Community Perception and Pangolins (*Manis spp.*) Conservation in the Kimbi-Fungom National Park, North West Cameroon

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Abstract—This study was undertaken in 2017 with the aim to bring out community perception that can contribute to the conservation of pangolins in the Kimbi-Fungom National Park (K-FNP). A survey was used for data collection with questionnaires administered, semi-structured interviews and focused group discussions. Results showed that, 58% of respondents reported Smutsia gigantea as the most abundant pangolin species followed by Phataginus tricuspis (27%) and Phatagimus tetradactyla (15%). Hunters' interviews revealed that 35% of hunted animal species in the Park were pangolins and about 1664 pangolins were killed annually in the seven villages surveyed. An average small pangolin in K-FNP area costs 2,500CFA. This showed a low cost-value of pangolins in the K-FNP compared with 550,000 to 625,000CFA (1100-1250USD) in countries like China. This probably explains the high poaching and the unwillingness of the good number of respondents (55%, n=117) who expressed negative attitudes towards Pangolins conservation with some stating that they have no means to alternative sources of livelihood. This means that, effective support for domestication of animals and frequent sensitization campaign should be actively undertaken around the K-FNP to divert the minds of the villagers from illegal hunting of pangolins toward their conservation.
Keywords— Conservation, Pangolin, Socio-economic activities, Traditional knowledge.

I. INTRODUCTION

Kimbi-Fungom National Park (K-FNP) is home to many species of wildlife such as lions, cheetah, hyena, kora, wild cats, a strange variety of gorilla, buffalos, a small population of giraffe, and many species of birds like vultures and parrots (Sainge, 2016). Chuo and Tsi, (2017), also reported the presence of chimpanzees and several species of monkeys. However, baseline data on the existence of pangolins is still not established despite the confirmation by Park authorities, hunters and villagers living around this park, of the existence of pangolins (Fominyam, 2015). This is evident by the frequent catch and seizure of pangolins and pangolin scales depicting a high poaching rate in the park (Fominyam, 2015). The four species of African pangolins: white-bellied tree pangolin (*Phataginus tricuspis*); Black bellied tree pangolin (*Phataginus tetradactyla*); giant ground pangolin (*Smutsia gigantea*) and Temminck's ground pangolin (*Smutsia temminckii*), which were previously listed as "least

concerned" or "near threatened" are now all classified as seriously "Vulnerable" or "Threatened" (IUCN,2017). The Ministry of Forestry and Wildlife (MINFOF), classified *Smutsia gigantea* in Class A amongst totally protected species and the other three sub-species in Class B as partially protected accordingly to the categories of mammals in Cameroon with both declared rare or threatened with extinction in some of their suitable habitats (MINFOF, 2013). Therefore, they are totally protected and it is forbidden to kill them except on special authorization issued by the services in charge of wildlife (MINFOF, 2013). Ahead of World Pangolin Day in February 2017, the government of Cameroon conducted Africa's first-ever public burn of confiscated pangolin scales, showing their commitment to conserving the world's most heavily-trafficked wild mammal (ZSL, 2016). This gesture of the state created awareness on the importance of these species of wildlife. Unfortunately, the rate of encroachment into the K-FNP by the local communities have been reported very

rampant and increasing (Chuo, 2018). This is because wildlife species especially pangolins are illegally hunted for food and for uses in traditional medicine as well as sold to improve livelihoods (Hill, 2000).

The community's perception towards the conservation of Pangolins has not been known in the K-KNP thereby creating a knowledge gap (Huggins *et al.,* 2004). This has greatly hindered pangolin conservation in this park. There is no map yet showing the distribution of these three species of pangolins in K-FNP (Fominyam, 2015). Thus limiting conservation efforts since knowing habitats characteristics, preferences and threats are of prime importance to wildlife conservation (Chuo and Tsi, 2017). It causes one to want to know the local peoples' perception about the Park. It will be important to know if these people actually support the maintenance of the Park or not and if yes why and if no, their reasons. Without answers to these questions, the conservation of species of wildlife in this park and pangolins in particular will still remain a big challenge. One of the problems faced in wildlife conservation around the K-FNP is the lack of education of local communities on the disadvantages of wildlife extinction, economic and social benefits that can be derived from the protected area (Tsi and Chuo 2016). Another problem is the corrupt practices of wildlife officials put in place by the state to keep a watchful eye over protected areas. A serious problem too is the shortage of staff to cover round the K-FNP (Nda *et al.,* 2018). Overdependence on the park by the villagers also poses a problem in conservation. It is for this reasons that this research was carried out to investigate community's perception towards the conservation of Pangolins (*Manis spp*.) in the K-FNP, North West Cameroon.

II.   MATERIAL AND METHODS

Description of study area

The K-FNP was created by a Prime Ministerial decree number 2015/0024/PM of 3 February, 2015 with a total surface area of 953.8 km^2 (figure 1).The K-FNP occurs approximately at latitude 6.5-6.9° N and longitude 9.8-10.5° E in the North West Region of Cameroon (Tata, 2011). The K-FNP cuts through 3 divisions: Boyo, Menchum, and Donga-Mantung, covering 4 Sub-divisions: Fonfuka, Fungom, Furu-Awa, and Misaje. In the north, it is bordered by Tumbo and Tosso in Nigeria, Baji, Nser, Kpep, Furubana, Supong, Akum, Edjong and river Katsina Ala in Furu Awa sub-division. In the east by Labo, Batari, and the Dumbo cattle ranch in the Misaje sub-division (Fominyam, 2015). In the South by river Kimbi, Kimbi village and Su Bum in the Fonfuka sub division. In the center by Zhoa-Nkang, Esu, Kundzong and Iwo in the Fungom sub-division, and in the West by Munkep and Gayama also in the Fungom sub-division. These two compartments are linked by a corridor that stretches between Nkang and Nkannye on the Fungom end to the north west of Kimbi and South West of Dumbo cattle ranch with river Kimbi being a natural boundary between the ranch and the National Park. The park has four main entry points: Kimbi to the south, Zhoa-Nkang in the center, Esu - Gayama to the west, and Furuawa to the North (Fominyam, 2015).
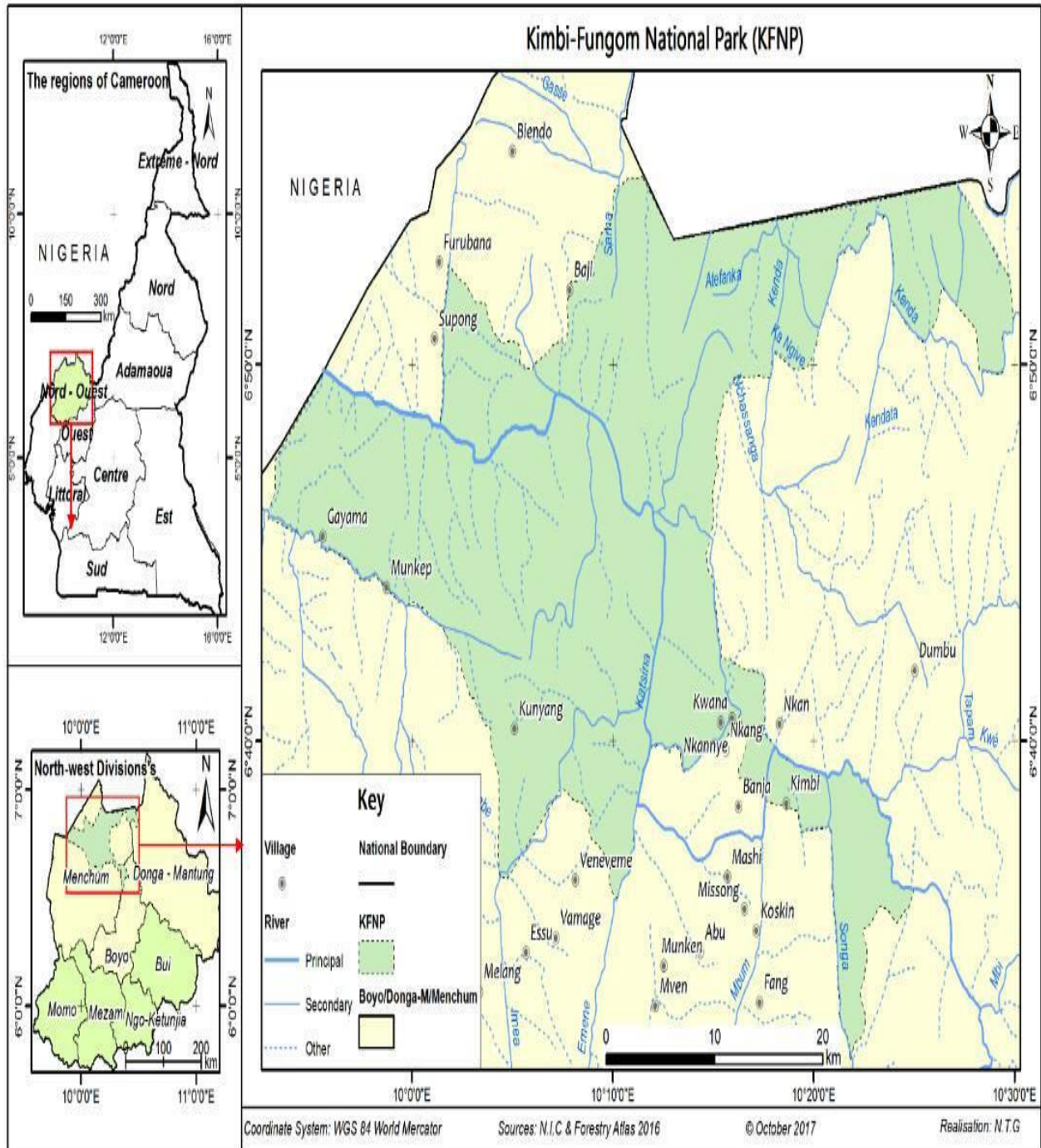
Fig.1: Map of Cameroon showing the location of the Kimbi-Fungom National Park in the North West region of Cameroon
Source: Adapted from COMAID map drawn for MINFOF (2014)

III. METHODS OF DATA COLLECTION

Data collection in the K-FNP was carried out from the 10th of July 2017 to 10th of October 2017 using the principles laid down by White and Edwards (2000). The main sources for primary data collection included: interviewed administered questionnaires, interviews and simple observations obtained from unit committee members, focus group discussions, Traditional Authorities, households, Wildlife Division staff among others. Questionnaires were administered from household to household. In each village an indigene was chosen by the chief to serve as an interpreter. Interviews were conducted both in Pidgin

English and local language aided by the interpreter. Questionnaires were administered mostly in the evenings, on market days and on Sundays to increase the probability of meeting the various target groups. Questions asked were centered on the people's knowledge about the different pangolins species, frequency encountered, conservation status of pangolins, and knowledge on medicinal values, sites of high pangolin density in the park as well as threats to their existence. During the interviews, posters of the three African species of pangolins were shown to the interviewees labeled A, Band C. The sampling was purposive and the targeted groups included farmers, hunters, grazers, restaurant dealers and "traditional doctors". The households were carefully selected such that all individuals from all the target groups were interviewed with no bias. An interview lasted for an average of 10minutes. A total of 335 households were targeted while 213 households were interviewed with focus mostly on the family heads or the eldest persons giving a sampling effort of 63.5% (Table 1). Four different focus groups were organized in each village constituted as follows: Farmers' group: farmers (men and women separately), grazers, youths (Non Timber Forest Products gatherers); "Traditional healers' group: witch doctors and sorcerers", Hunters' group including, part time hunters and full time hunters; Restaurant operators. Heads of the organizing committees were appointed by the Chief with collaboration with religious, administrative and municipal authorities.

Top on the agenda were issues pertaining to current status of pangolins, including their uses, strategies and action plan that could be put in place to ensure their conservation. Members in each group were asked to express themselves freely and where necessary, an interpreter would do the translation. Translation was specifically very important when it came to local names of diseases cured by pangolins.

➢ Farmers furnished information concerning the frequency at which they encounter individuals, be them other farmers, hunters, business men and women with pangolins or pangolin parts and where

➢ Traditional healers were asked the various diseases cured by different parts of pangolin

➢ Hunters were asked the frequency of catch of pangolins and the quantity in numbers sold per week and to whom. The researchers sought to know the various methods used to catch pangolins and their knowledge as per the current conservation status of pangolins

➢ Restaurant operators were asked how much they sell a medium slice of pangolin meat and the attitude of customers towards pangolin meat.

At the end of each focus group discussion, a blank cardboard paper was presented to the different members of each group to sketch the map of the KFNP at their own local level and to try indicating the villages where they had been seeing different species of pangolins most often and the specific sites. On the sketched map, they also indicated the possible roads that can enable a stranger or visitor to locate these sites. Table 1 shows the Administrative and geographical location, estimated number of households, number of households targeted, number of households interviewed and the sampling effort while table 2 shows the number of different groups of respondents encountered during the study.

Table 1: Administrative and geographical location, estimated number of households, number of households targeted, number of households interviewed and the sampling effort

Division	Zones	Villages	Estimated number of households)	Number of households targeted	Number of Households interviewed	Sampling effort (%)
Boyo	South	Kimbi	300	50	35	70
		Bua-bua	175	40	23	57.5
Donga and Mantung	Est	Dumbu	515	75	45	60
Menchum	North	Kpep	89	20	12	60
	West	Munkep	84	20	12	60
	Center	Esu	1622	100	60	60
		Nkang	248	30	26	86
		TOTAL	3033	335	**213**	**63.5**

Table 2: Number of different groups of respondents encountered during the study

Zones	Villages	Number of hunters	Number of farmers	Number of grazers	Workers	Number of restaurant dealers	Number of traditional healers	Totals
South	Kimbi	5	7	8	3	5	5	35
	Bua-bua	3	10	3	0	2	5	23
Est	Dumbu	10	10	15	2	5	5	45
North	Kpep	2	5	3	0	1	1	12
West	Munkep	3	5	1	0	2	1	12
Center	Esu	20	15	5	6	4	10	60
	Nkang	10	5	4	1	5	1	26
	Totals	53	57	39	12	24	28	**213**

IV. DATA ANALYSIS

The analysis of data recorded from people's perception began by decoding data sheets and information obtained from respondents during interview administered questionnaire surveys. They were then entered into Microsoft excel sheets and analyzed in line with the objective. Based on the research questions, themes were identified from the data and given meaning. Finally, field data results were presented in the form of tables, figures, frequencies, and percentages.

V. RESULTS AND DISCUSSION

Demographic factors of the interviewees

To understand the active population force of the study areas, questions were designed to bring out the age-sex structure of the members of each household interviewed. Results revealed that the number of females exceeded the number of males in the villages bordering the park. Up to 54.8% of the populations in the surveyed zones were females while 45.2% are males. These findings are in line with those of Chou and Tsi (2017) who found out that 53% of the population around the K-FNP are females while 47% are males. With respect to the age structure, majority of the households were within the economic active group (20-59). This constituted 84.9% of the total households while the aged population constituted 10.5% of the total households. Out of the 213 respondents interviewed, majority (n=98) of them did formal elementary education giving a percentage of 46%; 27.7% of them had never schooled at all. This was confirmed by the inability of some to fill questionnaires by themselves. About 21.6% of the respondents were either secondary school drop outs or had acquired the Ordinary and advanced Level Certificates but could not continue further. A small percentage (4.7%) actually pursued university education and were either working in the public and private sectors mostly in the teaching domain. Those without any form of formal education (46%) gave reasons for their non-attendance of any level of education as basically financial and lack of interest. Many of those who dropped out of school gave various reasons but mainly the fact that they were not performing well. Most (57.3%) of the respondents encountered in the park were farmers. This reveals that farming is an important economic activity in the area. This explains why encroachment into the park is fast gaining grounds as is the case in most parts of the Fungom compartment. After farming, the next economic activity is cattle rearing (18.3%). Hunting is equally an important activity although it is represented only by 15% of the respondents. This could probably be because some hunters did not want to identify themselves as hunters for fear of the unknown. Some few respondents were found to be teachers both in the private and public sectors (2%). This low percentage could be due to the fact that those that were civil servants could be reciting in cities where life is more comfortable. Schooling registered a low percentage as well (2%) which clearly depicts while about 72.4 % of the respondents considered literate ended at the primary level and schooled dropout as equally reported by (Tsi *et al,* 2016) in his findings in the Mbi Crater where 80.7% of literate ended at primary school or were secondary school dropouts. The survey also revealed that the people lack the requisite education that would enable them competes effectively for jobs in the formal sector. The people again lack the required occupational skills that would allow them to venture into different types of alternative livelihood activities. As a result they turn to find their source of livelihood in the K-FNP through traditional hunting, farming and grazing. The low level of education among the

people was observed to be affecting their appreciation and support for conservational policies in the K-FNP. Consequently, they invade the park for their livelihoods and live mostly in hamlets that are located within the park and virtually miles away from educational settings.

Relative presence of the three species of pangolins based on sampled opinions

The giant ground pangolin (*Smutsia gigantea*) is most abundant (58% of observation), followed by the tree or the white bellied pangolin (*P. tricuspis,* 27%) and the long tailed or black bellied pangolin (*P. tetradactyla,* 15%). Respondents however were not very sure of their answers when it came to deciding which species of the three pangolin species were most commonly seen. Illegal hunters for example based their reasoning on the size and on when they commonly see these pangolins. Given that the giant pangolin is nocturnal, most sizable pangolins caught in the night were assumed to be giant pangolins. Most literature published on the relative presence of pangolins does not come up with fix percentages or information about their presence. For example Tragester *et al*., (2017) reported that though pangolins do occur throughout Bangladesh area, findings do not specify clearly which of the possible pangolin species these observations refer to. No peer-reviewed study exists assessing the status or relative distribution of pangolin species within Bangladesh. Furthermore, no consensus exists pertaining to the validity of the historical distributions of the different pangolin species within Bangladesh. These results are also in line with those of Choudrury (2004) about the difficulty in establishing in numeric terms the percentage distribution of pangolin species in the protected areas of Bangladesh situated on the western cusp of the Indo-Burma biodiversity hotspot.

Illegal hunting in the Kimbi-Fungom National Park

Illegal hunting was reported to be a very lucrative economic activity in the different localities surveyed as all (100%) of the hunters interviewed accepted that hunting is still currently going on in the park. But further findings based on the authorization to hunt showed that no single hunter have ever acquired a hunting permit. That is, out of the 53 hunters interviewed during the study, none proved to ever have acquired a hunting permit. This was very surprising considering the fact that poaching is very rampant in the Park as all the hunters testified and it was further proven by the visible hunting indicators. From the point of view of the Park authorities, the Park is understaffed, vast and inaccessible making it very difficult to successfully ensure effective patrol. On the part of the hunters, government has not provided alternative sources of livelihood to them and their families yet is trying to deprive them of their only source of hope. In addition, the procedure for acquiring a hunting permit is too costly and complicated for poor villagers like them.

To prove if illegal hunting activities is really currently going on in the park, a question was designed to find out the animals frequently hunted for bush meat. Figure 2 show the animal frequently hunted in the park.
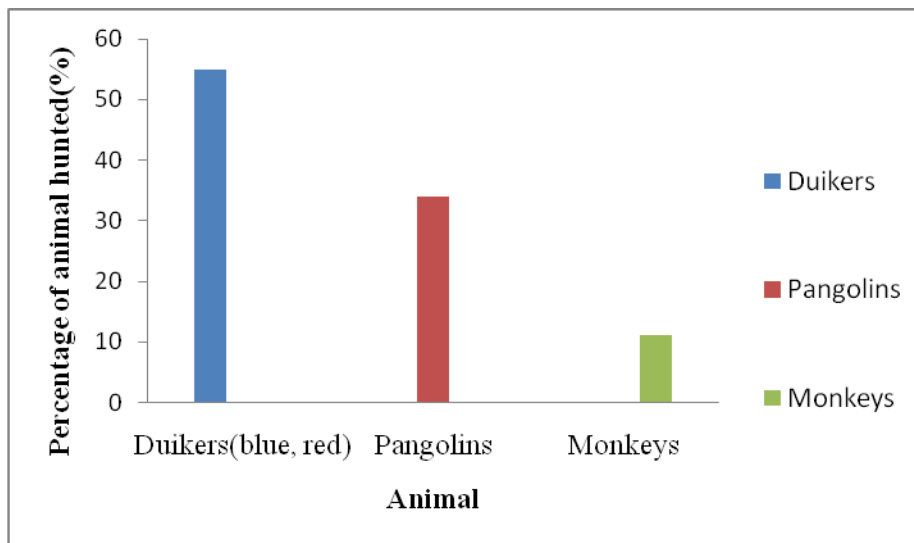

Fig.2: Animals frequently hunted in the Kimbi Fungom National Park

Figure 2 shows that duikers were the most hunted animal species (55%). This was followed by Pangolins (35%) and then several monkey species (10%). Results during focus group discussions with hunters revealed that duikers fetch much more money than any of the common species of animal. This high demand was related to their use in marriage, death and birth celebrations. These results agree with those recorded by Lahm *et al*. (1993) in three villages of North-eastern Gabon where artiodactyls (Bushbuck and Blue duiker) accounted for 57.5% of animals hunted with the Blue duiker being the most common species hunted by villagers. During focus group discussions, respondents said pangolins are mostly demanded by some traditional doctors and restaurant owners. Hunters testified that pangolins are mostly seen during the dry season but are very vulnerable and easy to catch. Restaurant operators also reported that pangolins are highly preferred by customers. Most hunters regarded monkeys as totems and that when killed the person concerned dies and that is why they do not mostly target monkeys. Most respondents refused having seen great apes like chimpanzees. Therefore, taboos, taste and availability are factors that greatly affect bush meat preference and consequently hunting level for wild animals in the K-FNP.

Illegal hunting of pangolin keeps increasing in the study areas and most surprisingly, when hunters were asked if they are aware of the penalties awaiting anybody caught with pangolins, all the hunters admitted that they were aware. These findings are in line with those reported by Chin and Pantel (2008) that despite awareness that it is illegal to be involved in the trade of pangolins, all of their respondents remained active due to the high sale prices they got from pangolin sales. A question was also designed to estimate the average number of pangolins that could be hunted in the K-FNP. Based on hunters' responses throughout the study area, table 3 summarizes the number of pangolins hunted per week and per year.

Table 3: Number of pangolins hunted per week and per year in the different villages surveyed

Villages	Number killed per week	Number killed per year
Kimbi	2	104
Buabua	1	52
Dumbu	5	260
Kpep	4	208
Munkep	5	260
Esu	10	520
Nkang	5	260
TOTAL	**32**	**1664**

Table 3 reveals that an estimated 32 pangolins were hunted per week and 1664 per year in the different villages surveyed. Out of these figures, Esu which is found in Menchum Division and in the Fungom compartment registered 10 pangolins per week and 520 per year. This is closely followed by Dumbu and Munkep with each recording 5/week and 260/year. The Kimbi and Buabua villages registered the smallest number of pangolins hunted per week and year. The high figures recorded in Esu and Munkep is due to high demand from restaurant dealers in Wum, Bamenda or as a result of demand from the neighbouring Nigeria for medicine. Also, the large figure in Dumbu is due to demand in bush meat by the population and restaurant operators from Nkambe or "poachers" from neighbouring Nigeria. "Poaching" around these entry points into the park is very pronounced not only in pangolins but in other species of wildlife.

Considering that a female pangolin (black bellied or white bellied pangolin) has a gestation period of 139 days (Van Ee, 1966), and considering that one female gives birth to one young and rarely to twins (Lim, 2008) each time, it can be deduced that the rate at which pangolins are hunted in the K-FNP far outweigh the rate at which they multiply. During focus group discussions, respondents stated that more than 20 villages are closely associated with the Park implying that the study surveyed only about 30% of the total villages closely related to the Park. This by extrapolation means more than 4992 pangolins are killed annually in the K-FNP. An in-depth research is urgently needed to ascertain an estimate of the total live pangolins in the Park so as to be able to state with certainty the fate of pangolins in the near future.

Price range of illegal hunted pangolins in the Kimbi-Fungom National Park area

A question was designed to know the price range of hunted pangolins in the communities in and around the study areas over the years. Figure 3 shows the average price for small, medium and large pangolins in and around the park.
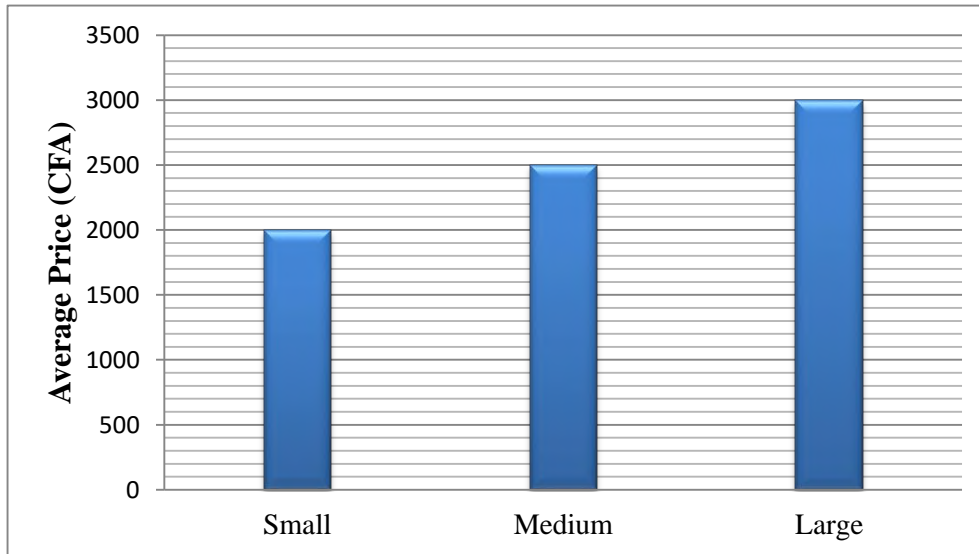
Fig.3: Average prices of small, medium and large size pangolins hunted in the Kimbi-Fungom National Park

Figure 3 reveals that averagely the price range of pangolins from average medium to large killed in the K-FNP was between 2000-3000 CFA. This price range seriously contrasts that of China where Yongping (2008), reported that the range was between 550,000-625,000CFA (1100-1250USD). Based on these two reports, one can conclude that pangolins in the localities of the study areas are highly devalued. The hunters as well as the population lack knowledge of the value of pangolins and therefore, a management plan of action has to be laid in which the local communities have to be part in order to educate them on the importance of conserving pangolins. The high demands and high prices of pangolins indicate that pangolins are a delicacy, have a variety of uses and that their status has to be raised both by CITES, IUCN and Cameroon's Ministry of Forestry and Wildlife.

During the survey, a question was asked to know where and who buy the hunted pangolins. Figure 4 shows that the pangolins hunted in K-FNP are sold at the local cities and at the international markets.
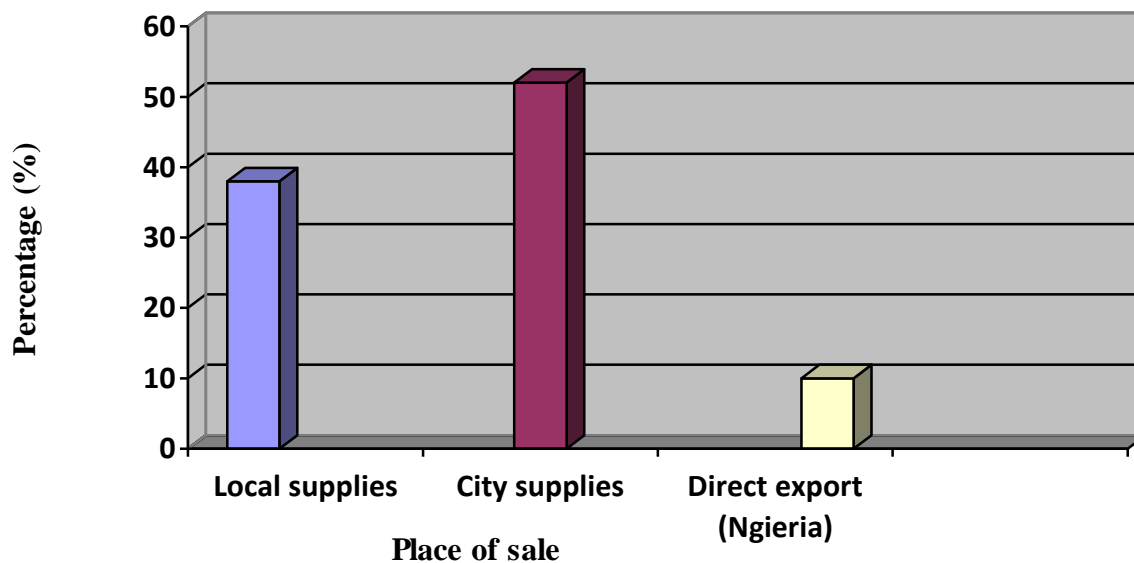

Fig.4: Market destinations of pangolins hunted in the Kimbi-Fungom Natinal Park

Figure 4 shows that pangolins killed in the K-FNP have three destinations. About 52% is sold in the cities, 38% sold in the local communities and 10% sold in the neighboring Nigeria. It should be noted that hunters were reluctant to answer these questions for fear that their markets may be disrupted. Some however admitted that they prefer to sell the scales instead of the smoked or fresh pangolins because it is easier and more lucrative. Most hunters reported that their most usual customers are the restaurant dealers and sometimes traditional medicine men. Open interviews with most of these restaurant dealers revealed that pangolins are highly preferred by most of their customers. Figure 5 shows the relative preference of bust meat in the local markets.
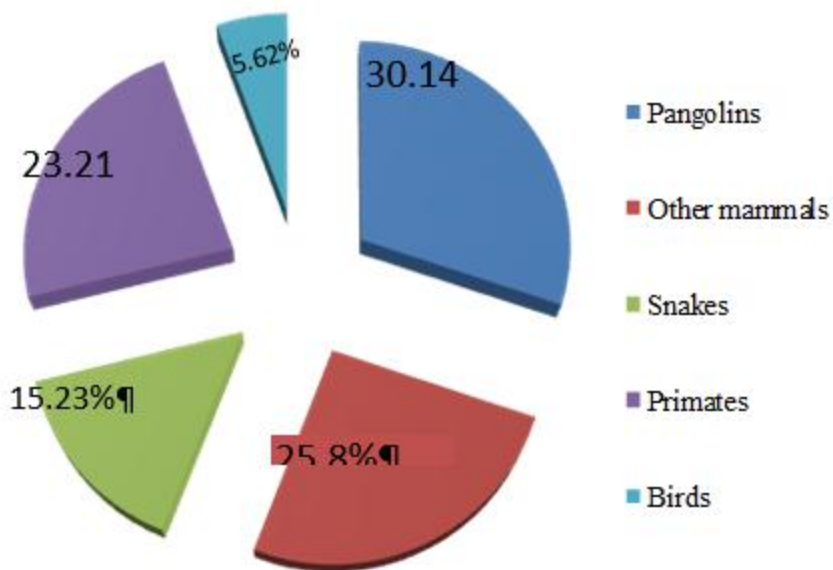

Fig.5: Bush meat preference in local restaurants expressed in percentages

Figure 5 shows that pangolins are demanded by more than 30% of customers. This is closely followed by other mammals (25.8%) (Duikers, porcupine sitatunga, deer) and primates (23.21%) like monkeys. Snakes and birds are the least on the list (15.23% and 5.6% respectively) with mostly the python and bust fowls demanded. The high preference of pangolins by customers in the F-FNP area also confirms the report furnished by Sopyan (2008) that Pangolin meat is a delicacy in China.

Perception on the medicinal values of pangolins

Concerning the indigenous knowledge about the medicinal values of pangolins, few traditional healers were knowledgeable on the different ailments treated by pangolin and its parts. Table 4 shows the different pangolin parts and the diseases cured.

Table 4: Pangolin parts and the various diseases cured

Pangolin part	Diseases cured
Scales	Spiritual protection, back pain, asthma impotence, mental illness
Bones	Bed wetting, rheumatism
Head	Skin rash
Meat	Financial ritual, elephantiasis, breast cancer sexual weakness
Claws	Waist pain, spiritual protection
Toes	Waist pain, spiritual protection

From table 4, the scales of pangolins have many uses compared to all the other parts. This is followed by the meat. This confirms why many traditional rulers were reported by hunters to be one of their usual customers. These results are however not enough when it comes to the medicinal values of pangolins. For example Kwame *et al.,* (2015) reported that a total of 13 pangolin body parts were identified as being used and prescribed for the treatment of 35 ailments in Ghana. Lack sufficient knowledge on the medicinal value of pangolins by hunters explains why hunters dump these animals in the market at little or no price. Both the hunters, traditional healers and the local

population are not aware of the extent to which they are wasting pangolins or loosing from their sales.

Attitude and willingness to participate in the conservation of resources in the Kimbi-Fungom National Park

A question was designed to ascertain whether the local populations are for or against the protection and conservation of resources in the K-FNP. The results show that most (55%, n=117) of the respondents held negative attitudes towards the conservation of resources in K-FNP. This could be attributed to high levels of illiteracy, increased number of crop farmers demanding more farmland, low participation in conservation awareness programs and past experience of human wildlife conflicts. Many crop farmers complained that animals especially monkeys cause untold damages to farm crops. More than three-quarter of hunters interviewed had negative impressions concerning conservation. Conservation of wild life according to them will deprive them of their livelihood as they cannot have access to the fertile soils in the forest. They put the blame on government for seizing their land and not providing them with alternative sources of income.

VI. CONCLUSION

Looking at the community perception towards the conservation of Pangolins (*Manis spp*.) in the Kimbi-Fungom National Park, North West Cameroon, it is evident that a greater proportion of the population (55%, n=117) were against the protection and conservation of Pangolins in the Park while 45% (n=96) showed positive attitudes towards their protection and conservation. Most of them complained about the empty promises made to them on yearly basis concerning the improvement of their livelihoods if they should stay away from the Park. These people need more action than words to cause them to change their mentalities about conservation. Therefore, the stakeholders of conservation, from Cameroon and abroad have a very big challenge to bring conservation to the doorsteps of the Kimbi-Fungom community, this time with more action than words. While there will be need in the future to study traditional knowledge and the genetic resources of pangolin for possible exploitation in the Access Benefit Sharing (ABS) process, an urgent action plan is needed to curb down illicit smuggling of pangolins and pangolin parts from K-FNP and its environs.

CONFLICT OF INTEREST STATEMENT

We declare that there is no conflict of interest regarding the publication of this paper.

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