

Full Length Research Paper

Non-timber forest products and their contributions on the income of local residents in the Douala- Edea Wildlife Reserve of Cameroon

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The Douala-Edea Wildlife reserve rich in biodiversity is a reservoir for the collection of non-timber forest products (NTFPs). These products are involved in the management of natural resources by providing additional income to households. This study examines the effect or contribution of NTFPs in household incomes of local residents in the reserve and has as objective to identify and evaluate the marketing of these products in the Douala-Edea reserve. The method used was based on surveys of people who practice on a daily bases the collection, marketing and consumption of NTFPs in order to determine species, harvested products and the quantities extracted from the forest. A second survey was conducted in two local markets (Mouanko and Dehaene) located in the periphery of the reserve to determine the market value of harvested forest products. A total of 18 species have been identified as NTFPs. 100% of the plants serve for human consumption as seeds (60%), fruits (30%), sap (5%), and the simultaneous use of seeds and fruits (5%). Women and children are involved in the collection and marketing, while men are associated with children only to collect. The NTFPs estimates obtained in the surveys in March and October 2012 showed 3 tonnes and 4 tonnes of *Ricinodendron heudelotii*, 200 and 300 kg of *Irvingia gabonensis*, 100 and 200 kg of *Coula edulis*, 500 and 800 kg of *Baillonella toxisperma*. NTFPs market value varied in dollars between 800 \$ and 1600 \$ for *C. edulis* 600 \$ to 800 \$ for *R. heudelotii*, 150 \$ to 1600 \$ in *B. toxisperma*, and 400 \$ to 800 \$ for *I. gabonensis*. This represents about 39% of household income in these forest zones.

Key words: NTFPs, Protected area, management, market value, inhabitants.

INTRODUCTION

Forests in Cameroon have important biological resources, hydrological and subsoil riches in mineral resources and hydrocarbons. These resources are continually used by the population at the local level and

by national and multinational companies. However, the daily management of non-timber forest products (NTFPs) can be controversial, regulation of state administration is necessary.

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In the case of the Douala-Edea reserve, the exploitation of NTFPs is an important activity for local population. According to (Souare et al., 2012), Non-timber forest products (NTFPs) strongly contribute to livelihood security of forest-adjacent communities. This activity includes children (for trade along roads and husking of these products) and adults (collection and revenue management).

To put at the disposal of the authorities responsible of the reserve, relevant information for the efficient management of NTFP, a study was conducted around the reserve in order to identify non-timber forest products used by the population.

In the estuary of Cameroon, mangroves have been subjected to numerous studies especially the Wouri estuary and the Atlantic coasts of the Douala Edea wildlife reserve (Ndongo, 1993; Ajonina, 2008). These specific studies describe the dynamics of mangroves through biometric data on different species of *Rhizophora* sp., and their roles in stabilizing ecosystems and food for wildlife. These studies identify as poaching, degradation of mangroves with an indiscriminate use of products from the forest because of poorly controlled human activities such as (smoking of fish, construction, manufacturing of canoes) (Ajonina and Toung, 1999; Ajonina and Usongo, 2001).

The Douala-Edea reserve is part of a large forest of the west coast, the coastal region whose floristic characteristics remain poorly understood; however, two activities, NTFPs collection and fishing are remarkable. Fishing is the main activity that involves more than 60% of the workforce of the Douala-Edea reserve and can be either artisanal or industrial. Artisanal fishing is practiced by the indigenous in rivers, streams and lakes, estuaries and creeks. As against semi-industrial fishing practiced by Nigerian Beninese and Ghanaian nationals, with the use of large motorized canoes (Ajonina, 2008).

NTFPs collection is usually done by all family members. This activity together with the tapping of raffia wine is one of the main sources of significant income of households in the reserves. The NTFPs affected and collected in the reserve are *Aframumum citratum* (Mbongo), *Ricinodendron heudelotii* (Ndjansang), *Garcinia cola* (Bitter cola), mushrooms, hazelnuts, *Irvingia gabonensis* (mango), the honi of mbongo, wood for the construction of canoes and straw for houses. Experiences with non-timber forest products have been mixed, largely due to difficulties of sustainable harvesting, the economically unviable commercialization of little-known products, and the lack of biological and ecological information on many potential useful species (Belcher and Schreckenber, 2007 in Souare et al., 2012).

The objective of this study is to identify and evaluate the marketing of non-timber forest products in the Douala-Edea reserve. More specifically, to identify exploited species; to determine the contribution of the gender aspect in the NTFPs circuit; identify and quantify

the different products and evaluate their market.

METHODOLOGY

Research location

The Douala-Edea wildlife reserve, created in 1932, is located in the coastal plain of Cameroon in Douala-Kribi Basin and includes an area of 160,000 ha (Figure 1). The rivers are the natural limits of the reserve but the Sanaga River divides the reserve into two unequal parts. The South part covers almost 2/3 of the reserve and extends from the Sanaga River north to south river Nyong. The smallest part extends along the Sanaga to the tip of Souelaba along the Atlantic coast to the island Manoka. It is bounded to the east by the Kwakwa creek (Ajonina, 2008).

Inventory of non-timber forest products

The investigation included three joints, closed questions, open questions and field visits. Closed questions have been recommended to maximize the information obtained through interviews (Ndoye and Ruis, 1999; Huntington, 2000; Tchatat and Doye, 2006; Fowler 2009.). The NTFP inventory aimed at identifying the names, type of products, functions and importance of NTFP species used by the various population groups.

Data were collected through interviews with 166 members of the 9 villages, ensuring a representation of the main ethnic groups in the area and the participation of both men and women, as well as people of different age classes.

The populations in the 9 following locations according to the number of people contributed in the survey. Yavi (15) Yatou (15) Yakonzok (8) Mombo (7) Édéa (4), Ongue (32) Yambong (23) Ndogbiang (27) and Ndogtima Creek (35). In the same vein as said by Lescuyer (2010), almost all members of the households involved in the activity participated in the completion of the questionnaire to summarize practices and collected products (Figure 2).

Study of the commercial value of NTFPs

A follow up of these NTFPs was performed in two local markets directly supplied by products of the reserve to conduct surveys during the harvesting months of March and October 2012. They are the Mouanko and Dehaene markets. This survey allowed a market evaluation of non-timber forest products and the identification of other potential markets.

Using a survey sheet, sellers and retailers were approached to get them to provide information on the name of the different products, the price of these products on the local market, the quantities sold and other potential markets, the use of the product, the benefit obtained on the two main season of production. The surveys were conducted by a team of two guides as facilitators to translate the questionnaire into the local language when necessary, three students and one researcher.

Sales price (March) = Quantity (kg) x Unit price

RESULTS

Wood resources involved in the exploitation of NTFPs

In the Douala-Edea reserve, 18 species distributed in 13

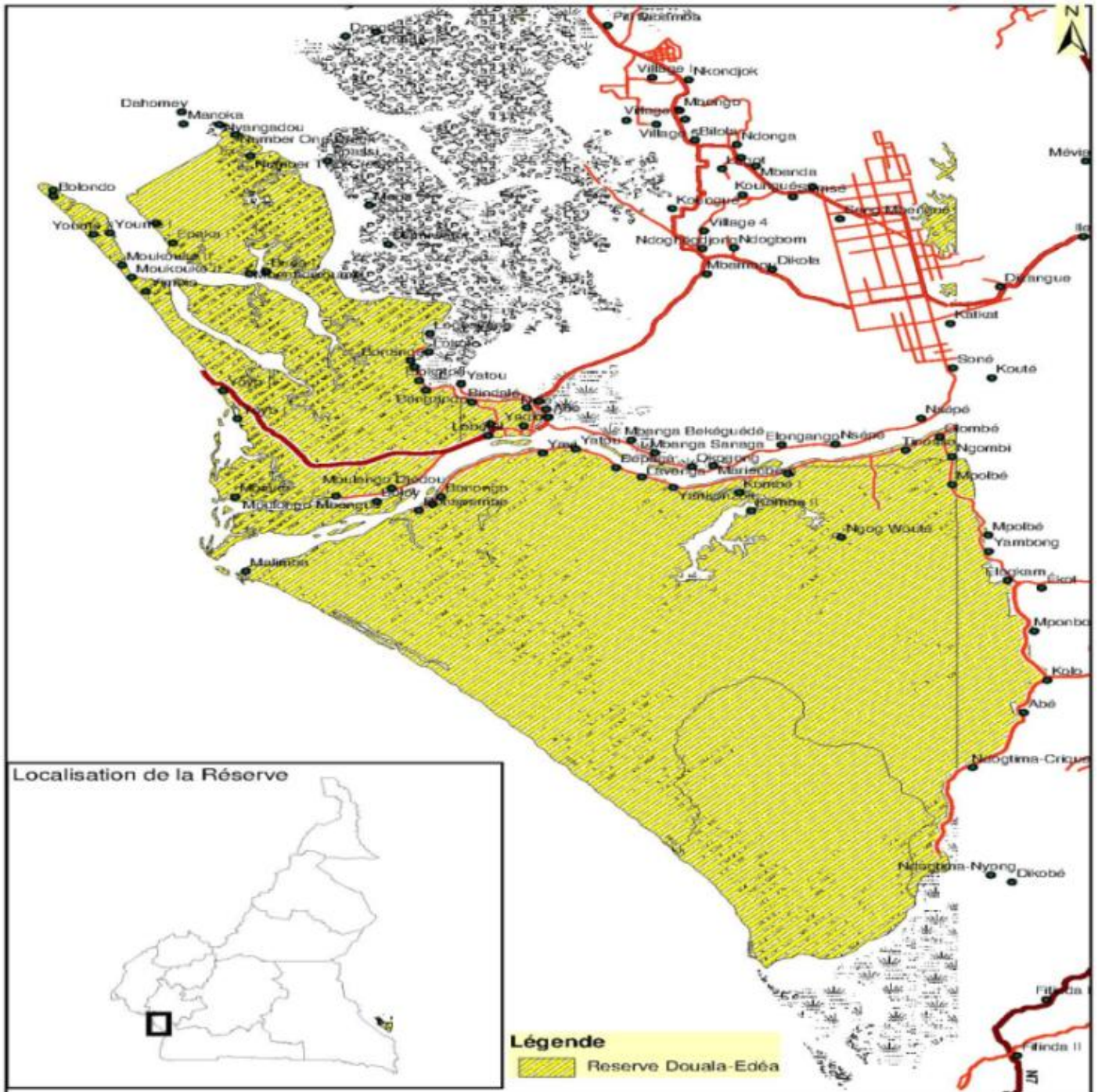


Figure 1. Location of Douala Edea Wildlife reserve.

plant families have been identified throughout the reserve as NTFPs. These products are from the left bank of the Sanaga Mouanko side and the right bank of the Nyong river. Thus two species exploited belong to the Annonaceae family (*Monodora myristica* and *Xylopia aethiopica* (Figure 5a) the Moraceae family (*Artocarpus communis* and *Treculia africana*) and the Zingiberaceae

family (*Aframomum citratum* and *Aframomum melegueta* and three species of the Palmaceae family (*Elaeis guineensis*, (Figure 5b) *Korthalsia rostrata* and *Rafia* sp.) (Table 1). About 100% of the plants are used for human consumption. About 60% are used as seeds, 30% as fruits 5% as sap and the simultaneous use of seeds and fruits at about 5%. In cooking recipes, natural products or

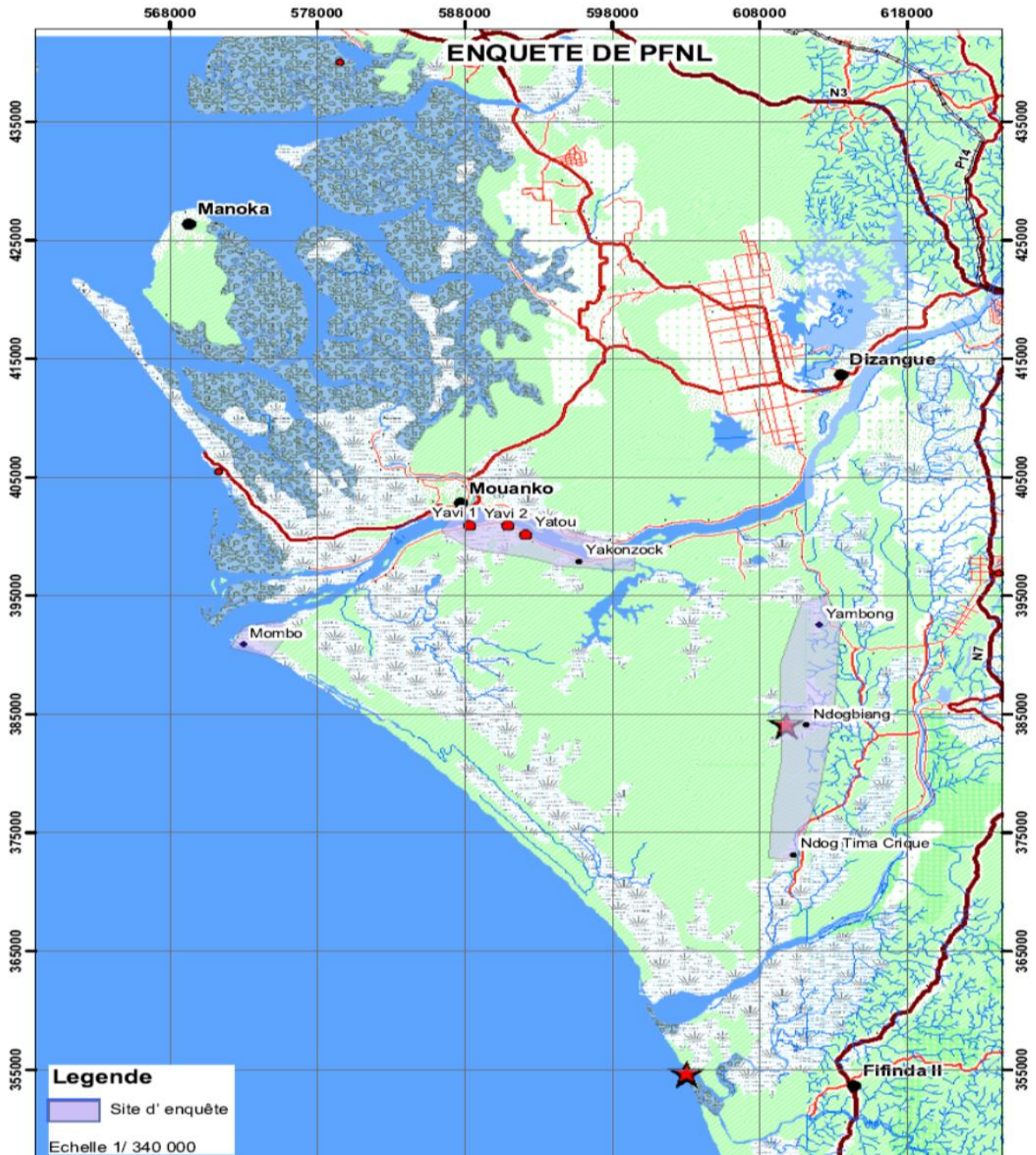


Figure 2. Research sites for NTFPs in the reserve.

derivatives are used as spices, dessert or cooking oil for example *Elaeis guineensis* and *Baillonella toxisperma* produce oil for cooking. Table 2 shows the different species collected by people and their different uses.

NTFPs market

Two periodic markets are functional around the reserve, one in Mouanko, with 26 traders which operate every

Table 1. List of plants exploited as NTFPs according to their families.

Family	Scientific name
Annonaceae	<i>Monodora myristica</i> <i>Xylopia aethiopica</i>
Euphorbiaceae	<i>Ricinodendron heudelotii</i>
Guttiferae	<i>Garcinia cola</i>
Huaceae	<i>Afrotyrax lepidophyllus</i>
Irvingiaceae	<i>Irvingia gabonensis</i>
Mimosaceae	<i>Tetrapleura tetraptera</i>
Moraceae	<i>Artocarpus communis</i> <i>Treculia africana</i>
Olacaceae	<i>Coula edulis</i>
Palmae	<i>Elaeis guinensis</i>
Palmae	<i>Korthalsia rostrata</i> <i>Raphia</i> sp.
Pandaceae	<i>Panda oleosa</i>
Piperaceae	<i>Piper guineensis</i>
Sapotaceae	<i>Baillonella toxisperma</i>
Zingiberaceae	<i>Aframomum citratum</i>

Table 2. List of exploited species and their use along the bank of the Nyong and Sanaga river.

Family	local name	Scientific name	Parts Used	How to use
Annonaceae	pébé	<i>Monodora myristica</i>	Seed Grain	Food
Annonaceae	goula	<i>Xylopia aethiopica</i>	Fruits	Food
Euphorbiaceae	Njasang	<i>Ricinodendron heudelotii</i>	Seed grain	Food
Guttiferae	Nyala	<i>Garcinia cola</i>	Seed grain	Food
Huaceae	Ohmi	<i>Afrotyrax lepidophyllus</i>	Seed grain	Food
Irvingiaceae	Mia	<i>Irvingia gabonensis</i>	Fruit/ seed grain	Food
Mimosaceae	Elere	<i>Tetrapleura tetraptera</i>	Fruit	Food
Moraceae	Mucabomukala	<i>Artocarpus communis</i>	Seed grain	Food
Moraceae	Tuwé	<i>Treculia africana</i>	Seed grain	Food
Olacaceae	Ahomo/noisette	<i>Coula edulis</i>	Seed grain	Food
Palmae		<i>Elaeis guinensis</i>	Seed grain	Food
Palmae	Missolamigombe	<i>Korthalsia rostrata</i>	Fruit	Food
Palmae	Meloko	<i>Raphia</i> sp.	Sap	Beverage
Pandaceae	Panda	<i>Panda oleosa</i>	Fruit	Food
Piperaceae	Lobé	<i>Piper guineensis</i>	Fruit	Food
Sapotaceae	Aya/moabi	<i>Baillonella toxisperma</i>	Seed grain	Food
Zingiberaceae	Bongo	<i>Aframomum citratum</i>	Seed grain	Food
Zingiberaceae	Ndindin	<i>Aframomum melegueta</i>	Seed grain	Food

Wednesday and in Dehane with 60-80 traders which usually open on Thursday and Friday. The products are sold in the markets or in markets of major cities like Edea, Douala and Kribi. There is a strong gender differentiation between the participation of women, youth and men in the collection and marketing of non-timber forest products.

During collection, we find 30% of men, 40% women and 10% children. In the marketing system of different

markets, women represent 80%, children 10% and men 10%. On highways we find especially children.

In general, children assist their parents in the collection and transportation of non-timber forest products. Children whose age vary between 13 and 15 account for 65% of cases encountered and 20 years old children occasionally embark on such activities. In addition, for products such *Coula edulis*, (Figure 5c), children are specifically involved in the husking and commercialization is generally assured



Figure 3. *Irvingia gabonensis* grains



Figure 4. *Ricinodendron heudelotii* grains and their measurement technic in the market

at 100% by women in the various markets.

Amount of harvested products

The quantities of NTFP harvested depend on the yearly production. The estimates at Mouanko market show that *R. heudelotii*, *Irvingia gabonensis*, *Coula edulis* and *Baillonella toxisperma* are the main economic assets of the reserves in terms of non-timber forest products exploitation. The estimates obtained from investigations reveal in March and October 2012, respectively, 3 and 4 tons of *R. heudelotii*, (Figure 3), 200 and 300 kg for *I. gabonensis*, (Figure 4), 100 and 200 kg for *C. edulis*, 500 and 800 kg for *B. toxisperma*. Table 3 shows the estimations of the quantity of NTFP obtained from the forest harvested by some fishermen during the months of March and October 2012.

Market value of non-timber forest products

In both major markets and during the production period,

non-timber forest products bring extra income to residents throughout the year. Regardless of the market, the revenues obtained on NTFPs vary amount locals and depending on the product collected: for example, 800 \$ to 1600 \$ for *C. edulis* 600 \$ to 800 \$ for *R. heudelotii* 1500 \$ to 1600 \$ in *B. toxisperma*, and 400 \$ to 800 \$ *I. gabonensis*. In Equatorial Guinea and Gabon markets, these products cost three times that in the Cameroonian market.

DISCUSSION

The collection of non-timber forest products remains a secondary activity providing a substantial income to the inhabitants of the reserve but priority is given to products that sell more. Also, Lescuyer (2010) reports the activity of harvesting of non-timber forest products in Southern Cameroon punctual but specifies that it is the subject of attachment of populations to the forest ecosystem. The impacts of the collection of non-timber forest products observed in the forests of the Douala-Edea wildlife reserve especially fruit collection that led to the destruction of herbaceous species were observed by (Tchatat and Ndoye, 2006) in their studies on non-timber forest products in Central Africa. In addition to their medicinal use values, the economic potential of NTFPs for poverty alleviation is very high compared with traditional cash crops such as cocoa. For example, the average prices of a kilogram of *I. spp.* and *R. heudelotii* were more than 200% higher than the average price of the same quantity of cocoa between 1996 and 1999 (Ndoye and Chupezi, 2004).

The devastating exploitation techniques by partial uprooting, or felling identified by (Tchatat and Ndoye, 2006) have not been identified in the Douala-Edea wildlife reserve. The Gender remains present in the sector. Collection and marketing activities are divided within the family. Thus children and women organize around marketing while men control the collection. These results are in agreement with those of (Tchatat and Ndoye, 2006) which indicate that in Cameroon there exist a border trade around NTFPs from the Douala-Edea reserve and this is a market that is not yet fully mastered. However Ndoye and Ruiz (1999) confirmed the existence of sub-regional trade and their neighbouring countries. Thus, between Cameroon, Nigeria and the Central African Republic, there is transfer of *C. acuminata* between Cameroon, Gabon and Equatorial Guinea, the exchange of *I. gabonensis*, between Cameroon and Nigeria, exchange of *G. africanum* between Cameroon and between Gabon and Congo there is exchange of *D. eudulis*.

Conclusions

In the Douala-Edea reserve, the exploitation of non-

Table 3. Market data of some NTFPs in March and October 2012.

Familyname	Local name	Scientific name	Quantity (Kg) March	Quantity (Kg) October	Total quantity	PU (\$)	Profit in march (\$)	Profit in october	Total Profit per specie(\$)
Annonaceae	pébé	<i>Monodora myristica</i>	38	65	103	4	152	260	412
Annonaceae	goula	<i>Xylopia aethiopica</i>	12	16	28	21	60	80	140
Euphorbiaceae	Njasang	<i>Ricinodendron heudelotii</i>	3000	4000	7000	1	600	800	1400
Guittiferae		<i>Cola pachycarpa</i>	122	146	268	11	366	438	804
Guittiferae		<i>Cola nitida</i>	50	65	115	11	150	195	345
Guttiferae	Nyala, Bitter cola	<i>Garcinia cola</i>	265		265	11	794	0	794
Huaceae	Ohmi	<i>Afrotyrax lepidophyllus</i>					0	0	
Irvingiaceae	Mia, mango	<i>Irvingia gabonensis</i>	200	400	600	6	400	80	480
Mimosaceae	Elere	<i>Tetrapleura tetraptera</i>					0	0	
Moraceae	Mucabomukala	<i>Artocarpus communis</i>					0	0	
Moraceae	Tuwé	<i>Treculia africana</i>					0	0	
Olacaceae	Ahomo/noisette	<i>Coula edulis</i>	100	200	300	8	800	1600	2400
Palmae	Meloko	<i>Raphia</i> sp.					0	0	
Palmae	Missolamigombe	<i>Korthalsia rostrata</i>					0	0	
Pandaceae	Panda	<i>Panda oleosa</i>					0	0	
Piperaceae	Lobé	<i>Piper guineensis</i>					0	0	
Sapotaceae	Aya/moabi	<i>Baillonella toxispermae</i>	500	800	1300	11	1500	2400	3900
Zingiberaceae	Bongo	<i>Aframomum citratum</i>					0	0	
Zingiberaceae	Ndindin	<i>Aframomum melegueta</i>					0	0	
Total							4822	5853	10675

**Figure 5.** Some non-timber forests products: (a) *Xylopia aethiopica* fruit (b) Harvest Wine *Raphia hookeri* (c) *Coula edulis* fruit.

timber forest products remains a vital activity. It provides income to the population and helps improve their living conditions. Eighteen (18) species of NTFPs have been identified, but those mostly involved economically are *C. edulis*, *R. heudelotii*, *I. gabonensis* and *B. toxisperma*. The parts used are seeds that are used for food and we note the presence of a species used to produce raffia wine (*R. hookeri*).

NTFPs are collected by adults and children. These products supply markets in Mouanko, Dehaene, Douala, Edea, Kribi and Yaounde where they transit to neighbouring countries. Domestic markets provide income to the population of about 4822 \$ on March and 5853 \$ in October 2012. However the sector is not yet regulated to effectively play its role in improving the living conditions of the population. No trade have been identified on the field. NTFPs are collected on the sustainable manner in the forest for local consumption or market purpose.

Conflict of interests

The authors have not declared any conflict of interests.

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