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INVENTORY OF THE NON WOODY FOREST PRODUCTS WITH MEDICINAL VALUE MARKETED IN THE TOWN OF BOMA

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ABSTRACT

Forest products constitute a significant source of economics resources, food, energy and social uses. Non woody Forest Products (NWFP), ensure by their importance's (medicinal, food, artistic) of the incomes the populations and are in addition products of subsistence Approximately 90 % of the most stripped populations depend on the forests to remain and get incomes. The general objective is to inventory NWFP of medical use marketed in an urban environment of Boma. The method consists of documentary review and inquires into the market. The parameters analyzed are the diversity of the species collected, techniques of harvest, diseases treated by these NWFP, marketing ¶ and perception on the availability of NWFP has values medicinal. 24 vegetables species of NWFP were identified. Barks (42%), roots (29%), stems (17%) and others parts (12%). The average price in dollar of NWFP is 0,83 for roots ; 1,36 for stem ; 0,48 tubers. For the perception concerning the a viability of PWFP 48% person consider that PWFP are still available, 31% think they are rare 16% think they are becoming very rare and only 5% think they are still abundant.

Keywords: Forest products, Non woody, Medicinal Value Marketed

1. INTRODUCTION

1.1. Problematic

In central Africa (FAO 1995), forest products constitute a significant source of economic resources, food, energy and social uses for various layers of population. They are however an undeniable source of the incomes for the poor populations of the rural populations.

With surroundings 155 million hectares of forests (Malele, 2013), the Democratic Republic of Congo (DRC) contains significant vegetable and animal resources. This vegetable diversity includes woody and Non woody resources with multiple uses making of DRC one of the mega biodiversity countries. Vegetable Goods other than the sawlog (Kadiata, 2010), Non woody Forest Products (NWFP), ensure by their importance's (medicinal, food, artistic) of the incomes the populations and are in addition products of subsistence. According to the World Bank (Loubelot, 2012), approximately 90 % of the most stripped populations depend on the forests to

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remain and get incomes. Admittedly, they created a considerable interest in the world during these last years because of their contributions to households economy and food safety as well as the achievement of the environmental objectives such as the conservation of the vegetable biodiversity (Apema et *al*., 2010).In DRC, the importance of NWFP with medicinal value highlighted itself with the appearance of the document of the traditional pharmacopeia congolaise in 2009 (Kambu, 2009).

More than 150 significant nonwoody forest products was estimated for the international trade. During 1990, the average value of their trade was in the fork from 5 to 10 billion dollars american (Apema et *al*., 2010) .

However, the economic importance of NWFP to the survival of communities involve their excessive exploitation and a disturbance of ecosystem's balance, which situation can be worsened with climatic variations consequences. Increased request of urban and peri urban zones in forest products, increase this risk.

Few reliable data are available on the exploitation and the chain of value of NWFP in order to guide the decisions. Biloso and *al*, (2006) announce that in many areas of the DRC, few information on the exploitation and the markets of the nonwoody forest products (NWFP) are available.

The town of Boma, harbour city, not far from the estuary of Congo river, one of the historical cities of the DRC, which extend without slackening consequence of a rural migration, is a place being the subject of trade of the various products. Near to the forest of Mayombe currently in its relics, it influences considerably the exploitation of the surrounding forests especially out of wooden energies and other NWFP. It famous (Nsimba, 2015) with is quoted of Kinzau-mvuete the like principal one oppressor with the Reserve of Biosphere of Luki, inheritance world of UNESCO (Funds of the United Nations for Science, Education and the Culture).

It is in this context that this study is carried out in order to evaluate NWFP with medicinal value marketed in the Town of Boma with the aim of direct the strategies of durable management of these products.

1.2. Objective General

The general objective is to inventory NWFP of medical use marketed in an urban environment of Boma.

In a specific way, it aims to:

- To establish an inventory of its NWFP with medicinal value;
- To identify the sites of collection of its NWFP with medicinal value;
- To evaluate the part of the plants used like its way of cutting;
- To list the diseases that their treat;
- To evaluate the prices of these NWFP.

1.3. Assumptions

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The inventory of NWFP with medicinal value marketed in the town of Boma reveals a diversity of the exploited species but the range of the marketing of these products remains still vague to direct the sustainable management of these resources.

2. MATERIEL AND METHOD

2.1.SITE

2.1.1.Geographical situation

The town of Boma is located at 8m altitude, 05°50' of Southern latitude and with 13°06' of East longitude (Fahem, 1988).
The town of Boma is limited:

- In North by the territory of LUKULA and enclave of Cabinda
- In the South by the Republic of Angola
- In the East by the territory of SEKEBANZA
- In the west by the Atlantic Ocean.

2.1.2.Climatic conditions

The climate of Boma is the type AW4 according to the classification of Kôppen (Meulemberg, et al..1948).
It is a wet tropical climate characterized by a strong contrast between two seasons quite distinct within temperature and insolation, precipitation.

The rainfall saison extends from October at May with a small dry season from mid-January in mid-February. Precipitations are weak and not exceeding 100 mm per month and are characterized by a great interannual variation. The temperatures are high during the rainy season. They reach the maximum ones about 35°C (Meulemberg et al.., 1948).In the dried season, they are relatively low, down than 20°C.

2.1.3.Edaphic conditions

Boma is characteristed by Kaolinitiques grounds in the group of the ferral grounds.It is the type of argillaceous, muddy, sandy (FAHEM, 1988).

2.1.3.Vegetation

The characteristic vegetable formation is a shrubby savanna where dominate *Hypparhenia spp, maximum Panicum and Imperata cylindrica* with a shrubby layer from 1 to 4 m of hymenocardia (Fahem, 1988).

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2.1.4. Hydrography and topography

Boma's town is built on small hills very cut out by a dense hydrographic network.The Kalamu river constitutes, apart from the river Congo, the principal element of the hydrographic network.The city is located at the junction of this river and developed thereafter in the valley of its affluents (Mbangu and others) on plates surrounding.The Congo river run in edge of the downtown area and determines the border between the DRC and the Republic of Angola (Puati, 1993).

2.2.MATERIALS

2.2.1.Vegetable material

The NWFP with medicinal value were the subject of this study.

2.2.2.Tools

- A camera: to take picture of the NWFP with values medicinal to find on ground.
- A computer: for text processing on Word and the analysis of the data on Microsoft Excel.
- Memo pad: for catch of the notes at the time of the relevant enquêtes' and other information.

2.3.Methodology

To achieve the pursued goals, the methodological approach used for the data-gathering consisted with the abstract like with the investigations in the targeted markets of Boma's town

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2.3.1.Documentary review

The realization of this study required the search and the reading for several documents resulting from various sources of which the Internet, documents and reports/ratios on the town of Boma, reports/ratios of the various organizations, the various public administration of the DRC like various former scientific publication.

2.3.2.Inquire into the markets

The techniques of interview, structured semi maintenance and systematic observation were employed to collect the data. A card prepared for this purpose, served to collect the data. A sample representative of the saler was selected on the basis of criterion related to the availability.

The studied parameters made it possible to collect relative information:

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- The diversity of the species collected ;
- Techniques of harvest ;
- Diseases treated by these NWFP ;
- Marketing ;
- Perception on the availability of NWFP has values medicinal.

The survey was carried out in three markets targeted in the town of Boma and where 17 sale were investigated:

- 6 in the market of Dumbi;
- 6 in the market of the Commune;
- 5 in the market of Roundabout

3. RESUTATS

This chapter prsents the various results obtained in relation to aims in view.

3.1.Identification of surveyed

3.1.1.Distribution of surveyed by sex and age bracket

Table 1 below presents the distribution of the saler surveyed by gender.

Table 1.Distribution of surveyed by sex

GENDER	INVESTIGATION NUMBERS	FREQUENY (%)
Masculine	6	35
Female	11	65
Total	**17**	**100**

The table above reveals that majority of surveyed are women (65%), against 35% men. This results demonstrate the importance of the women in the majority of the activities of trade of the forest products and their influences in the contribution of households incomes.

3.1.2. Distribution of the investigated by age bracket

In the table 2 below are consigned the distribution of the saler by age bracket.

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Table 2.Distribution of the investigations according to their age bracket

Age bracket (year)	Number	Frequency (%)
20 to 29	2	12
30 to 39	6	35
40 and more	9	53
Total	**17**	**100**

It deduced from this table that the majority of the sale rare at least 40 years (53%) old, followed by section from 30 to 39 years with 35% and in end the section from 20 to 29 years with 12%.It is noticed that the majority of the saler of WFNPwith medicinal use are adults with 30 years old.

The study related to some markets located in the town of Domain table 4 below are consigned the number of vegetable species met by market and the number of surveyed by market.

Table 4. Investigate salers and species found by market

Steps	Number of species	Investigated salers
Dumbi	11	6
Commune	8	5
Lufu	0	0
CBCO	0	0
Rond-point	5	6
TOTAL	**24**	**17**

It is revealed from the table 4 that on the five markets investigated in Boma, in two markets the salesmen of PFNLs have identified, they are the markets CBCO and LUFU. For the three remainders 17 salers were surveyed respectively 6 for Dumbi and 5 for commune and 6 for Rond-point.

On the whole 24 species were inventoried. It was noticed that, in fact the same species are sold because the salers supply themselves in almost homogeneous sites of the point of considering phytosociological and receive all the same demands.

3.2.Evaluation of the sold species

On the whole 24 species, were identified on the markets of PFNLs of medical use on the markets of Boma as presented in table 3 below in vernacular name and scientific name.

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Figure 1 below presents the frequency of the taxonomic families of species. This figure reveals that the most exploited family is : Clusiaceae (15%), follow by apocynaceae (10 %), Fabaceae (15%), Rubiacea (15%), Sapindaceae (10%), Zingiberaceae (15%), and Annonaceae (10%), Asclepiadaceae (10%), Erythrophylaceae (10%), Euphorbiaceae (10%), Poaceae(10%), , Sterculicaerae (10%) et Ulmaceae (10%),

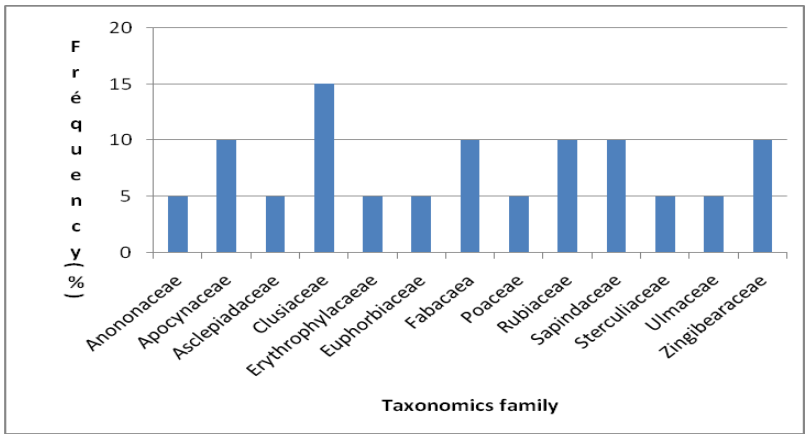

Figure 1. Distribution of taxonomics families .

In the figure 2 below is consigned the ponderal distribution of species origins of exploitation according to whether they are the forests and savannas. It comes out from this figure that 83 % of the species come from the forests against 17% which come from savannas.

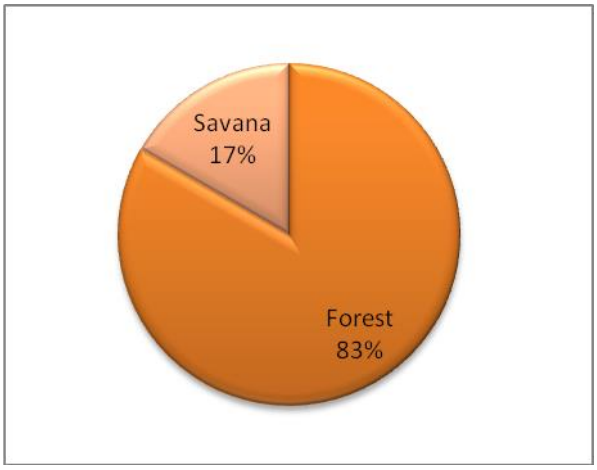

Figure 2. Distribution of species originsbetween forests et savanna

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The Figure 3 below illustrates the part of exploitation according to each party of trees used.It comes out from this figure that the parties of trees sold are in majority barks with 42 %, follow-up of the roots 29%, the stems 17% and finally the other parts 12%. These 12 % gather seeds, the tubers and the rhizomes.

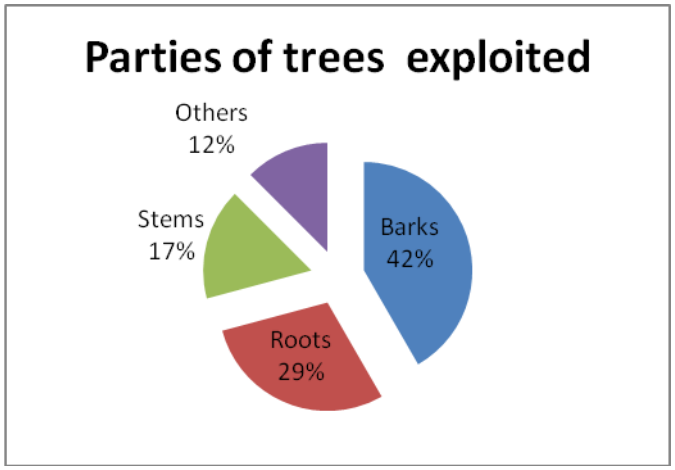

Figure 3.Distribution expressed as a percentage of the parts of sold species

The Table 3 below presents the inventoried species, their taxonomic families, their sites of exploitation, the part sold as well as the treated diseases.

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Table 3. List of some of the most important species inventoried in Boma's target markets

N°	Vernacular name (Kiyombe)	Scientific name	Diseas treated	Taxonomic Family	Party of tree used	Site de collection
1.	Khase	*Erythromphleumsuaveolens*	Plant exorcist	Erythroxylaceae	Bark	Forest
2.	Nbamba	*Croton mubangu*	Spleen	Euphorbiaceae	Bark	Forest
3.	Mundayinday i	*Rawolphia volitari*	Sexual impotence	Apocynaceae	Bark	Forest
4.	Mbodo bodi	*Symphonia globulifera*	Constipation	Clusiaceae	Bark	Forest
5.	Kinuimba	*Marsdenia latifolia*	Plant exorcist	Asclepiadaceae	Stem	Forest
6.	Bangu	*Tema africana*	Sexual impotence	Ulmaceae	Bark	Forest
7.	Nlondo	*Garcinia epunctata*	Stomach	Simaroubaceae	Root	Savanna
8.	Nsengi nsengi	*Mondia whitei*	Sexual impotence	Rubiaceae	Root	Savanna
9.	Vonda kadi	*Trema orientalis*	Malaria	Clusiaceae	Stem	Forest
10.	Dilemba nzau	*Quassia africana*	Plant exorcist	Zingiberaceae	Stem	Savanna
11.	Ngadidia	*Gardenia ternifolia*	Malaria	Apocynaceae	Graine	Forest

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12.	Disisa sisa	*Garcinia cola*	Sore throat	Zingiberaceae	Graine	Forest
13.	Nteti meme	*Aframomum melegueta*	Hernia and diabetes		Graine	Forest
14.	Tanga wisi	*Rauwolfia vmitoria*	haemorrhoid	Fabaceae	Rhyzome	Forest
15.	Dilandu	*Zingibera officinale*	Plant exorcist	Sterculiaceae	Tuber	Forest
16.	Nkazu	*Tonningia sanguinea*	Sprain et diabete	Poaceae	Bark	Forest
17.	Kitsangu tsangu	*Cola nitida*	Plant exorcist	Rubiaceae	Stem	Forest
18.	Ntumbi tseki	*Cymbopongo densiflorus*	Yellow Fever	Sapindaceae	Root	Savanna
19.	Didila	*Naucea latifolia*	Plante exorcist	Fabaceae	Bark	Forest
20.	Mvanza	*Ganophyllum giganteum*	Diarrhoea	Clusiaceae	Bark	Forest
21.	KiKuadi	*Pentaclethra macrophylla*	Tension	Fabaceae	Bark	Forest
22.	Dikasa kasa	*Garcinia punctata*	Filaria	Annonaceae	Barak	Forest
23.	Mukhala	*Albizia gummifera*	Haemorrhoid	Fabaceae	Seed	Forest
24	Mukala	*Xylopia aethiopica*	Haemorrhoid	Annonaceae	Bark	Forest

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It comes out from this table that PFNLs inventoried treat several diseases such that the spleen, the sexual impotence, Constipation, Hémorroïde, Tension, Filaires Wrench and Diabetes, Yellow fever, Angine, Hernie and Diabetes, Malaria and the evils of stomach.Other plants are also used for exorcism.

Figure 4 presents the frequency of the species by disease treated. It comes out from this figure that 6 species inventory are used in the rites spiritual or cultural in exorcism or the fight against the bad spirits. For the sexual weakness 3 species were inventoried, Two species respectively for the diabetes, constipation and malaria. And a species for each disease remaining is hernia, tension, wrench, yellow fever, stomach, telegraphic, and haemorrhoids

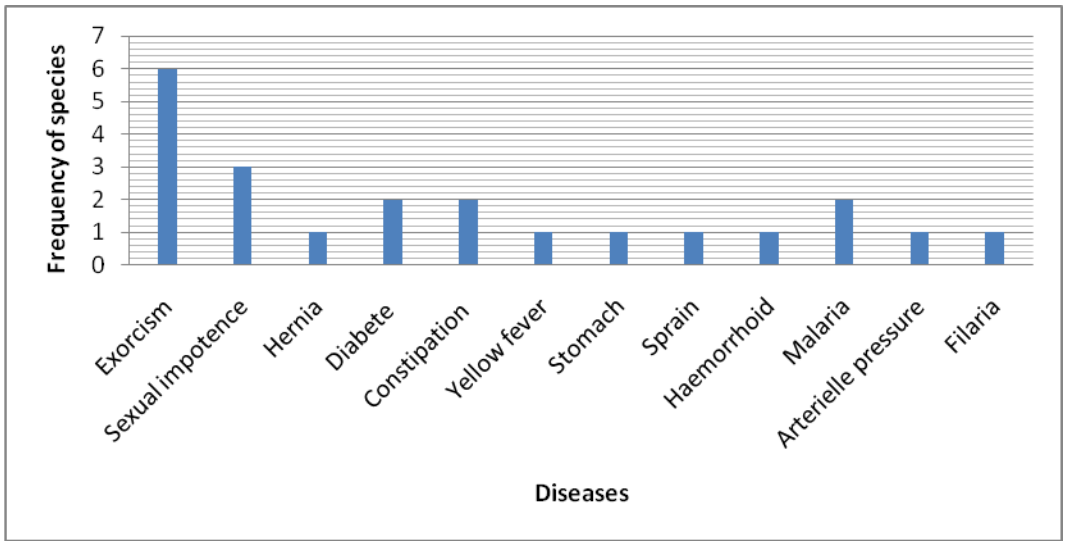

Figure 4. Frequencies of the species by treated types of disease.

3.4. Minima, average and maxima prices by sold part

In the Table 5 below are presented the maxima, average and minima prices of NWFP sold by each part.

This table shows that the majority of the NWFP parties with medical value sold in the markets of Boma, have a minimum price inferior has 1$ such is the case for roots (0,54), seed and Rhyzome (0,22), tuber (0,33) and the barks (0,54); except for the stems (1,08 $). For the maximum price, the stems and the barks have a higher maximum price 1$ while the remainders of the parts have a maximum price lower than 1 dollars.

The average price in dollars is respectively 0,83 for the roots; 1,36 for the stems and barks;0,38 for seeds and rhyzomes and finally, 0, 48 for the tubers.

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Table 5.Minimaand maxima price of each part sold

Sold party	Minimum Price ($)	Maximum price ($)	Moyenne ($)
Roots	0,54	1.09	0,83
Stem	1,08	1,6	1,36
Seed	0,22	0,54	0,38
Rhyzom	0,22	0,54	0,38
Tuber	0,33	0,65	0,48
Bark	0,54	2,17	1,36

3.5.Perception on the availability of PFNLs

Figure 5 below presents the perception of surveyed into the availability of PFNLs.

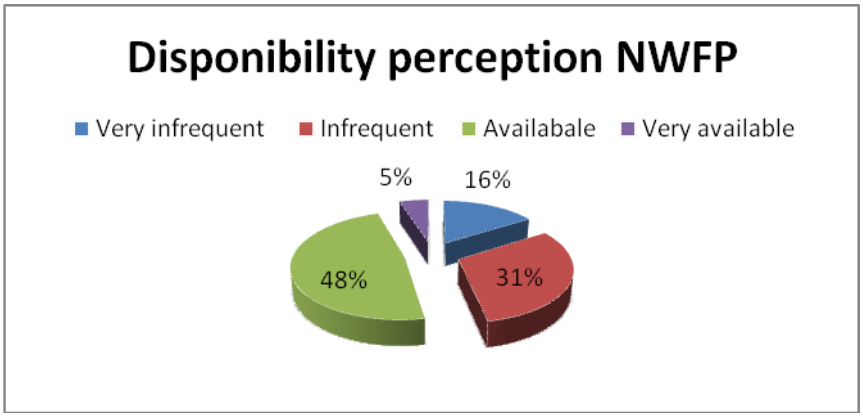

Figure 5. Perception on the availability of NWFP

It arises from figure 5 below that 48 % of surveyed think that PFNLs are still in sufficient quantity to ensure its use by the population;31 % of surveyed think that PFNLs became rare, 16% think that PFNLs are very rare thus, in the process of disappearance because of

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overexploitation.5 % think that PFNLs are still very available. This last category thinks that the forest resources are inexhaustible.

CONCLUSION

The present study related to the inventory of the nonwoody forest products (PFNLs) has medicinal value marketed in the harbour markets cheap of Boma.

Specifically it aimed inquired the salesmen of PFNLs with medicinal value in the markets targeted in this work. It consisted in inventorying the species of PFNLs has medicinal value, the sites of collection, the techniques of harvest, the parts collected for each species, the price selling of each part of the species as well as the diseases which treat each species.

Methodology used was that of the investigations into ground.17 salesmen on L on markets of the town of Boma of which Dumbi, Roundabout and Commune. The markets of Lufu and CBCO were not the subject of this study.35 % were men against 65 % of the women.

It comes out from this study that 24 vegetable species left again in 13 botanical families provide of PFNLs to medicinal value in the town of Boma. These species come with forests to 83 % and 17 % from savannas. The inventoried taxonomic families are family of clusiaceae (15%) followed by Apocynaceae, Fabaceae, Rubiaceae, Sapindaceae and Zingiberaceae with 10%. And finally, Anonaceae, Asclepiadaceae, Eryhtrophylaceae, Euphorbiaceae, Poaceae, Sterculiaceae and Ulmaceae with 5%.

The bark represents the great proportion of the parts sold with knowing (42%), followed roots (29%), stems (17%), and in end the other parts 12% are seeds, tubers and Rhyzome. Technics of harvest are principal demolition, barking and the collecting. These NWFP inventoried treat several diseases such as: the spleen, sexual impotence, Constipation, Hémorroïde, Tension, Telegraphic Wrench and Diabetes, Yellow fever, Angina, Hernia and Diabetes, Malaria and evils of stomach. Others are also used for exorcism.

The average price in dollars of NWFP is respectively 0,83 for the roots; 1,36 for the stems and barks;0,38 for seeds and rhyzomes. And finally, 0, 48 for the tubers.
With regard to the perception of surveyed vis-a-vis the availability of NWFP, it is arisen that 48 % of surveyed think that they are still available in the zone, 31% think they became rare, 16% think that they are very rare incomes and only 5% think that they are still abundant.

Thus, by what precedes, it is recommended what follows:

- The promotion of the domestication of NWFP;
- The quantification of the availability of NWFP
- The promotion of the durable practices of exploitation;
- A study on the impact of exploitation of NWFP in the incomes of households;
- Making of a legal framework on the exploitation of NWFP;

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