approximately one quarter the value of *Ricinodendron heudelotii*. Incidentaly, *Ricinodendron heudelotii* with the lowest local demand, most prolific in year-to-year production and most accessible to all racial groups has the highest revenue potential.

For an equivalent surface area the average revenue possibility of $US 43,000 is thus approximately six times what the State (Government of Cameroon) would expect as opportunity

cost reward by foregoing forest fees derivable from timber exploitation (an extractive/destructive use of forests), if negotiations for conservation concession breaks down.

Such cases where the intrinsic value of forest biodiversity hangs in the balance; with the spectre of destructive use (through industrial style timber exploitation) on the one hand and non destructive uses (such as through NTFPs, carbon markets and others) significantly helps provide necessary linkages between non timber products dynamics (which depends on forest conservation), to incentives and content of forest policy development. However, in the analyses of public willingness to support taxation as contribution to forest biodiversity conservation, the findings are mixed, sometimes contradictory but rarely without bases.

6.3 CONCLUSIONS ON WILLINGNESS TO SUPPORT CONSERVATION THROUGH TAXATION.

Firstly, there was very strong indifference regarding willingness of members of the public, represented by respondents in this research, to provide discrete currency amounts to reveal what they would support as taxation for forest conservation. Approximately 83.0% of persons across all categories declined to provide discrete curency amounts as taxation they would be willing to support. This level of rservation was observed despite 79.0% of respondents who agreed to support the 'taxation' principle for forest conservation. Despite such strong levels of reservation regarding revealing prefered amounts, a pattern was discernible in the 17.0% that provided responses and especially in the rest 83.0% that declined to.

Respondents appeared most able and willing to make suggestions about consumption areas with which they were most familiar. Despite the 79.0% willingness to support some form of taxation to strenthen forest conservation, none of the respondent characteristics were staistically associated with the results of that referandum. This sugested that either there was measurement error, or random, undetected factors existed which characterized respondent attitudes towards supporting taxation to pay for forest conservation; or that, the willingness, was very conditional.

There was association between age, seniority in decision-making, income and Sex. Associations between these factors showed significance ($p<0.05$) with most areas of consumption behaviour.

The more detrminant consumer characteristics were narowed down using different analyses and intuitions, to three stand alone attributes. Thus, seniority in decision-making positions, income bracket and to a lesser extent Gender (Sex) appeared to explain much of the unwillingness or willingness to support taxation to pay for forest conservation.

Tests of perceptions and conditions for supporting forest conservation thererafter focused on these major consumer characteristics and produced results that best explained the behaviour of the sample size..

There was significant agreement ($p<0.005$, df = 4, Chi-square = 715.2) that "Biodiversity conservation is not just an affair of rich countries but of poorer ones too".

Furthermore, agreement was also strong on support for forest conservation that ensured "forest, wildlife management and livelihoods for local forest dependent communities". That such support would not only be worthwhile, forth-coming but could be sustained "if funds were transparently managed, stakeholders were regularly informed of how they were being used and were free to opt out if either funds were not being properly managed or were not achieving the objectives for which they were intended".

As would be expected statistically, much of the trends in Concordance with both perceptions and support for forest conservation could be explained by the bigger (intermediate respondent categories). These categories also showed the highest coefficients of variation in expressing their attitudes. This finding means that the most effective way to capture this willingness is less likely to be effective if left to chance, and more likely to achieve its purpose if the unwillingness of such groups to support forest conservation via taxation were to be cultivated iteratively and later, constrained by policy.

Based on these findings therefore, a number of recommendations emerge, which can ensure effective linkages between possible policy implementation and the development of non timber forest products. These recommendations pertain to those aspects of NTFPs development that need to be targeted by policy; and what the policy content needs to be, in order to meet intended goals of the research.

6.4 RECOMMENDATIONS FOR LINKING NTFPS DEVELOPMENT TO POLICY

6.4.1 STEPS TO STRENGTHEN NTFPs DEVELOPMENT

- Forest policy that supports NTFPs management effectiveness must consider spatial variability in the distribution of important NTFPs resource species and the explicit competition between this industry with industrial timber exploitation.
- Similarly where there is evidence of cultural differences at local levels, ensuring equity requires that consideration be given to differential perceptions of customary access and control rights by local communities.

By recognizing these variations in resource distribution and matching this with access, control, local knowledge and local social relations, decisions on participatory assessments of NTFPs resources, stakeholder participation in management and equitable sharing of benefits, under a non extractive forest management regime are most likely to be fair and effective.

- Knowledge of differential distribution of non extractive resources such as NTFPs within natural forests should be used as bases for developing land use plans based on comparative production potentials of different parts of the forests.
- Such information remains critical in estimating the opportunity costs of alternative forest use strategies and therefore should be made available and consistently used in negotiating options for forest use other than, for timber exploitation.

- Despite different racial and social groups existing together in the same forest location, non extractive use of forests resources can be culturally linked. While such differences should be handled with the utmost sensitivity it is important that their existence is recognized and capitalized.

Community association with NTFPs generates knowledge critical in ensuring necessary management for different NTFPs resource species. The associations with NTFPs are especially useful as raison d'être for evaluating opportunity costs to some communities in the event where

trade-offs have to be made resulting to reductions in the supply of such resources, to their disappearance, or reduced access to them, such as through the creation of conservation zones or agriculture plantations.

- For best ecological and socio-economic results, in locations where there is evidence of local socio-cultural differentiations there is need to evaluate power relationships between groups where there is a need for community based management of NTFPs in a common pool.

Differences in power relationships exist, which create inequalities, oblivious on the surface but which may impose greater effort on one social group for similar or often less returns. Unless such sources of inequalities are identified, fully characterized and incorporated in negotiated agreements, there is likelihood that such agreements, if critical to sustainable forest management may fall apart eventually if these fine-level injustices remain undressed for long enough.

- More specifically, it is critical that prior to establishing negotiated agreements under land use plans in forest zones, analyses are carried-out to better understand incidence of social equity or of in-equality in resource access and use. Additionally, local choices and options for land use depend on locally perceived costs associated with use of a particular resource. If costs incurred in the use of a non extractible resource are social (such as increased distances and collection costs incurred by Pygmy groups relative to Bantus), rather than improve technological alone (such as needs to improve processing of one species, e.g.', *Ricinodendron heudelotii*), action-oriented social analyses must be carried-out to avoid high ecological costs resulting through failure to master and address social in-equality. Such limit scope of solutions may also provoke local resistance in negotiated options for equitable forest use or sustainable forest management.

- There is need to favor assessment methods which bring out hidden potentials in NTFPs resource species, such as about the incidence of vegetative dormancy in some tropical forest species. The significance of the analyses of 'off-season' production of NTFPs to revenue contribution and to the custody of management knowledge needs to be better reflected in overall implementation of non extractive use regimes for forests.

'Off-season' production is likely to hold the key to the viability of NTFPs management as an alternative option to destructive use (such as industrial timber exploitation). Both off-season potentials of NTFPs and custody of knowledge about diverse species producing during 'off-seasons' need to be mastered in use-based assessment of NTFPs.

- There is need in forest policy implementation to recognize differences in the relationships between NTFPs and social groups within local communities as a strategy to both enhance management of NTFPs resource species and harness critical knowledge about such species contained within such communities. Strong correlations exist between some local social groups and NTFPs use. Provided the relationship between NTFPs users and the resource is a dependent one (as it seems to be the case between Pygmies and numerous NTFPs in the study site), such understanding can serve as a fairly accurate proxy method of assessing the production potential of NTFPs even as differential distribution, different life-forms makes application of classical forest inventories to NTFPs challenging.

- There is need to adopt locally relevant methods of NTFPs assessment and accounting which are adapted to critical factors such as fluctuations in market demand for the products, species diversity, production cycles, size of the main user groups. This is so because returns will fluctuate according to a complex of ecological and social factors that are changing all the time. Micro-level analyses remains critical because, some NTFP resource species, such as *Ricinodendron heudelotii*, though very prolific, demonstrating high levels of equitable access potentials due to its ubiquitous distribution, and good market potentials at national (even regional levels), continue to suffer strong technological constraints leading to extremely weak (even non-existent local demand). Such unapparent local demand can lead to misleading expectations and potentials being attributed to NTFPs based on coarse macro-level, aggregated analyses. When solutions are provided based on these coarse level analyses, they often fail to address fine-level constraints and therefore do not promote overall sustainable forest management as such processes often intend. Thus, the analyses scope must match with the scope where the impact is expected.

- In view of the need to standardize measurement and monitoring methods for NTFPs, in the event of a public incentive mechanism across forests systems, underlying social, cultural and ecological differences should be used mainly in negotiating binding agreements within fair and equitable rewards programs for ecosystem service conservation. From results obtained for CODEVIR, specific social, cultural and ecological characteristics impacting on the potentials of the three NTFPs studied produced a time-averaged estimate of $US 10.5 per hectare of forest. In comparative terms, NTFPs thus represent over four times the expected value from forest fees (estimated at $US 1.9/ha). However, the approximate value of NTFPs as benefits from non extractive use of forests depends on diverse factors which are unlikely to repeat themselves evenly across forested areas.

In view of the established, direct linkage between NTFPs development and forest biodiversity conservation, forest policies must be developed which guarantee the conservation of forests and leave little to chance. This study produced information potentially critical in developing such policies. Outlined below are recommendations drawn from this study aimed at bringing about such an outcome.

6.4.2 RECOMMENDATIONS TO ENSURE FOREST POLICY CONTENT ADDRESS NTFPs DEVELOPMENT EFFECTIVELY

- Policy proposals for fiscal or similar mechanisms to support forest conservation must be proactive and targeted (not ambiguous). There is evidence from this study of overwhelming reluctance on the part of the public to commit itself to discrete un-negotiated currency amounts as basis for their support for forest conservation policies. Still, there is evidence of equally overwhelming support for a taxation principle to pay for forest conservation. However, for greater effectiveness such proactive policies should be differentiated to ensure that allocations to different groups are not only proportional to purchasing power and ability to pay, but tied to consumption areas where targeted groups are most familiar.

- Prior to instituting such a public taxation system, there is need for very broad-based public consultations, including a clear explanation of what such a taxation system seeks to achieve.

A series of mechanisms need to be proposed and modalities for its functioning debated publicly if high levels of ownership are to be achieved. Irrespective of what is agreed, a feasible taxation system to conserve forest biodiversity should explicitly incorporate evidence that differential analyses of geographical, ecological, social and cultural contexts have been taken on-board. Specifically, such policies should demonstrate:

  - Awareness of the need to address differential access and tenure rights to non extractive use of forest products at local levels.
  - Awareness of the need to selectively reward livelihoods which directly conserve forest biodiversity through valorization of accumulated knowledge and protection of rights of marginalized groups.
  - Awareness of the need to encourage more sustainable forest use by providing incentives such as secure forest tenure rights to groups with demonstrated dependent relationships with NTFP resource species.
  - Awareness of differential needs for technological development to improve the market value of NTFPs such as *Ricinodendron heudelotii* whose development can help secure the conservation of other less prolific species with regeneration problems or that are threatened due to multiple uses, such as *Baillonella toxisperma*.

- Such policy mechanisms should be openly communicated to the immediate public and other stakeholders providing details of what is working and what is not, to enable public feedback.
- Conditionality in supporting the taxation principle may be overridden by State prerogatives. Creative mechanisms for some categories of supported to opt out of such a fiscal system, if the system is not working well will help inspire confidence, keep it flexible and serve as incentive to participate.
- In implementing results of consultations and feedback intended to improve the effectiveness of such a policy support system for forest conservation, results of analyses even if inconclusive from an empirical view point should be used as ‘information’ in policy development and implemented. This need for expediency is supported by the fact that in the results achieved, trends in expressed support for forest conservation were strongly influenced by dominant categories of respondents, within which high level of

variations (or dispersions) can be observed. Due to these variations, policy processes need not wait for 'empirically conclusive' arguments but should observe general tendencies; cognizant of internal differentiations and precautionary behaviors, and carry-on with the policy implementation.

- Finally, for purposes of sustainability and institutional capacity building within State structures, it is important that mechanisms be sought through which the State can play a central role in both implementing the policies and in administering forest conservation. Results obtained during this study suggest that stakeholders are likely to be apprehensive if such funds where managed by the State or collegially. The conditions demonstrated that, what is more critical is good governance and stakeholder ability to contribute to the process; not rejection of the State per se as supervisor of the process.

CONTRIBUTION TO KNOWLEDGE

Firstly, much of forest conservation funds come to Cameroon from foreign sources. It is also likely that much of climate change adaptation and mitigation funds to reduce deforestation and forest degradation, and strengthen true forest dependent livelihoods, will come to Cameroon from foreign sources. This is the first original work in Cameroon which attempts to evaluate the characteristics and conditions of willingness by national level stakeholders to contribute financially, towards forest conservation. Non timber forest products (NTFPs), local knowledge about forests, option values, climate regulation and all other forms of non destructive forest use, depend on successful forest conservation policies.

As a result of this work, it is now known that, even without new policies for conservation, for climate change adaptation and mitigation, actual tax payers and potential ones can be willing to make minimal financial contributions to support forest conservation. And if incentives such as: regularly informing tax payers of how their contributions are used; or providing them with the flexibility to opt in or out of mechanisms; and or providing them with the option to contribute towards improving the functioning of such mechanisms, are put I place, willingness to contribute to a forest conservation fund can be increased by as much as a factor of four.

Furthermore, it has been hypothesized that non destructive forest use carries a high opportunity cost to society if timber extraction is significantly curtailed. Nevertheless, it has been known for some time that, forest conservation and diversified use, with emphases on non extractive uses like non timber forest products (NTFPs) can increase gross revenue from forests. This study supports diversification and demonstrates that, for the same forest type and surface area, if timber fees alone are considered, and marketing support provided to NTFP activities at the appropriate social level, revenue from only three NTFPs; *Baillonella toxisperma, Ricinodendron heudelotii and Irvingia gabonensis* can be as much as four times that from timber fees alone.

This study provides micro-level analyses of the complex relationship between NTFP user groups and supply potential of NTFPs resources. While it has been known that indigenous groups are most closely associated with NTFPs, proof of the intricacies of that relationship has been sketchy. The analyses in this theses throws light on how two ‘forest user’ groups; Pygmies and Bantus can have different extents of dependence; the former more existential or ‘truly dependent’ and the latter, more opportunistic, in their relationship with non destructive forest uses. Thus the argument that, loss of

human populations will impact NTFP supply, and or vice versa, how loss of NTFPs can impact indigenous populations is now clarified by this work. It helps depict the unequal nature of that 'forest-dependency' concept in the relationship between Bantus and Pygmies; and each user group, with the NTFP resource. It thus further clarifies at least within a short time frame, how dissimilar, the relative cost of forest destruction to either group would be.

Until now, most NTFP supply studies have focused on cross-border trade opportunities and when local in scope, have used assumptions of 'community' cohesiveness. Many have also focused on peak seasons of production. From a methodological stand point, when considering social dynamics at local levels, and physiology of NTFP resource species, only conclusions from all-year-round, spatially explicit and user group-differentiated monitoring of NTFP should be considered sufficiently robust. Furthermore, this study demonstrates mild variance with the status quo wherein some NTFPs studies consider the household as the unit of analyses and the administrative village as the impact level. Whereas this study supports the household unit of analyses, results of fine-level analyses points to a need for 'specific, identifiable user groups' as impact levels. And that, the village or local community, due to their increasing complexity, may not be the appropriate, expected impact level for access and rights-based work as well and for benefits sharing mechanisms of benefits from forests.

Finally, if non Elite capture and distribution of benefits of forests to diverse groups, is an overarching goal, exclusive investment on technology and marketing support, without linking these to local resource sociology, will fail to achieve that goal. This work therefore, provides some answers to, why, expected impact on livelihoods of vulnerable; truly forest dependent peoples have very weak and poorly coordinated despite decades of substantial investments in forest policy, conservation support programs and even directly, on NTFPs development.

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APPENDICES

APPENDIX I:

1. SOCIO-ECONOMIC ANALYSES, EQUITY IN ACCESS, PRODUCTION AND REVENUE DYNAMICS OF NTFPS

1.1. SURVEY TOOL (Checklist)

This survey has been designed for purely academic purposes. The confidentiality of the information collected can be guaranteed and many thanks to you for your time and collaboration in this survey.

A. HOUSEHOLD SURVEY

1. Household No.
2. Village name
3. Name of the respondent and status in the household:
4. Number of persons in the household 5: Gender: Sex: a) □ Male b) □ Female
6. Age range: a) □ 0 to 20, b) □ 21 to 30 c) □ 31 to 40 d) □ 41 to 50 e) □ 51 to 60,
7. Marital Status: a) □ Married, b) □ Single, c) □ Widowed, d) □ Engaged
8. Level of education: a) □ primary b) secondary □ c) □ above, d) □ none
9. Principal Activity
10. Racial group: Bantu □ Pygmy □
11. Observations..... ....

FOCUSSED GROUP DISCUSSION (FGD) TOPICS, DATA STRUCTURE AND DATA TYPE:

B. ACCESS RIGHTS TO COMMUNITY FOREST AND DIFFICULTIES ENCOUNTERED

12.1. *Discussion topic:* For each NTFP, determine and map collection sites?

12.2. *Data structure/type:* Participatory mapping using village resource persons and informants

13.1. *Discussion topic:* For each NTFP, determine qualitative (perception) and quantitative aspects of distance to collection sites using participator map as applicable.

13.2. *Data structure/type:*

B. toxisperma collection__ discrete_numeral_distance_	*I. gabonensis* collection_ discrete_numeral_distance_	*R. heudelotii* collection__discrete_numeral_distance

14.1. *Discussion topic:* For each NTFP, determine areas where respondents collected and those where they are prohibited from NTFPs collection.

14.2. *Data structure/type*:

B. toxisperma provenance_string_choice_of_Secondary forest/Virgin forest/fallow	*I. gabonensis* provenance_string_choice_of_Secondary forest/Virgin forest/fallow

15.1. *Discussion topic*: For each NTFP, determine how access to different sources of NTFPs is shared

15.2. *Data structure/type:* Notes, comments narrative

16.1. *Discussion topic*: Determine how control over access is maintained over NTFPs collection sources?

16.2. *Data structure/type:* Notes, comments and narrative.

C. PERCEPTION OF LOCAL DEMAND.

17.1. *Discussion topic*: For each NTFP, establish the major buyers?

17.2. *Data structure/type:*

B. toxisperma	*I. gabonensis*	*R. heudelotii*
string_choice_of_1_passers-by_2_next door neighbor_3_middle traders	*string_choice_of_1_passers-by_2_next door neighbor_3_middle traders*	*string_choice_of_1_passers-by_2_next door neighbor_3_middle traders*

18.1. *Discussion topic:* For each NTFP, establish the provenances of the major NTFPs buyers

18.2. *Data structure/type:*

B. toxisperma	*I. gabonensis*	*R. heudelotii*
string_choice_of_1_same village_2_neighboring village _3_main market	*string_choice_of_1_same village_2_neighboring village _3_main market*	*string_choice_of_1_same village_2_neighboring village _3_main market*

19.1. *Discussion topic*: For each NTFP, establish frequency with which produce is demanded.

19.2. *Data structure/type*

B. toxisperma	*I. gabonensis*	*R. heudelotii*
string_choice_of_1_in town_2_farmgate _3_never	*string_choice_of_1_in town_2_farmgate _3_never*	*string_choice_of_1_in town_2_farmgate _3_never*

19.3.*Addirional data type*

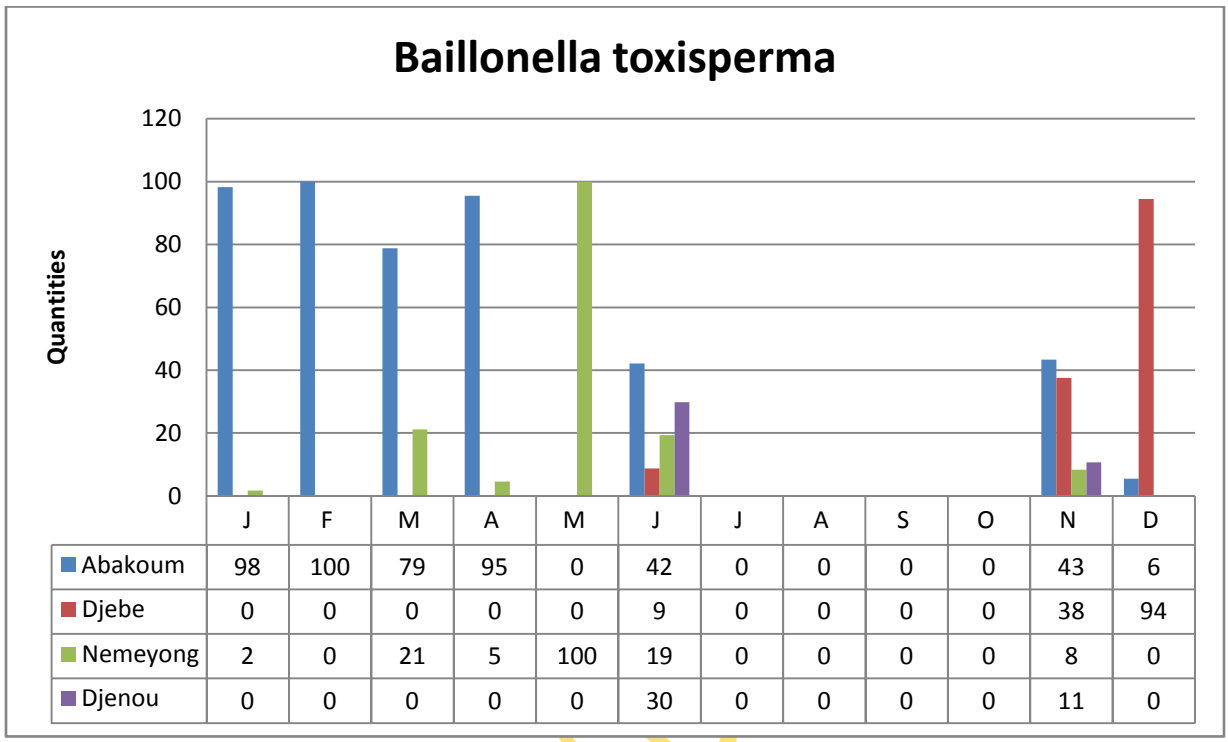
B. toxisperma	*I. gabonensis*	*R. heudelotii*
likert_scale_choice_of_frequency of demand	*likert_scale_choice_of_frequency of demand*	*likert_scale_choice_of_frequency of demand*

NTFP QUANTIFICATION

D. DATA COLLECTION SHEEET USED OVER THREE CALENDAR YEARS

Name of enumerator	Village name	Date of activity	Species measured	Quantity of resource (11 litres buckets)

1.2 NTFP COLLECTION BY COMMUNITY DURING LEAN PERIODS

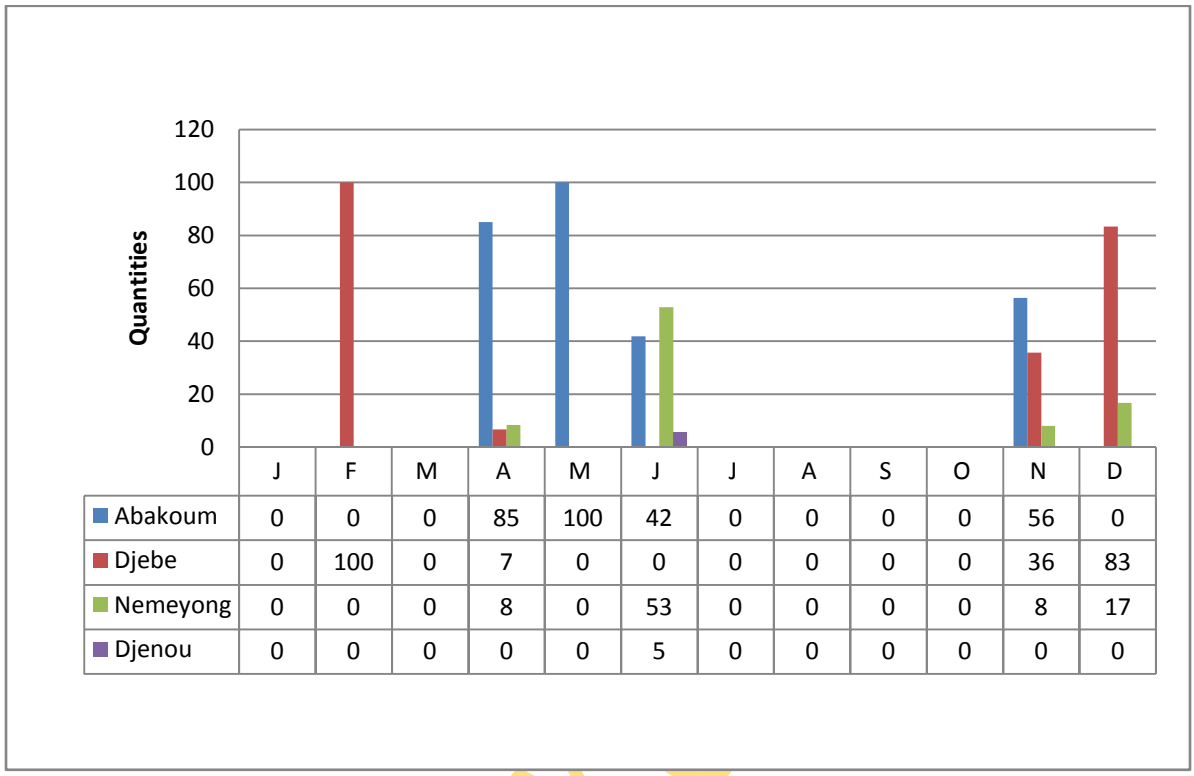


	J	F	M	A	M	J	J	A	S	O	N	D
Abakoum	98	100	79	95	0	42	0	0	0	0	43	6
Djebe	0	0	0	0	0	9	0	0	0	0	38	94
Nemeyong	2	0	21	5	100	19	0	0	0	0	8	0
Djenou	0	0	0	0	0	30	0	0	0	0	11	0

Note: Peak production months blanked-out

Figure 1:Relative proportions and contribution by community to the CODEVIR monthly total for *Baillonella toxisperma* during lean periods

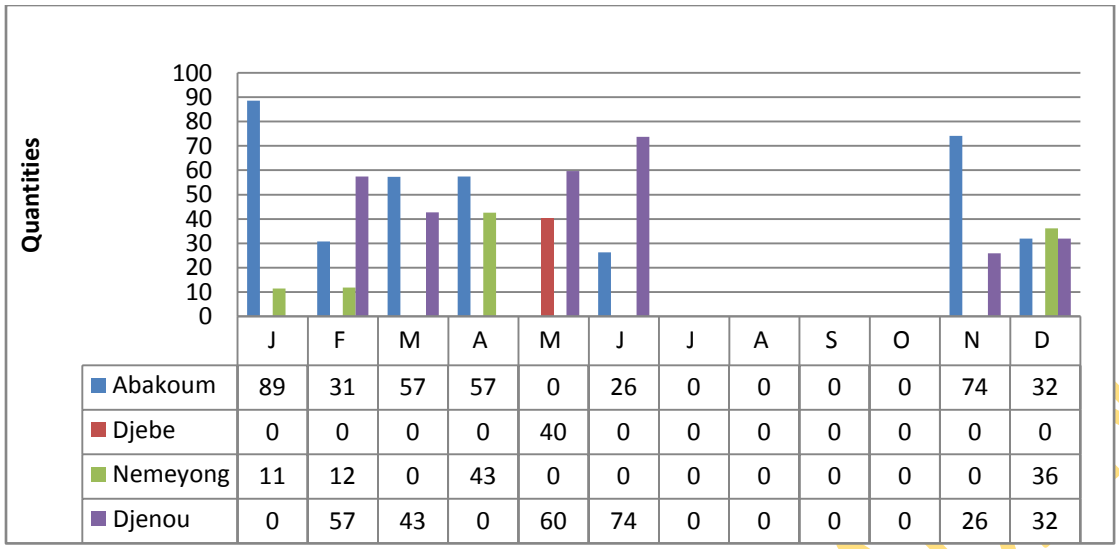
Source: This analysis represented in this fugure is based is based on original data colected and analyzed for this research



	J	F	M	A	M	J	J	A	S	O	N	D
Abakoum	0	0	0	85	100	42	0	0	0	0	56	0
Djebe	0	100	0	7	0	0	0	0	0	0	36	83
Nemeyong	0	0	0	8	0	53	0	0	0	0	8	17
Djenou	0	0	0	0	0	5	0	0	0	0	0	0

Figure 2: Relative proportions and contribution by community to the CODEVIR monthly total for *Irvingia gabonensis* during lean periods. or during lean periods

Source: This analysis represented in this fugure is based is based on original data colected and analyzed for this research



	J	F	M	A	M	J	J	A	S	O	N	D
Abakoum	89	31	57	57	0	26	0	0	0	0	74	32
Djebe	0	0	0	0	40	0	0	0	0	0	0	0
Nemeyong	11	12	0	43	0	0	0	0	0	0	0	36
Djenou	0	57	43	0	60	74	0	0	0	0	26	32

Figure 3: Relative proportions and contribution by community to the CODEVIR monthly total for *Ricinodendron heudelotii* during lean periods.

Source: This analysis represented in this fugure is based is based on original data colected and analyzed for this research

1.3 PRODUCTION AND REVENUE PROFILE OF NTFP IN CODEVIR

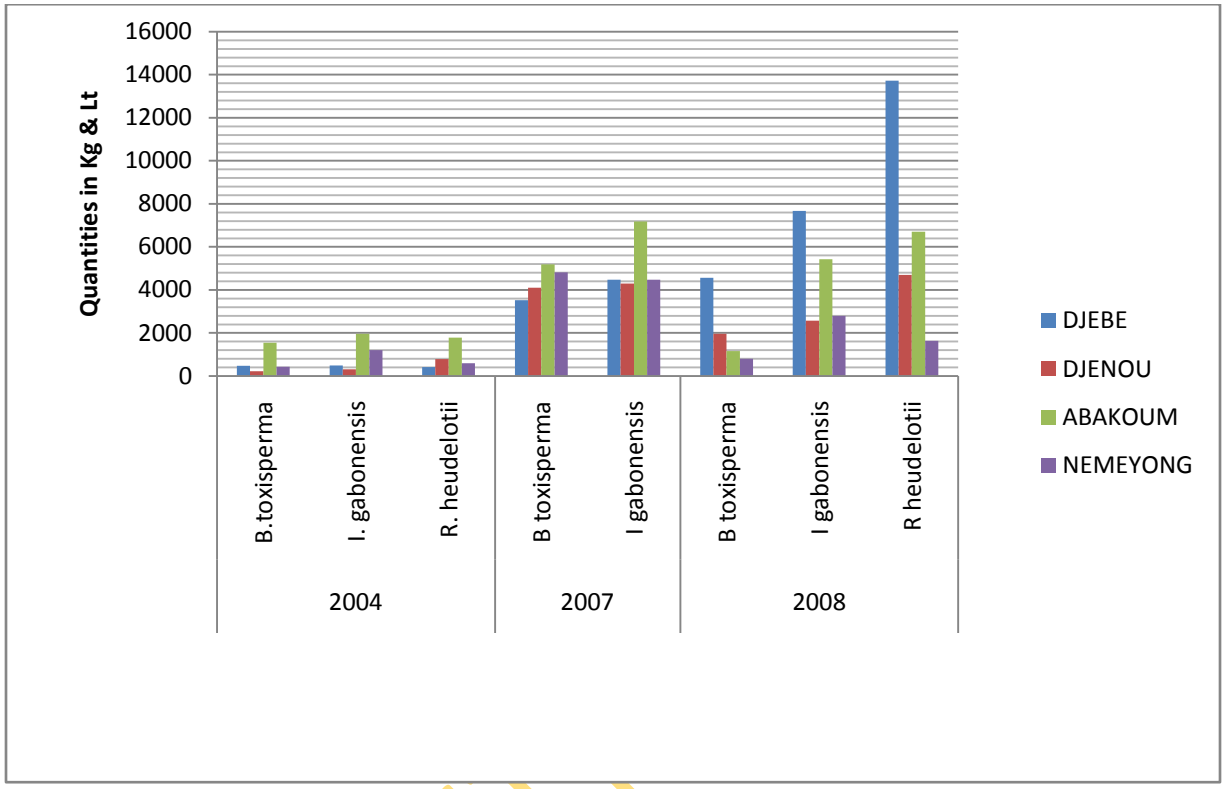


Figure 4: Profile of NTFP production (2004, 2007 and 2008)

Source: This analysis represented in this fugure is based is based on original data colected and analyzed for this research

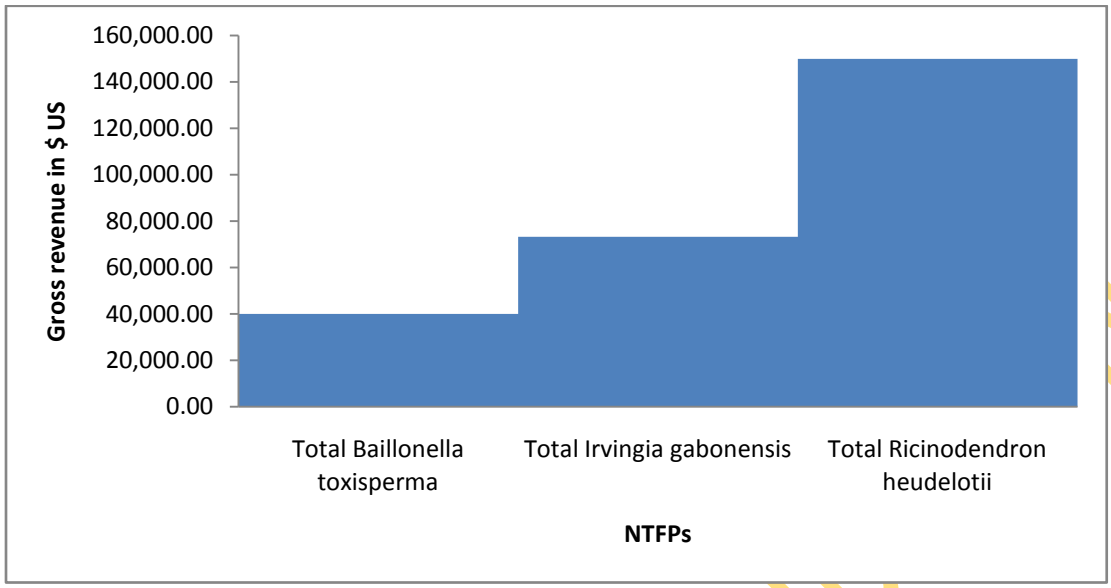
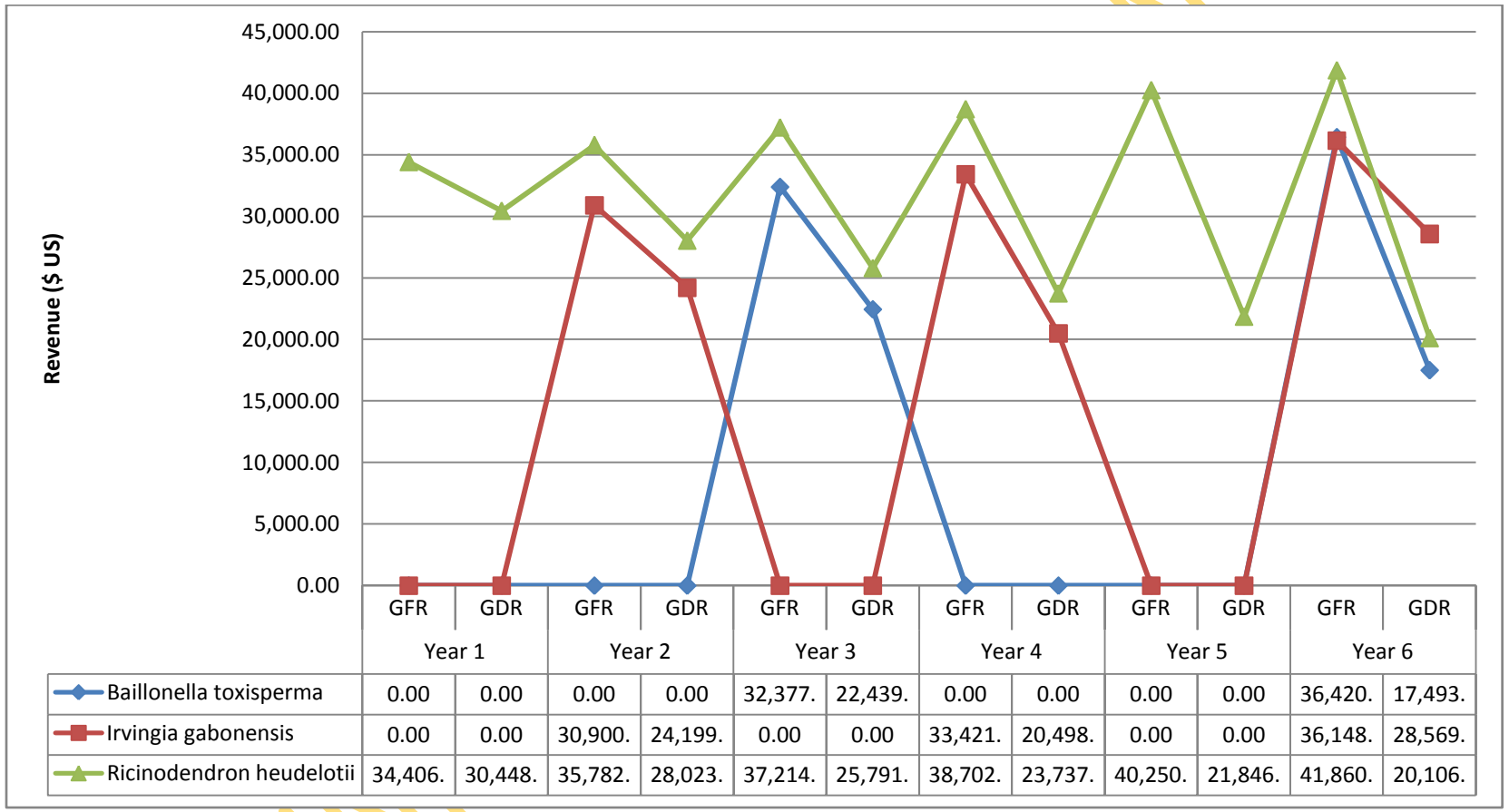


Figure 5: The comparative revenue potentials of three NTFPs studied (over six years)

Source: This analysis represented in this fugure is based is based on original data colected and analyzed for this research.

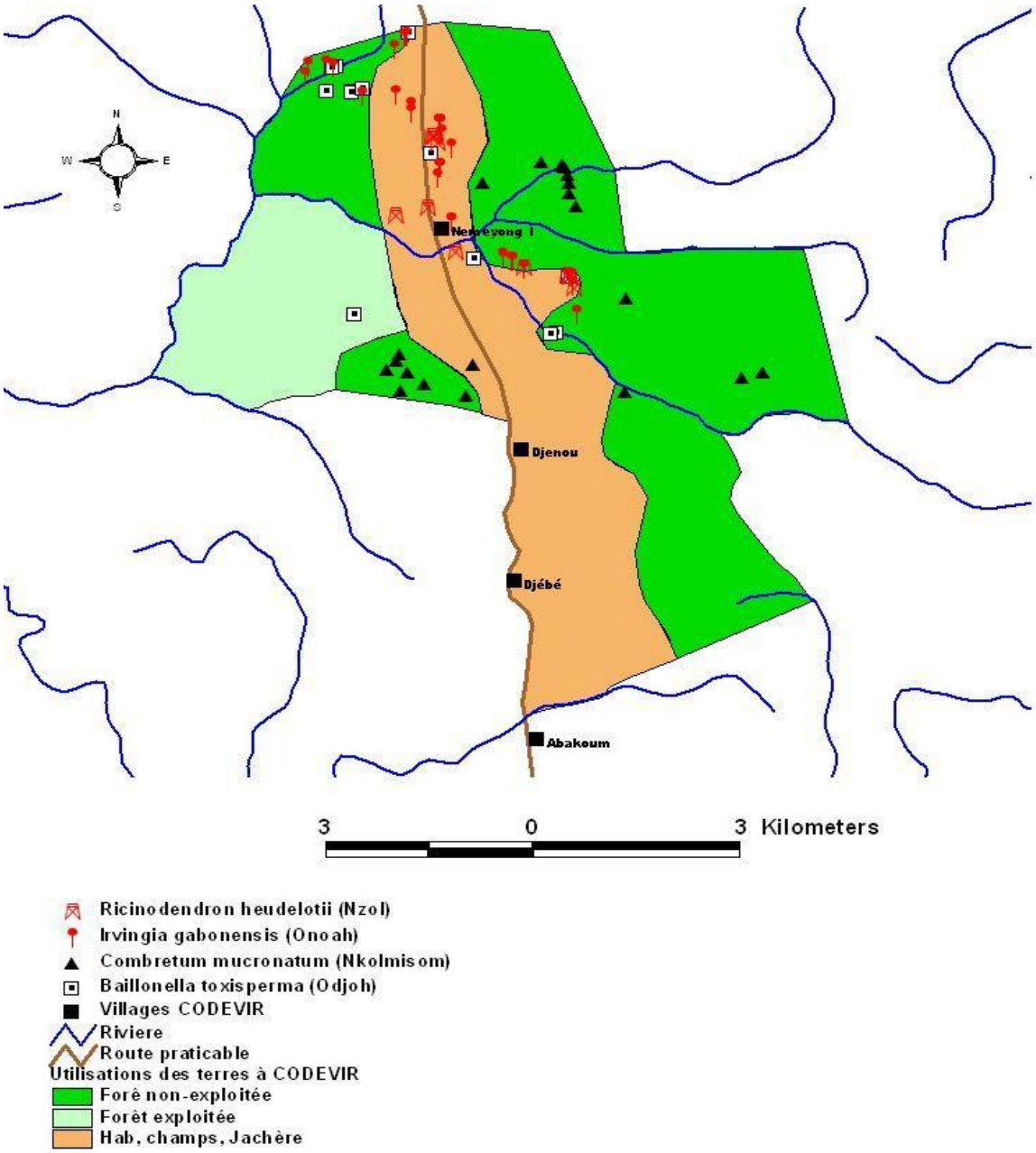
Figure 6: Profile of gross forecasted revenue ($ US) from three (3) non timber forest products from NTFPs in CODEVIR (allowing for periods of vegatative dormancy)



	GFR	GDR	GFR	GDR	GFR	GDR	GFR	GDR	GFR	GDR	GFR	GDR
	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
Baillonella toxisperma	0.00	0.00	0.00	0.00	32,377.	22,439.	0.00	0.00	0.00	0.00	36,420.	17,493.
Irvingia gabonensis	0.00	0.00	30,900.	24,199.	0.00	0.00	33,421.	20,498.	0.00	0.00	36,148.	28,569.
Ricinodendron heudelotii	34,406.	30,448.	35,782.	28,023.	37,214.	25,791.	38,702.	23,737.	40,250.	21,846.	41,860.	20,106.

Baillonella toxisperma = once every 3 years; *Irvingia gabonensis*, once each two years and *Ricinodendron heudelotii*, every year

Source: This Table and the associated data is original and was generated as a part of this research



Map 1: NTFPS locations in CODEVIR mapped using participatory spatial analyses and corroborated through ground-truthing using a Global Positioning System (GPS)

Source: This map was produced by Peter Mbile in 2008, in a Geographic Information System (GIS) using various sources of secondary spatial data.

APPENDIX II:

Faculty of Agriculture and Forestry

Department of Forest Resources Management

University of Ibadan, Nigeria.

2: WILLINGNESS AND CONDITIONS FOR SUPPORTING TAXATION QUESTIONNAIRE

2.1 SURVEY TOOL

RESPONDENT/CONSUMER QUESTIONNAIRE

Administered in confidence strictly for the purpose of policy-oriented scientific research

(Print or circle response as appropriate)

A: RESPONDENT'S CHARACTERISTICS

ID of Interviewee: _____

2. Sex: F / M

3. Age:_____

4. Are you a Cameroonian National or an expatriate (non-Cameroonian)

1 = Cameroonian 2 = Expatriate

5. Geo-ecological zone in Cameroon from which respondent originates:

1 = Forest regions 2 = Savannah region 3 = Sahel region

6. Are you a regular staff, earning a salary on a monthly basis? Yes / No

7. Average Monthly Income range (FCFA):

1 = ≤100,000 F	4 = 351,000-500,000 F	7 = ≥ 1,000,000 F
2 = 101,000-200,000 F	5 = 501,000-700,000 F	
3 = 201,000-350,000 F	6 = 701,000-1,000,000 F	

8. Employer: _____

9. Decision-making position in Organisation:

Lower-level Middle Higher level

10. Do you own a house or plan to build one? Yes / No

If not, do you plan to build in the near future?

If yes, when do you intend to start?

1 = In 1 year's time, 2 = In 2 year's time 3 = In 3 year's time 4 = beyond 3 years

12. Do you own a private car? Yes / No

If yes, how often do you use your car?

1 = daily; 2 = 2-3 times/week; 3 = occasionally

13. Do you use inter-city bus transport? Yes / No

If yes, how often do you travel by bus?

1 = often (at least once a month); 2 = regularly (at least once every two months);

3 = occasionally (less than 3 times a year)

14. Do you travel by air? Yes / No

If yes, how often do you travel by air?

1 = often (at least 3 times a year); 2 = regularly (at least once a year);
3 = occasionally (less than once a year)

15. What is the destination of most of your travels? 1 = within Cameroon; 2 = within the Central African region; 3 = outside the central Africa region

16. Do you use hotel accommodation within Cameroon? Yes / No
If yes, how often do you use hotel rooms?

1 = often (at least once a month); 2 = regularly (at least once every two months);
3 = occasionally (less than 3 times a year)

17. Do you use restaurants in Cameroon? Yes / No
If yes, how often do you take meals in restaurants?

1 = often (at least once a week); 2 = regularly (at least once a month);
3 = occasionally (less than once a month)

18. Do you pay audio visual tax? Yes / No

19. Do you consume alcoholic beverages? Yes / No

If yes how often? 1 = Every day 2 = Every week 3 = Every month

20. Do you smoke or consume tobacco products? Yes / No

If yes how often? 1 = Every day 2 = Every week 3 = Every month

B: RESPONDENT'S AWARENESS AND ATTITUDE TOWARDS BIODIVERSITY CONSERVATION

21. Indicate the extent to which you agree with the following statements?

1 = Strongly disagree; 3 = Neutral; 5 = Strongly Agree; X = Don't know

22. Understanding and commitment to biodiversity conservation

	Statement	**1**	**2**	**3**	**4**	**5**
1	Unwise exploitation of forest resources can lead to irreversible loss of biologically diversity					
2	Loss of plant biodiversity can affect the conservation of all types of biodiversity					
3	It may be necessary to seek national financial resources to ensure sustainable management of forests to conserve biodiversity					
4	Biodiversity conservation does not concern African citizens, it is an affair of foreign donors					
5	Biodiversity conservation needs the participation of all citizens of a country					

24. Would you personally be willing to contribute to an "eco-fund" in order to improve forest management and biodiversity conservation in Cameroon?

Yes / No

If No please provide reasons_____

_____

_____

If yes, under which conditions? (circle as appropriate)

(a) To improve the management of forests and wildlife

1 = Strongly disagree, 2 = Neutral, 3 = Strongly Agree

(b) Only if the fund is solely used to improve the lives of the communities living near the forests

1 = Strongly disagree, 2 = Neutral, 3 = Strongly Agree

(c) Only if the fund is used both to improve management of forests and wildlife and to improve the lives of communities

1 = Strongly disagree, 2 = Neutral, 3 = Strongly Agree

(d) Only if the fund is managed by NGOs, parastatals or local councils and not by government

1 = Strongly disagree, 2 = Neutral, 3 = Strongly Agree

(e) Only if the fund is managed by government

1 = Strongly disagree, 2 = Neutral, 3 = Strongly Agree

(f) Only if I am regularly informed on progress of the use of the fund and can decide to withdraw in case of dissatisfaction

1 = Strongly disagree, 2 = Neutral, 3 = Strongly Agree

(g) I will not trust project implementers alone and will need to be informed about the progress

1 = Strongly disagree, 2 = Neutral, 3 = Strongly Agree

C: DISCRETE CHOICE PAYMENT AMOUNTS and METHODS

If you would be willing to make a financial contribution towards conserving biodiversity in sustainably managed forests, indicate how much you would be willing to make as additional payment above the current 'cost' of the stated property, product or service and indicate whether this is a recurrent payment (RP) every month or one-time payment (OP) per year

Proxy Payment methods and amounts (*Respond only to payment forms that are applicable to you*)

Example

Methods of Payment (Taxation Proxy)	**RP**	**OP**	**Willingness to pay surplus on Road Tax (Vignette)**
Example: Consumer Mahop Tax on Transportation Lorry		X	10,000 FCFA more on Road tax (vignette)

a)

Methods of Payment (Taxation Proxy)	**RP**	**OP**	**Willingness to pay surplus as percentage of profits**
Tax on businesses dealing with sales of raw or process forest products			
Comment if any			

(b)

Methods of Payment (Taxation Proxy)	**RP**	**OP**	**Willingness to pay surplus on Road Tax (Vignette)**
One-off annual vehicle road tax (only if vehicle owner)			
Comment if any			

(c)

Methods of Payment (Taxation Proxy)	**RP**	**OP**	**Willingness to pay surplus on Fuel**
Taxation on price of fuel (only if vehicle owner)			
Comment if any			

(d)

Methods of Payment (Taxation Proxy)	**RP**	**OP**	**Willingness to pay surplus on audio-visual tax**
Tax on State-run audio-visual services			
Comment if any			

(e)

Methods of Payment (additional levy on bus fares)	**RP**	**OP**	**Willingness to pay surplus on inter-city bus fares**
Levy on inter-city bus fares (only if user)			
Comment if any			

(f)

Methods of Payment (Taxation Proxy)	**RP**	**OP**	**Willingness to pay surplus on domestic air fares**
Levy on air domestic air transport fares (only if user)			
Comment if any			

(g)

Methods of Payment (Taxation Proxy)	**RP**	**OP**	**Willingness to pay surplus on CEMAC air fares**
Levy on CEMAC zone air transport fares (only if user)			
Comment if any			

(h)

Methods of Payment (Taxation Proxy)	**RP**	**OP**	**Willingness to pay surplus on all other international air fares**
Levy on all other international air transport fares (only if user)			
Comment if any			

(j)

Methods of Payment (Taxation Proxy)	**RP**	**OP**	**Willingness to pay surplus per litre of alcoholic beverage**
Tax per litre on alcoholic beverages (only if user)			

Comment if any			

(k)

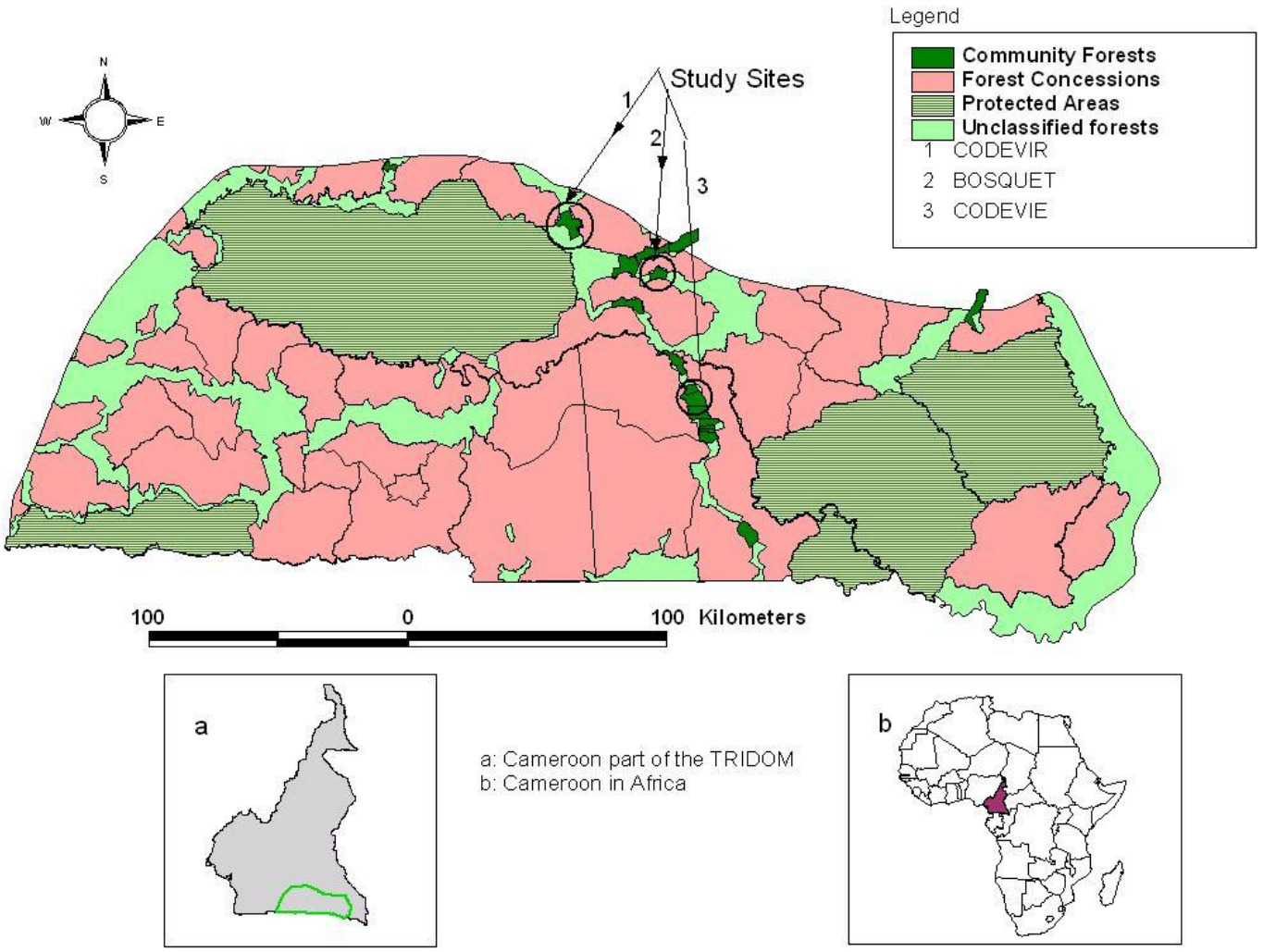
Methods of Payment (Taxation Proxy)	**RP**	**OP**	**Willingness to pay surplus per packet/Box of tobacco product**
Tax per packet/Box of tobacco products (only if user)			
Comment if any			

(l)

Methods of Payment (Taxation Proxy)	**RP**	**OP**	**Willingness to pay surplus per room or plate of food**
Business Tax per hotel room and per plate of food in restaurants (only if regular user)			
Comment if any			

Thanks for your kind attention.

APPENDIX III:



Map 2: Layout of the DJA LANDSCAPE (Cameroon) showing pre-selection of sites prior to settling on CODEVIR used for this research.

Source: This map was produced by Peter Mbile in 2008, in a Geographic Information System (GIS) using various sources of secondary spatial data.