Non Timber Forest Products (NTFPs) Exploitation and Household Uses in Bui Division, North West Cameroon

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Abstract:- **This study was carried out in Oku, Bui Division, North West Cameroon with the aim of examining the uses of four selected Non Timber Forest Products (NTFPs) (Fuel wood, Alpine bamboo, Honey, and Bushmeat-Rodents) by households. Data were collected from randomly selected 400 households in 8 villages using semi-structured questionnaire. Frequencies and percentages were used to analyse the data. The findings revealed that Fuelwood was most exploited by Households (80.75%), followed by Alpine bamboo (68.5%), Honey (50%) and Rodents (38%). A great number of households exploited all the four NTFPs under review (20.75%). Just a few households collected only one NTFP (24.25%) while 75.75% collect at least two NTFPs. NTFPs were mostly collected in the households for both consumption and commercial purposes (90.5%), while 9.5% were collected for consumption purposes only. No households indicated that they collected NTFPs for commercial purposes only. The NTFPs were mainly used by Households for food, medicine, construction, culture and as tools, with "tools only" being the greatest use. From field findings, it can be concluded that respondents could not do without these NTFPs in their daily domestic activities as they serve as sources of food, medicine, income and thus means of livelihood. We therefore recommend that households should exploit sustainably and the government and NGOs should keep educating households on more sustainable ways of using the forest.**

Keywords: **non-timber forest products, households, utilization, livelihood, exploitation.**

I. INTRODUCTION

Forests have value to people and contribute to meeting human needs in a number of ways. The importance of NTFPs to the rural livelihoods of rural people is widely acknowledged globally (Mahonya *et al.,* 2019). Numerous previous studies have found that it is often the poorest people and households that are most dependent on these resources. NTFPs are now even perceived to be of importance to some local and national economies as well as being important elements in sustainable forestry and for their "contribution to environmental objectives, including the conservation of biological diversity" (FAO, 2003).

For most of the worlds' rural households, NTFPs provide essential food and nutrition, medicine, fodder, fuel, thatch and construction materials, mulch and nonfarm income. These products are particularly important in relieving the 'hunger periods' in the agricultural cycle, and in smoothing out other seasonal fluctuations. Dealing in NTFPs can provide employment during slack periods of the agricultural cycle, and provide a buffer against risk and household emergencies (FAO, 1995). For example wood energy is increasingly used in developed countries with the aim of reducing dependence on fossil fuels. For example, about 90 million people in Europe and North America use fuel wood energy as their main source of domestic heating (FAO, 2014).

Statistics on NTFP use and trade are typically scarce because most extraction is for subsistence, and the bulk of trade is unregistered on local markets. Despite this, FAO estimated in 1997 that around 150 species reach international markets, representing a value of US$11 billion. According to Pimental *et al.* (1997), NTFP resources play a major and very often critical role in the livelihoods of a high proportion of the world's population. UNDP (2001) ascertained that non-timber forest resources (NTFRs) are in daily use throughout the tropics, commonly providing resources crucial to people where no other social security is provided by the State. According to The Economist (2000), in a typical African country, only one person in ten has a formal job and economically important species provide a source of informal sector income. In such situations edible wild foods (fruits, wild vegetables, fungi, bushmeat and insects) commonly provide dietary supplements (Cunningham and Davis, 1997).The Kilum-Ijim forest is a source of rural alternative food supplements for inhabitants of the neighbouring villages (Fogwe and Kwei, 2015). This forest is also the source of other products like fuelwood, Honey, *Prunusafricana*, Alpine bamboo and many others which play a major role in the livelihoods of households in Oku.

1.1 Location of the Study area and methods

1.1.1 Location of the study area

This study was carried out in Oku sub division which falls between latitude $6^{0}5'$ to $6^{0}15'$ North and $10^{0}20'$ to $10^{0}40'$ East stretching on 232 km^2 of the 35 villages being 126,426 inhabitants as of 2016 (Kimengsi and Ngala, 2018).

Oku subdivision is situated in Bui Division of the North West Region of Cameroon (Figure 1).

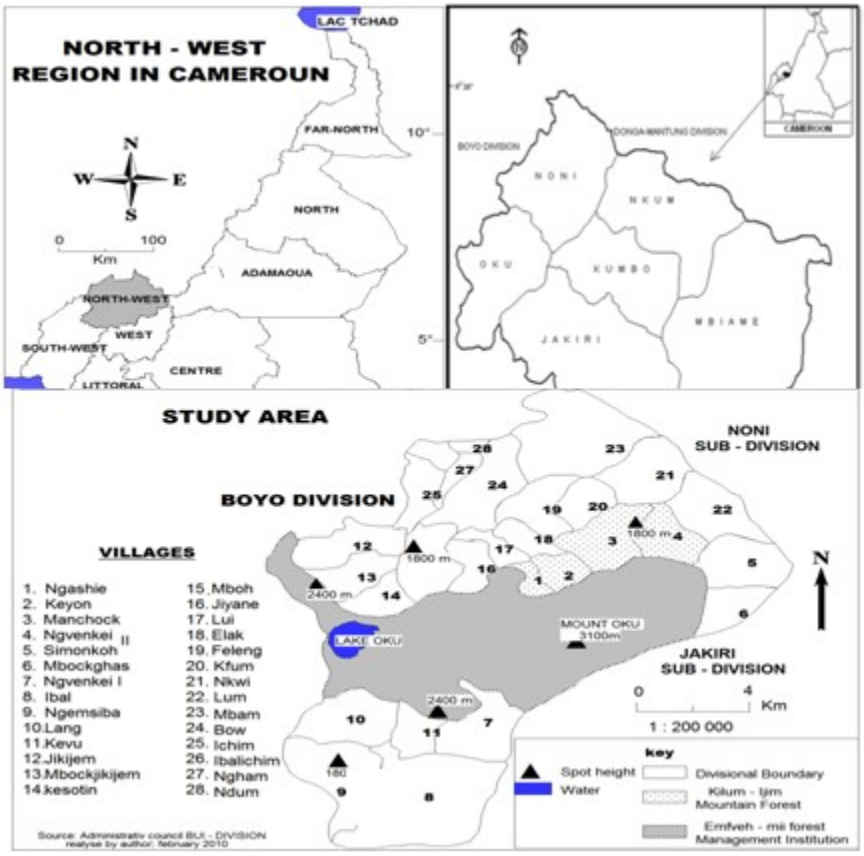

Figure 1: Location of study area

This area is bounded to the north by Noni subdivision, to south by Babungo in Ngoketunjia Division, to the east by Kumbo and Jakiri and to the west by Boyo Division. The study area is an important one for biodiversity, especially the Kilum-Ijim forest. The contiguous Kilum and Ijim Mountain Forests (known as the Kilum-Ijim Forest) are located between latitude 6°07′N and 6°17′N and Longitude 10°20′E and 10°35′E (FAO, 2002). Three fondoms cover the Kilum-Ijim Forest: the fondoms of Nso and Oku in Bui Administrative Division (covering the Kilum Forest) and the fondom of Kom in Boyo Administrative Division (covering the Ijim Forest). Agriculture is the main economic activity of the study area and about 90% of the population is directly engaged in agricultural activities. Besides agriculture, 10% of the population in the area is engaged in other local activities like carving, hunting, embroidery and blacksmithing which are all forest dependent activities. There has also been the establishment of small scale industries such as the honey processing, coffee milling and numerous furniture workshops (Kimengsi and Ngala, 2018).

1.1.2. Methods

The population of the study area comprised of Households in Oku in 8 purposively selected villages. They included Jiyane, Ngashie, Keyon, Mboh, Manchok, Lui, Ngvenkei II, and Jikejem. The study used 400 semi-structured questionnaires (50 from each of the 8 villages selected) to collect data that were administered to randomly selected households. The number of households for sampling was determined using the formula by Yamane (1967), and as used by Maua *et al.* (2018). The formula is as follows;

$$n = N / [1 + N (e)^2]$$

Where;n is the sample size, N is the population size, and e is the level of precision.

The collected data was analyzed using statistical software and econometric analysis as used by Langat *et al.* (2016), and Thu Moe and Junchang (2016). Statistical Package for Social Surveys (SPSS) version 25 and Microsoft Excel 2010 were used.Descriptive statistics such as frequency and percentage were also used.

II. RESULTS AND DISCUSIONS

2.1Typology of NTFPs exploited by Households

A good number of NTFPs are exploited by households in Oku. Some of them include Fruits (Strawberry, Bush Mango), Honey, Bush meat (Rat mole, Monkeys, Grass

cutter), *Prunusafricana*, Fuel wood, Alpine Bamboo, Vegetable, and Mushroom (Tambi and Kengah, 2018). The study however limits its scope on four of these NTFPs which are Honey, Bushmeat, Fuelwood and Alpine Bamboo.

Field results show that 20.75%of households exploit all the four NTFPs under review. A lower percentage ofhouseholds collect only one NTFP (24.25%) while majority (75.75%) collect at least two NTFPs (Table 1). These findings seem to correlate with those of Mahonya *et al.* (2019) who found that all sample households in the Zomba District, Southern Malawi, collected and used more than one NTFP.

Table 1: Collected NTFPs

NTFP collected			
		Frequency	Percent
Valid	Alpine bamboo	20	5.0
	Bush meat	12	3.0
	Fuelwood	65	16.25
	Alpine bamboo, honey, fuelwood	72	18.0
	Alpine bamboo, honey	45	11.25
	Alpine bamboo, fuelwood	46	11.5
	Bush meat, fuelwood	49	12.25
	Alpine bamboo, bush meat, honey ,fuelwood	83	20.75
	Alpine bamboo, bush meat, fuelwood	8	2.0
	Total	400	100.0

The collection of multiple NTFPs can be justified by the fact that some NTFPs are collected principally while others are collected in the process of collecting others. From discussions with households, it was gotten that NTFPs like Bush meat (rodents) are sometimes collected when they get into the forest to harvest honey. This is a similar case with fuel wood which does not really have a definite collection time table. Given that the households are mostly located close to forest, the high percentage of those who collect more than one NTFP could be inferred to the fact that they had easy accessibility to NTFPs. Such accessibility can influence the extent to which specific NTFPs are collected and used as well as the means by which they are procured, notably via purchase or self-collection or a combination of both. Moreover, such extensive collection and use can also reflect the cultural and utilitarian demand for NTFPs in the region, and for many households, their high level of dependence on wild products as stipulated by Angelsen*et al.,* (2014).

2.1.1 Collection Activity

Honey collection activity is one that generates most income to households in the study area. This is so because of the local and international recognition of Oku white honey. However, this activity is mostly dominated by men who are often assisted by other household members. It is a pretty tedious activity as it entails carrying the hives on their heads down the plains so that bees colonise the hives and moving up the mountain with these hives. For a greater part, households carry their hives to the plains of Mbam, which is a 30 minutes' walk distance from Elak, Oku. This is because the bees do not live spontaneously in the forest. Once colonised, these hives are transported by the farmers on their heads to the forest and installed on supports or in trees around 1.5 to 2.5 m height. Indepth field findings revealed that there is a small but growing habit of keeping hives around the home and farm. The honey collected around the farms is not white in colour because *Schefferaabyssinica* and *Nuxiacongesta* that is pollinated by hives to produce white honey grows only in the forest.The qualities of white honey are directly linked to these two plant species whose flowers are pollinated by bees in the forest, namely *Schefferaabyssinica* and *Nuxiacongesta*. Households start by building the hives. Then, the swarms of bees are captured in the plains. According to the households, the hives are colonised between September and April. Thereafter other hives are placed in the plain, and then moved to the forest between November and March, and old hives that have been used in the past are also left in the KilumIjim forest. When ready for collection, the honey is harvested. The period between June and October is one considered as no entry of hive to the forest by harvesters. It is the peak period for the rainy season when the trees are left to flower and road paths to the forest are very rough. Traditionally, honey collection and accompanying activities, given the tedious tasks that they entail is dominated by men and the elderly boys at home.

Collection of rodents by households in the Kilum Forest is a very old practice. The proximity of households to the forest permits them to easily hunt or trap rodents from the forest without any impediment. Even though 38 % of households collect these rodents, indication was however made by most households in this activity that it is secondary. By secondary, we mean households that exploit NTFPs like fuel wood, honey only accompany them with some rodents as a secondary activity. Rodents are trapped throughout the year and sometimes household members have to travel to the forest as early as 3am to place traps, check the ones that had been placed or do both. When the rodents are harvested, they are either consumed or sold. Some of these rodents are tied in bundles of leaves of 10 commonly call Oku sardine (locally called *fehse*) are a protein delicacy in sold at prices varying from 700 to 1500 FCFA per bundle and per village.

Maisels*et al.,* (2001) in their research on the extirpation of large mammals and implications for montane forest conservation at the case of the Kilum-ljim Forest through casual conversations with hunters revealed that one hunter could have as many as 200 'rat-squashing' traps out at one time, but may harvest only 5-10 rodents on each visit. A survey by the Kilum-Ijim project in 1999 suggested that most people had given up hunting because of the poor rates of return. However, even though the activity is considered secondary to some, it still occurred occasionally. Moreover,

fringe communities live within a day's walk of the forest and of these about half are adults, and even if only 38% of households still hunt, that can be a non-negligible number of hunters whose activity should be checked so that we do not run to total extinction of these rodents.

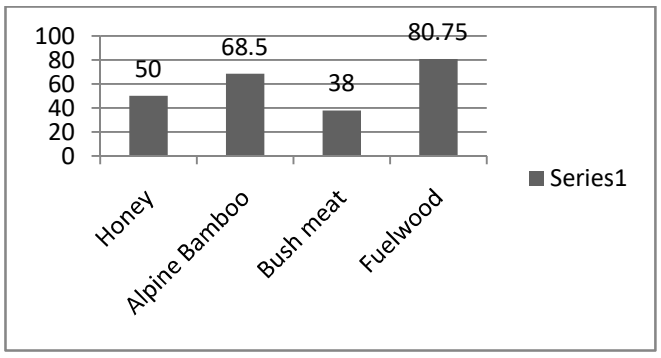

Figure 1: NTFPs Collected

Fuel wood is the predominant fuel for rural households in much of the study area as 80.75% of households involved in the collection NTFPs collect fuel wood. This percentage is even higher when we want to look at households that use firewood as fuel in Oku as over 90% of the people of Oku use firewood as a source of fuel (Fogwe and Kwei, 2015). The multiple uses of fuelwood, its frequency of use and economic value are good justifications for this high percentage of exploitation. This implies that villages that surround the forest are naturally dependent on the forest for fuel wood. Household members such as the father and boys (girls occasionally) will travel to the forest very early in the morning to harvest the fuel wood. This activity has been intensified since the socio-political crisis arose in the North West and South West regions of Cameroon. Given that most schools in the area have closed due to this crisis, most youths have turned to harvest NTFPs and especially fuel wood thus creating more pressure on the forest. This used to be the case during holidays when primary school and secondary school students collected fuel wood so as to provide for some school needs when schools reopened. Even though most households are involved in the collection and use of fuel wood, it may not be a main activity or principal NTFP collected. Some households that collect honey for example only collect fuel wood on their way out of the forest but do not practice it as a main activity. Fuel wood is collected in the dry and rainy seasons alike and localities such as Keyon, Manchok and Ngashie tend to have the highest number of exploiters due to their proximity to the forest.

Alpine bamboo is also exploited by households. Household members rise very early in the morning to travel far into the forest where they can find dry bamboo. When found, the bamboos are carried or transported on their heads. It is common to find bamboos tied in bundles on the way to the mountain. They are transported from the mountain to these various spots where they can be progressively moved to the homes.Only 5% of households exploit bamboos alone and the remaining percentage accompanies its collection with other NTFPs. The total percentage of alpine bamboo exploitation is 68.5%. This high percentage can be justified by the various uses of alpine bamboo in households which will be discussed later. It is worth noting that most households indicated that they are permitted to harvest only dry alpine bamboo even though from field observation this is not always the case. This is due to a 1993 Prefectural Order which included a prohibition on cutting young bamboo in the Kilum–Ijim forest. When this lapsed, rules were jointly developed by traditional chiefs and a conservation project that only mature or dry bamboo could be cut, and if young bamboo were needed, the community must be consulted(Ingram and Tieguhong, 2012).

2.1.2 Sources of NTFPs in Households and Collection Purpose

Households do not only get and use NTFPs from the forest only (11.5%), there is mixed blend between Forest and Market (47%) and Forest, Market, Gifts (41.5%). Collection from the forest is generally supported by local abundance. This undermines the prospects for significant markets within a village. However, field finding revealed that households do not only collect from the forest but also buy NTFPs. This can be due to local scarcity of some NTFPs such as rodents and to a certain extent honey which has a very high demand and limited supply. Local scarcity of particular NTFPs is regarded as an important catalyst for markets (Mahonya*et al.* 2019). Some NTFPs like fuel wood are also highly purchased in some areas because of the distance households sometimes have to cover to the forest. This is the case of some areas like Jiyane, and Mboh.

NTFPs are mostly collected in the households for both consumption and commercial purposes (90.5%). While 9.5% of respondents collect NTFPs only for consumption purposes, no households indicated that they collect NTFPs for commercial purposes only. The NTFPs are traded in local markets and international markets (Honey) and are used in the households for food, medicine, tools, construction and cultural purposes. As shown in the results, most households collect NTFPs for both domestic and commercial purposes. A bundle of fuel wood for commercial purposes for example is sold between 700 to 1500 FCFA in the dry and rainy seasons respectively. There is a variation in the demand and supply of fuel wood in Oku which is directly a function of economic activities in Manchok, Keyon and Elak villages and even Kumbo town that harbours the highest number of civil servants, restaurants and bakeries. Lui, Ngashie and Keyon villages that are close to Elak have the highest demand for wood and so most vendors use two-wheel trucks to supply firewood to some bakeries, restaurants and households. Villages like Manchock, and Nguvikei II along the Oku-Kumbo road axis have sales points where fuel wood is bought and transported to Kumbo. Revenue from the sales of firewood is used in the construction of houses, payment of school fees and other development related activities. The cost

of a bundle of Alpine bamboo sells between 700 to 1000FCFA and is highly demanded by households that collect honey.

2.2 Use of NTFPs in Households

The NTFPs in the households are either used for food, cultural, medicinal, construction, or tool purposes. Fuelwood, honey and alpine bamboo have multiple uses.

2.2.1 Use of Honey in Households

As indicated by households, Honey is used as a medicinal product, food and its products as a tool or raw materials for other products like wax. All households that collect honey use it as food and medicine while a very insignificant percent (1%) of these household use it as a tool to produce products like wax, and honey drinks. This is in line with the findings of Ingram (2014) in the Adamaoua Region of Cameroon where all households consumed honey as food, with majority (71%) using it for it for medicinal purposes. Though honey may not be the most exploited NTFP, it is the most valued economically. As a medicinal product, it is used by households to cure ailments like cough, fever, stomach disorder, malaria fever and gastric. Sometimes it is mixed with garlic to produce the cough medicine. Liquid products for pain and rashes are also produced from honey. Field findings also indicated that it can also be applied to fire burns for quick recovery. is worth noting that Honey is a popular ingredient in medicines prepared by traditional healers in Oku, frequently mixed with herbs to treat a wide range of illnesses. As food, households that collect honey mainly consume it with the comb. It is occasionally sold without being filtered but more of the time filtered before it can be sold in the market and eaten with bread and as a sweetener in drinks. Honey as a tool is mainly through its byproducts. Some households reported that chaffs from drained honey can be used to produce wax which in turn will help in the production of candles. Shoe polish can also proceed from this. Households also reported that juice can also be made out of honey. It is worth noting that very few households are engaged in the various forms of honey transformation as this is left in the hands of the honey cooperative. Moreover, most households interviewed reported that they lack the knowhow to engage in this form of transformation.

2.2.2 Uses of Alpine Bamboo in Households

Alpine Bamboo is the second most exploited and used NTFP (68.5%). This is certainly because it plays a major role in building bee hives, and is used in many ways by the households. Alpine Bamboo is mainly used as a tool and as a construction material. Occasionally, alpine bamboo products can be used as a tool to produce spears which are used in cultural events and as decoration in some households. Alpine Bamboo as a tool is one of the main elements used to build beehives (photo 1). This explains why it was noted that all households that exploit honey by extension also exploit alpine bamboo for its use in building beehives.

Photo 1: Beehives made out of Alpine Bamboo.

Source: Author (2019)

It is also used by exploiters to produce musical flutes, storage jars, mats, picks for grilled meat and baskets. Even though Nurse *et al* (1995) report that bamboo has been used for paper making in this area; which is a technology that was introduced by the Kilum-Ijim project in the 1990s, we didn't seem to observe this in any of the households. Alpine bamboo can be used for other purposes such as production of toothpick but most households are not engaged in this form of transformation.Alpine bamboo is also used by households in the domain of construction. It is the main NTFPs among other NTFPs under review to be used for this purpose. It is used in households as ceilings, which serve as barns and construction works on fences of gardens. This reduces their expenses on conventional building material. Also, it is used to build fences for gardens, homes, etc.Even though most households in the area use alpine bamboo for various uses, it was noticed that most of these households limit their uses to tools such as beehives, baskets, mats and for construction. This seems to be a narrow list as this product can also be used for furniture, utensils, water pipes, etc. This agrees with Ingram and Tieguhong (2012) who say that despite at least 30 years of construction use and over 60 years using Alpine bamboo, the array of products produced is narrow compared with Asia.

2.2.3 Use of Bush meat (rodents) in Households

Households in Oku mainly depend on farm products such as; Irish potatoes, beans, corn for food but an assortment of fruits, bush meat are used to add extra flavor to the starchy traditional staple dishes such as corn fufu. Some bush meat commonly called by consumers "Oku sardine" or "fehse" in the local language is the most consumed among other bush meat. All households that indicate collecting bush meat (100%) use it for food.

2.2.4 Use of Fuel wood in Households

Fuel wood among other NTFPs such as honey and bamboos is the most collected and used NTFP. It may not have many uses as alpine bamboo and honey but is used by

almost every household i.e. over 79% of households. This percentage could even be higher given that some households that do not collect fuel wood either buy it from neighbors, the market or receive as gifts. Fuel wood is mainly used as a source of cooking fuel in households, restaurants and bakeries. These findings go in line with those of Mahonya*et al.* (2019) who found in their study in Southern Malawi that all households used fuel wood as a source of cooking fuel. Households that have access to NTFPs have a sure source of energy and this is the main source of energy in the study area. Besides being used as cooking fuel, a few households use fuel wood in the construction of their fences especially for gardens.

The NTFPs and their products are classified as either being used for cultural purposes, food, medicine, construction or tools (table 2).

Table 2: Identification Matrix of NTFP uses and Percentage of Exploitation

Use NTFPs	Culture	Food	Medicine	Construction	Tools	F/M/T	F/M	T/Con	T/Con/Cu l	**Total**	**Percent**
Bush meat	xx	152	xx	xx	xx	xx	xx	xx	Xx	26	38
Honey	xx	xx	xx	xx	xx	20	180	xx	Xx	200	50
Alpine Bamboo	xx	xx	xx	xx	100	xx	xx	164	10	274	68.5
Fuel wood	xx	xx	xx	xx	300	xx	xx	23	Xx	323	80.75
Total	xx	152	xx	xx	400	20	180	187	10	xx	xx

Source: From field Data (2019).

N/B:

F/M/T: Food/Medicine/Tools F/M: Food/Medicine

T/Con:Tool/Construction T/Con/Cul: Tools/Construction/Culture

Some NTFPs such as fuel wood, honey and alpine bamboo however have multiple uses. By this, we had a food and medicine combination, food, medicine and tools, then tools and construction combination. Such extensive use could be a reflection of the cultural and utilitarian demand for NTFPs in the region, and for many households, their high level of dependence on these products. This line of reasoning agrees with the inventory of widely used NTFPs in other household surveys countries; Mahonya*et al.,* (2019), Angelsen*et al*., (2014). We can note from the table that most of the NTFPs collected by households are used for "tools only". This is because fuel wood and Alpine bamboo which have the greatest percentage of exploitation are used for this purpose. Fuel wood as a tool is used for cooking fuel and alpine bamboo as a tool to produce beehives, mats, etc. The combination of tools and construction follows for the same reasons as stated above. Fuel wood and alpine bamboo are widely used by households for these purposes. The high percentages of food and medicine come to confirm the high percentages of exploitation of honey which is mainly used for these purposes. This shows the high household use and economic benefit of honey but is also a call for a more sustainable use.

III. CONCLUSION AND RECOMMENDATIONS

Fuelwood, Honey, Alpine bamboo and rodents are highly exploited and used. It can therefore be concluded that majority of the households cannot do without using NTFPs for domestic purposes as sources of food, employment and income generating activities. These play a great role to ameliorate the social and economic status of the households. In other words, it will be difficult and inappropriate to restrict further access to the KilumIjim Forest from households.This conclusion does not however cancel the fact that the sustainable use of these resources in Oku still remains a major concern as most exploiters do not take future generations into consideration as they exploit. Households should therefore exploit sustainably and the government and NGOs should keep educating households on more sustainable ways of using the forest.

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