https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

Status of Bushbuck (*Tragelaphus scriptus*) and Buffalo (*Syncerus caffer*) in the North and South Eastern Parts of the Kimbi-Fungom National Park, North West Region of Cameroon

NKEMTAJI Franklin NDA[1], TSI Evaristus ANGWAFO[1,2], FOMINYAM Christopher[1], MVO Denis CHUO[1], FOTANG CHEFOR[1], AGBORTOKO Bate ASHU[1], AKWO Christian EBUA[1]

[1]School of Agriculture and Environmental Science, Department of Forestry, P. O. Box 222 Dschang, University of Dschang, Cameroon.

[2]Faculty of Agronomy and Agricultural Sciences (FASA), P. O. Box 222 Dschang, University of Dschang, Cameroon.

Abstract—The study titled "Status of Bushbuck (Tragelaphus scriptus) and Buffalo (Syncerus caffer) in the North and South Eastern parts of the Kimbi-Fungom National Park (K-FNP) of the North West Region of Cameroon" was carried out in the rainy season from 1st May to 31st July 2015. The general objective was to contribute to the conservation of bushbuck and Buffalo in the K-FNP through the establishment of status of mammals which will serve as a guide for management decisions. The methodology employed was the "recce-walk". Twenty seven (27) lines transects of 2 km long each were walked making a total effort of 53km. One hundred and fifty six (156) questionnaires were administered to the local population, twenty one (21) semi-structured interviews to households and seven (7) focus group discussions with local chiefs and notables were used to get local people's perceptions about wildlife conservation in the NP. Results revealed a total of 13 species of mammals within the NP belonging to 6 families. The Bovidae family had the highest number of species represented by the buffalo (Syncerus caffer), bushbuck (Tragelaphus scriptus), the blue duiker (Cephalophus monticola) and the red duiker (Cephalophus dorsalis). The buffalo and the bushbuck recorded encounter rates of 0.85 and 0.34sign/km respectively. The Buffalo had a higher density in the North East of the South East compartment of the park while the bushbuck had a higher density in the south west of the north east compartment. There was a strong relationship (R^2=0.792) between the encounter rate of mammals and anthropogenic activities. Ninety two (92.31%) of respondents recognized the importance of the NP because they depended on it for collection of NTFP's (34.60%), hunting of Bushmeat (12.80%), fuel wood gathering (7.70%), religious activities (6.40%), agricultural land (5.10%), harvesting of medicinal plants(5.10%), source of clean water (5.10%), traditional rituals (3.80%) and traditional medicine harvesting (2.6%). Ninety seven percent (97.2%) supported wildlife conservation because of its touristic, aesthetic and for sustainability. Thirty four percent (34.60%) of the respondents were aware of community implication in managing the NP. K-FNP is poor in species abundance, species richness and flagship species. Associated benefits from ecotourism are far-fetched coupled with encroachment by grazers. We therefore recommend that the government, councils, NGOs and the local communities should step up conservation efforts.

Keywords—Anthropogenic activities, Conservation, Large mammals, Perception, Status, Kimbi-Fungom National Park.

I. INTRODUCTION

Protected areas in Cameroon are home to around 90% of the country's animal species, 95% of plant species, close to 65% of habitats and 80% of the country's ecosystems (MINFOF, 2008). Cameroon's rich biodiversity has made it one of the world's biodiversity hotspots; it ranks fifth in Africa for biodiversity (MINEF, 1999) and the country is home to nearly 8,000 species of plants, 250 mammals, 542 fish, 848 birds, 330 reptiles, and 200 amphibians many of which are endemic (Fomete *et al.*, 1998). Most of the country's biodiversity is located in forested areas and the lower Guinean forest, which is renowned for its high number of endemic plant and animal species and are one of the country's key biodiversity hotspots (MINEF, 1999). Furthermore, forests covered 23.8 million Ha or 51.3% of land area in Cameroon (FAO, 2003). However, these forests are continuously under

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

deplorable state. According to the World Bank, 1998 the annual average deforestation rate in Cameroon for the 1980–1995 periods was 0.6% or a loss of close to 2 million ha. The annual rate of change in the forest cover between 1990 and 2000 was 0.9%, resulting in an annual net loss of 222,000 Ha during the decade, (FAO, 2003). Between 2000 and 2005 the rate reached 1% (FAO, 2006). Today, it is estimated that between 1990 and 2010, Cameroon lost 4,400,000 ha (18.1%) of forest cover at an average rate of 220,000 ha (0.90%) annually. As such, many of the protected areas within the country have been damaged as most important ecological aspects of such areas have not been considered. In these areas, plans based on ecological data are needed for land use planning, improvement and development (Jurgen, 1993).The conservation of natural resources is the fundamental problem. Unless we solve that problem, it will avail us little to solve all others (Roosevelt, 1907). For instance, in 1982 the UN developed the World Charter for Nature, which recognized the need to protect nature from further depletion due to human activity. It states that measures need to be taken at all societal levels, from international to individual, to protect nature. It outlines the need for sustainable use of natural resources and suggested the protection of resources should incorporate national and international systems of law (UN, 1982). To look at the importance of protecting natural resources further, the World Ethic of Sustainability, developed by the IUCN, WWF and the UNEP in 1990, set out values for sustainability, including the need to protect natural resources from depletion. Since the development of these documents, many measures have been taken to protect natural resources including establishment of the scientific field and practice of conservation biology and habitat conservation, respectively (Fein, 2003).

The Kimbi-Fungom National Park, just like any other protected areas are potential areas for the development of ecotourism because of their biodiversity, landscapes and cultural heritage of local or indigenous people (Ndenecho, 2009; Chuo *et al.,* 2017d). The floral potentials of the park attracted the interest of the International Union for the Conservation of Nature and Natural Resources (ICUN), The World Wildlife Fund (WWF) and the International Council for Bird Preservation (ICBP). It has been identified as one of the most at risk terrestrial ecological regions (Macleod 1986; Stuart 1986; Alpert 1993). A total of 98 plants are recorded in the reserve. These belong to 43 plant families (Kwanga, 2006). The eco-region as a whole has one of the highest levels of endemism in the whole of Africa, particularly among birds and vascular plants. For example, 20 bird species are found only in this eco-region (Stuart, 1986). A total of 203 bird species are recorded in the Kimbi Game reserve. These include 45 of the 215 Guino-Congo forest biome bird species and 8 of the 45 bird species restricted to the Sudan-Guinea Savannah. Species of interest include the brown chested plover *(Venellus supercilious)*. This is an uncommon and local intra-African migrant found to breed in Cameroon and Nigeria (Alpert 1993). The park is reported to harbor remnant populations of Nigeria-Cameroon chimpanzee (*Pan troglodytes ellioti)*, (Fominyam, 2015). Critchly, (1968) also reported the presence of both gorilla and chimpanzee nests. Other primates reported here include Preuss's monkey (*Allochrocebus preussi*), putty-nosed monkey (*Cercopithecus nictitans*),, baboons (Papio Anubis and P. cynocephalus), buffaloes (Syncerus caffer), duikers, snakes e.g rock pythons, birds, (Fominyam, 2015; Chuo *et al.,* 2017d).

With the increasing demand on wildlife and forest products, the government of Cameroon is doing everything it can to protect the K-FNP. However, since its creation little has been done to take stock of the wildlife population that exists in the park. This research study is therefore aims at helping the government as she strives to protect the biodiversity of the park for Tourism and also from being encroached and subsequently disappearing. Equally, the area is plaque by so many conflicts that arise as a result of population increase and pressure on land (Chuo *et at.,* 2017c). Even though there exist a conservationist in this area, the rate of poaching continues to increase with the increasing demand for bush meat from the surrounding city centers like Bamenda and beyond. The Government seems to lack capacity, and also the willingness to regulate hunting, which means that fraudulently acting hunters are almost certain to avoid any punishment, (Amariei, 2005). Habitat fragmentation can also be noticed from the numerous settlements that exist in the park, the construction of the ring road and other secondary roads which pass inside the park. The scarcity of land is now forcing Grazers and farmers to feed their livestock and grow their crops within the boundaries of the park. Intentional bush fires are also rampant and are caused by grazer's who burn the grass so that they can obtain fresh grass for their cattle (Chuo *et al.,* 2017d). Insufficient numbers of adequately trained forest personnel's is also a major problem that encourages encroachment in the Kimbi-Fungom National Park. The lack of awareness regarding the value or potentials of the park to the local population is underestimated. The local population benefit very little from the creation of the park. This now forces the people to move into the Park in search of NTFP's, medicine for health, bush meat to provide them with a source of protein. All these culminate leading to a loss of biodiversity in the K-FNP.

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

II. MATERIALS AND METHOD

2.1. Description of Study Zone

The K-FNP is located in the North West region of Cameroon where it covers a total area of 95,380 hectares. It was created by prime ministerial decree number 2015/0024/PM of 3 February, 2015 and spreads within 3 divisions of the region as follows;

- Donga Mantum within Misaje sub-division
- Boyo division within the sub-division of Bum
- And Menchum division within Fungom and Furu Awa sub-divisions.

The northern section of the park runs along the Cameroon-Nigeria border, while the Eastern, southern and Western parts of the park are within Cameroon territory (Tata, 2015). This national park was realized after the merging of two reserves; the Fungom Forest Reserve (created in 1936) and the Kimbi Game Reserve (created in 1964 and situated in the Western High Plateau region of Cameroon and falls within the Mount Cameroon chain of volcanic mountains range that extends from Mount Cameroon (4,095 metres altitude) on the coast, through Mount Oku (3,011 metres altitude) to the Adamoua plateau, (Tata, 2011). Figure 2 below shows the map of the Kimbi-Fungom National Park in the North West Region of Cameroon. The park is surrounded by the following villages: Dumbo to the North, Buabua to the South, Kimbi village to the South while the former Fungom Forest reserve was surrounded by Esu, Gayama, Akum, Munkep, Lutu, Ezong, Malo and Furu-Awa.

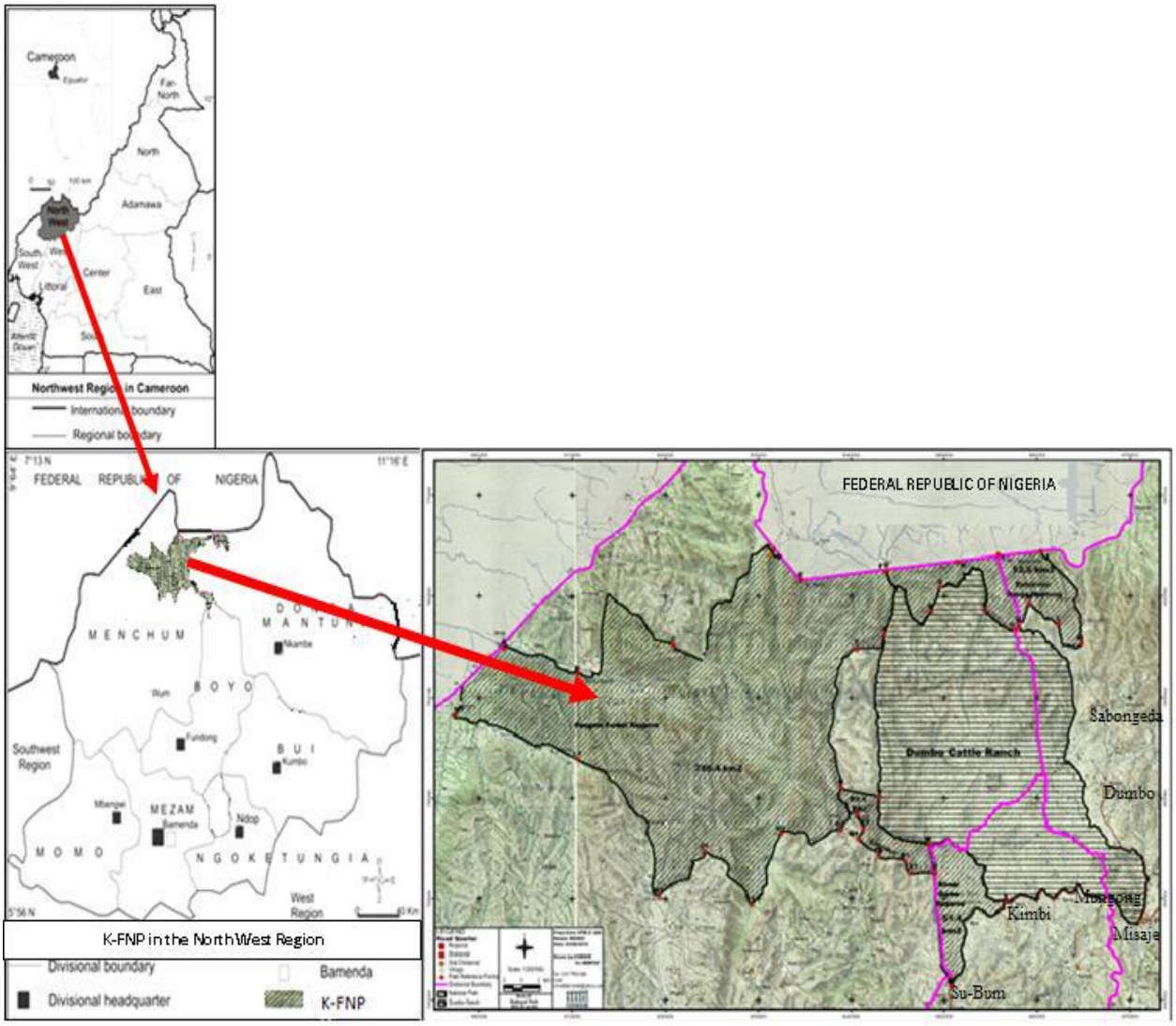


Fig.1: Map of Cameroon showing location of the K-FNP in North West, Cameroon

Source: Adapted from COMAID map drawn for MINFOF (2014)

2.2. Data collection

Data collection in the North East and South East of the K-FNP was carried out from May 1st 2015 to July 31st 2015. During this period, the "recce walk" method was used, (White and Edward, 2000). A recce is a path of least resistance through an area following a compass bearing (e.g. north-south, southeast-northwest and east-west). The "distance transect method, "despite its wide use (White and Edward, 2011), presents disadvantages which turned to be exacerbated on this study site due to the

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

characteristics of the terrain in the North East compartment of the park . The zone was subdivided into quadrates of 2km x 2km giving a total of 27 quadrates. Inside each sampled quadrate, a transect of 2km long oriented in a random manner was established. A total of 27 recces of 2km each were covered giving a total distance of 53km as shown on the sampling plan on figure 2 below. The Recces were oriented to cut across the major vegetation types of the area (primary forest, secondary forest, gallery forest and Savannah) and drainage features (rivers and streams) in order to have a representative sample of the reserve. The starting point of each recce was randomly generated using a random number table. The start and end point of each recce was determined using a global positioning system (GARMIN geko 201).

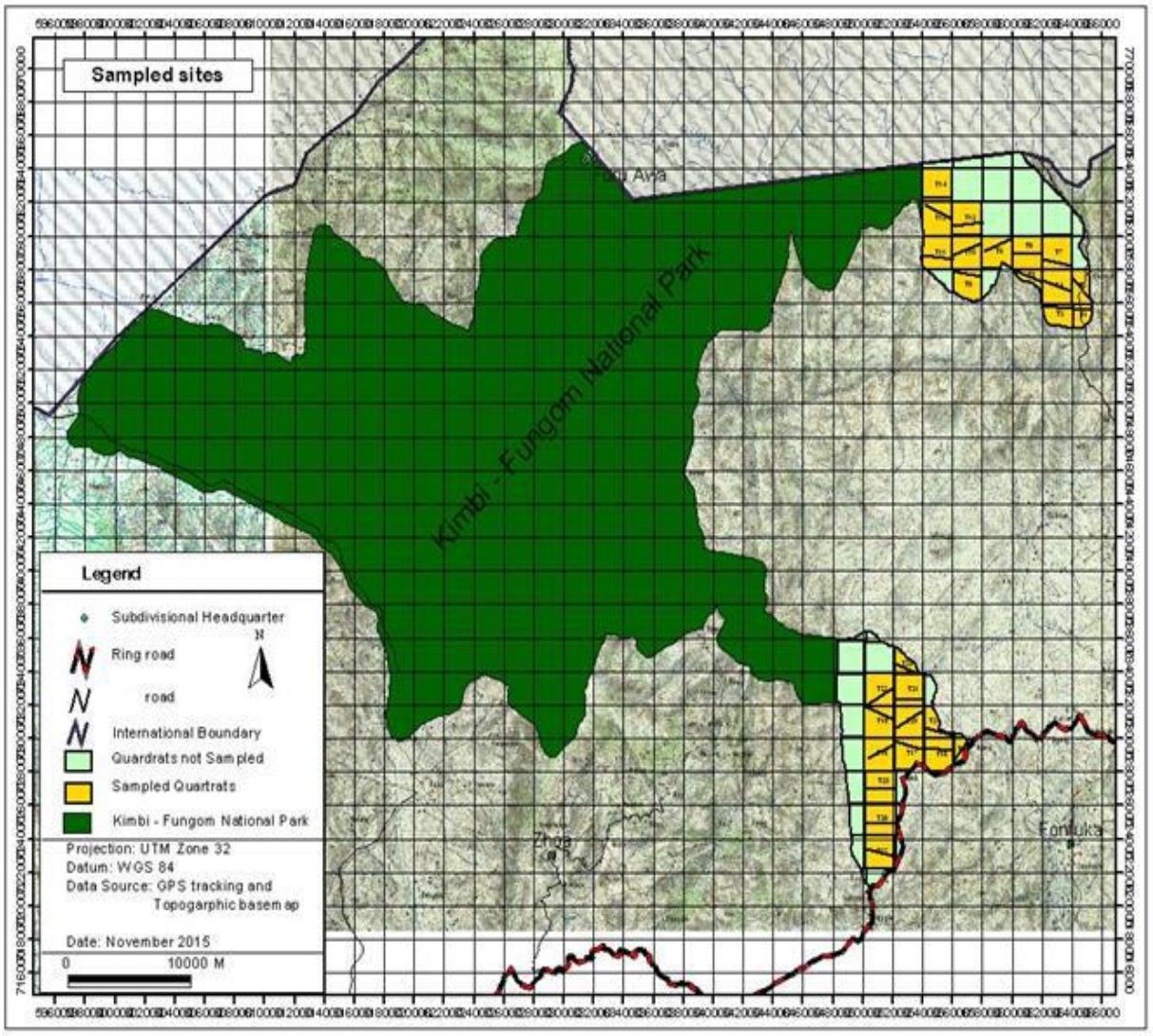


Fig.2: GIS Map showing representation of Recce- transects for animal inventory in the K-FNP

The team on the field comprised five individuals: one leader, two field assistants and two hunters. The leader was responsible for reading the bearing and guiding the team along the recce transects, the first field assistant carried a pair of binoculars and recorded all observations in a data sheet, the second field assistant helped the team leader in searching for signs while the first hunter helped as field guide due to his familiarity with the terrain and the second hunter, acted as porter and also as a guide. During the recce walk, all mammal sightings, vocalizations, signs (dung, nests, foot prints, carcasses, tracks and food remains) and the signs of anthropogenic activities such as farms (active or abandoned), machete cuts, snares, gun shells, grazing and hunting camps (active or abandoned) along recees were recorded. A digital camera of mark Samsung (P1200) and a Samsung Galaxy SII camera were used to take photographs of mammal indices as well as signs of anthropogenic activities while a Binocular of mark Canon (10x45) was used to observe animals away from recce -transect. Table 1 below shows the age and indices of presence of animal species encountered (Mahop, 2007).

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

Table.1: The stages used for the classification of dung

Index	Observation	Age
Dung:	**Fresh** – boli intact, still warm, strong smell, shiny fatty acid sheen glistering on exterior	1-2days
	Recent – boli intact, odour when boli is break, flies, fatty acid sheen disappear	3-5 days
	Old – no odour, dung form still intact although boli may be partly or completely broken down into anamorphous mass;	6- 14 days
	Very old – dispersed, flattened, tending to disappear	14 days and more

To better understand the perceptions of the local population towards the K-FNP, a survey was carried out in 7 (Kimbi, Dumbo, Mungong, Su-Bum, Buabua, Misaje And Sabongeda) out of the 29 villages that make up Misaje and Fonfuka council areas with a total population of 15000 inhabitants (BUCREP, 2005) purposively selected based on their closeness to the North East and South East of the Park. One focus group discussion was also held per village guided by questions related to Drivers of mammal decline in the KFNP, Park Ownership and control, Animal presence, types, numbers and routes, Relationship between, park management and community, Relationship between wildlife and people. Each focus group had at least 6 participants (2 notables, 2 men, a woman and a youth). The turnout of women was very low. The venues for these discussions were the chief's palace, primary schools or community halls. Focus group discussions were done on traditional Sundays when most villagers were at home. These discussions were done with the help of two translators chosen by the conservator of K-FNP based on their previous involvement in conservation projects. A wildlife guide for central Africa mammals was used to facilitate the identification of animal species in cases where identification was difficult. Semi-structured interviews were conducted with 3 households per village with the help of an interview guide giving a total number of 21 household sampled to get information on the importance of the NP, perception about mammal conservation, awareness of community implication in the management of the K-FNP and animals hunted by the local population. This venue was the premises of the quarter heads of each sampled village. Two closed ended test questionnaires were designed and administered to two notables in each village after consultation with the chiefs. The aim of this exercise was to identify difficulties and to ensure that the language used was fully understood by respondents before proper administration. A total number of 156 individual out of a population of 15000 were sampled giving a sampling rate of 1.04%.

2.3. Data Analysis

Field, data sheets were decoded and information entered into Microsoft Excel, where the observations were grouped according to the different mammal species and type of anthropogenic activity. Densities were calculated manually since the number of times dung was encountered did not attain 60 for all two species to use program DISTANCE 6.0. The Encounter rate (ER) or index of Kilometric Abundance (IKA) = Total number of objects or signs observed divided by the length (L) of transect (in kilometer).

ER= N /L

Where: **N =** Number of objects observed

Lt = Length of transect (Km)

With this, we were able to estimate the relative abundance of animal population and signs of anthropogenic activities.

The GPS points of buffalo and bushbuck indicators and human activities recorded per quadrant were exported to ArcView computer program 3.3 and geo-referenced to produce different spatial distribution maps. The classes of encounter rate were then defined in order to group similar quadrates and represent zones of different concentrations. Different colour bands and corresponding colour intensities were used to represent different encounter rates

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

on the distribution maps. This permitted us to define important zones for mammal species (buffalo, bushbuck, duiker etc) in order to determine management strategies for their conservation. Regression analyses were carried out to test the relationship between the encounter rate of mammals and anthropogenic activities. Encounter rates of these two variables were exported to SPSS (Version14) to produce fitted regression line. The mathematical formula for the coefficient of determination (R^2) and correlation coefficient (r) are given below.

$$R^2 = \frac{\left(\sum XY - \frac{\sum X \sum Y}{N}\right)^2}{\left[\sum X^2 - \frac{(\sum X)^2}{N}\right]\left[\sum Y^2 - \frac{(\sum Y)^2}{N}\right]}$$

$$r = \sqrt{R^2}$$

Where: X: is Anthropogenic activities. , R^2: is the Coefficient of determination

Y: is the Mean encounter rate BF/BB N: is the Number of observation and

r: is the Correlation coefficient.

Quantitative data analysis began with coding the answers given by the respondents from questionnaires. The coded answers were entered into Microsoft Excel and SPSS (Version14) computer software and analyzed in line with the objectives. Descriptive analysis was also used to analyze qualitative data (information collected from informal interviews and information captured through observation and group discussions). Results were presented in the form of frequencies, percentages and other statistical diagrams such as histograms, pie charts, graphs and tables.

III. RESULTS AND DISCUSSION

Relative Abundance of Bushbuck and Buffalo in the K-FNP

After covering a distance of 53km with 27 transects, a total of 13 species of small, medium and large mammals were recorded within the K-FNP belonging to 9 families. The Bovidae family had the highest number of species represented by the buffalo (*Syncerus caffer), bushbuck (Tragelaphus scriptus),* the blue duiker (*Cephalophus monticola*) and the red duiker (*Cephalophus dorsalis*). The second most abundant family was that of the Cercopithecidae represented by the monkeys and the baboons. In this research we did not really go into details recognizing the different species of the monkey because we did rely very much on foot prints since it was in the rainy season. This means that it would have been very difficult to distinguish between the different species. This was followed by the Viverredae represented by the African civet and off course the Suidae represented by the red river hog. These results agree with those of Akwo *et at.,* (2018), who recorded 12 species in the Kom-Wum forest in the North West Region of Cameroon and Afuh, (2013) who recorded 14 from Mbanyang Mbo Landscape, in the South West Region of Cameroon. Table 2 below summarises the mammals recorded in the K-FNP.

Table.2: Mammal species recorded in the K-FNP according to family

Family	Common Name	Scientific Name
Bovidae	Buffalo	Syncerus caffer
	Bushbuck	Tragelaphus scriptus
	Red duiker	Cephalophus dorsalis
	Blue duiker	Cephalophus monticola
Pongidae	Chimpanzee	Pan troglodytes ellioti
Ercopithecidae	Monkey	Cercopithecus sp.
	Baboon	Papio sp.
Suidae	Red river hog	Potamochoerus porcus
Canidae	Bush dog	Lycaon pictus
Viverredae	African civet	Viverra civetta
Herpestidae	Slender Mongoose	Herpestes sanguinea
Hystricidae	Porcupine	Hystrix cristata
Thryonomyidae	Cane rat	Thryonomys swinderianus

Indices of Mammals Identified In K-FNP

During our recce walk of 53km, a sum of 249 signs (dung, foot prints, tracks, food remains, nest and carcass) were recorded in this study. The table 3 summarized both direct and indirect indices of buffalo and bushbuck together with those of other small, medium and large mammals observed in the K-FNP.

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

Table.3: Indices of mammal species identified in the K-FNP

Species	Indirect observations									Direct observations	Total
	D	FP	T	FR	RS	N	H	C	V		
Buffalo	16	45	10	8	3	_	_	_	_	_	**82**
Bush buck	_	18	1	3	_	_	_	_	_	_	**22**
Red duiker	4	17	_	_	_	_	_	_	_	5	**26**
Blue duiker	7	11	8	_	_	_	_	_	_	2	**28**
Chimpanzee	_	_	2	_	_	_	_	_	_	_	**2**
monkey	_	3	1	18	_	_	_	_	1	3	**26**
Baboon	_	_	4	3	1	_	_	_	1	_	**9**
Civet cat	2	3	_	1	_	_	_	_	_	_	**6**
Bush Dog	1	3	_	_	_	_	_	_	_	_	4
Slender Mongoose	_	_	_	_	_	_	3	1	_	_	**4**
Porcupine	_	1	14	_	_	_	_	_	_	_	**15**
Cane Rat	6	_	2	15	_	_	_	_	_	_	**23**
Bush Pig	_	2	_	_	_	_	_	_	_	_	**2**
Total	36	103	42	48	4	0	3	1	2	6	**249**

Legend: D= Dung, FP= Foot Prints, T = Trail, FR= Food remains, RS=Resting Site, N= Nest, and C= Carcass, V= Vocalization

Both direct and indirect signs were used to identify mammals in the field. In the case of buffalo, indirect signs registered were dung and footprints. For dung they appeared to be like those of the cow but for the fact that the material in the dung appeared finer than those of cow dung probably because buffalos browsed on softer vegetation or probably because they have a better digestive system. For the footprints, those of matured buffalos looked larger. Their prints also looked deeper than those of the cow, especially the front foot that have to support most of the weight Chuo, (2018) in his study in the Black Bush Areas of Waindow differentiated similarly buffalo foot print from those of caws .

Relative abundance of mammals using indirect indices

After 53km of recce-walk, we recorded a total of 156 indirect signs of mammals. Table 4 shows the relative abundance of mammals in the K-FNP.

Table.4: Encountered rate of indirect signs of mammal species recorded in the K-FNP.

Common Name	Family	Scientific Name	TNI	TDC	ER
Buffalo	Bovidae	*Syncerus caffer*	45	53	0.85
Bushbuck	Bovidae	*Tragelahus scriptus*	18	53	0.34
Chimpanzee	Pongidaea	*Pan troglodytes ellioti*	2	53	0.04
Baboon	Cercopithecidae	*Papio Anubis*	4	53	0.08
Bush Pig	Suidae	*Potamochoerus porcus*	2	53	0.04
Red duikers	Bovidae	*Cephalophus dorsalis*	17	53	0.32
Blue duikerb	*Bovidae*	*Cephalophus monticola*	11	53	0.21
Monkey	Cercopithecidae	*Cercopithecus SP.*	18	53	0.34
Slender Mongoose	Herpestidae	*Herpestes sanguinea*	04	53	0.08
Porcupine	*hystricidae*	*Hystrix cristata*	14	53	0.26
Cane Rat	*Thryonomyidae*	*Thryonomys swinderianus*	15	53	0.28
Bush dog	*canidae*	*Lycaon pictus*	3	53	0.06
African civet	*Viverridae*	*Viverra civetta*	3	53	0.06
Mean			156	53	0.23

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

Legend:
ER: Encounter rate, TDC: Total Distance Covered (KM), TNI: Total Number of Indices

Table 4 above showed that buffaloes (0.85sign/km) were the most abundant mammal species recorded in the K-FNP followed by the bushbuck and monkeys with 0.34sign/km. This was then followed by the red duiker (0.32sign/km) and 0.28 sign/km for the cane rat. The overall relative density of mammals in the K-FNP was estimated at 0.23 sign/km. This implies that one would identify at least one mammal sign for every 5km of the study area. This therefore implies that the NE and SE portions of the K-FNP appears to be very poor in mammal species.

Geo-Spatial Distribution of Mammals in the NE and SE Park Compartments

Generally, the distribution of Mammals species is highly affected by vegetation type (primary forest, secondary forest, gallery forest and open savannah), (Akwo, 2015). In the K-FNP, the buffaloes are around marshy areas, wet or areas with very young vegetation. Bushbucks were mostly sighted around drinking spots in the galleries and around their peripheries. The monkeys were mostly in and around the galleries, primary and secondary forests. The blue duiker was easily sighted in the open savannah while the bay duiker was found in the galleries. Determining animal distribution permits managers and researchers to locate protected and unprotected areas of high biological diversity by targeting specific areas for protection or areas to allow improved management (Tsi *et al.*, 2006). Figure 3 shows the geo-spatial distribution of all Mammals in the NE and SE of the K-FNP.

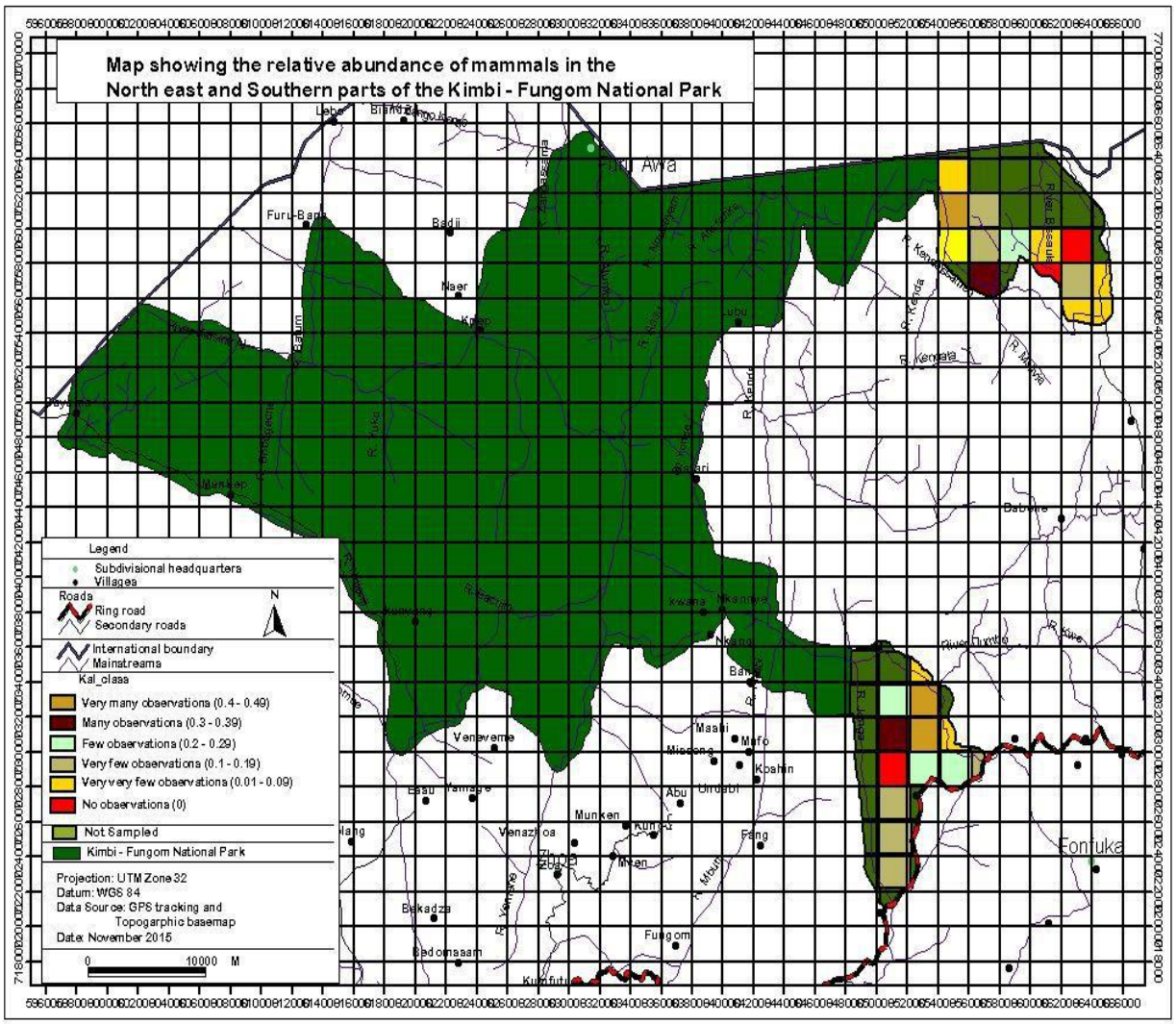


Fig.1: GIS map showing geo-spatial distribution of mammals in the NE and SE of the K-FNP

Figure 3 shows that most mammals are abundant around a small portion in the North West section of the NE compartment of the NP. In the SE compartment of the NP, we also recorded an abundance of mammal species around

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

the North East section. These areas are therefore biodiversity ''hot spots''. This high abundance in the SE compartment of the park could be due to its closeness to the head quarters of NP where regular patrols are undertaken by forest guards. Meanwhile the high abundance in the NE of the NP is due to the accidental nature of terrain with little human interference. The other areas were poorer in Mammal species probably due to the high human interference in the area.

Geo-Spatial Distribution of Buffaloes in the NE and SE of the K-FNP

Habitat requirements such as river courses, salt licks, vegetation and anthropogenic activities are one of the factors which affect the abundance of species distribution in an area (Tsi *et al.*, 2006). Figure 4 shows the geo- spatial distribution of buffaloes in K-FNP.

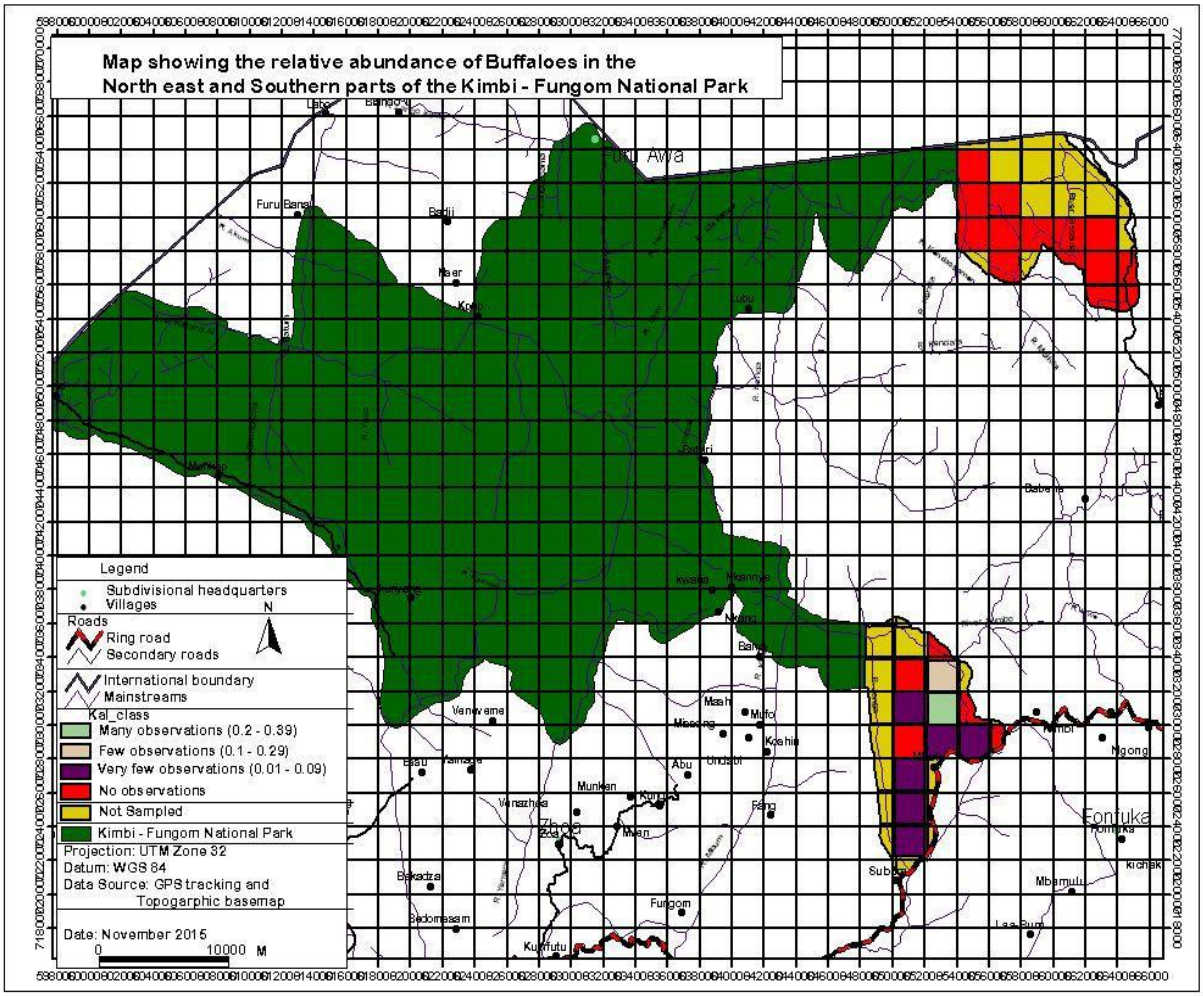


Fig.2: GIS map showing spatial distribution of Buffaloes in the NE and SE of the K-FNP

Figure 4 revealed that Buffaloes were found only in the SE compartment of the K-FNP with a high relative density in its Eastern section (0.2 < ER<0 .39 (light green colour)) and North East section (0.1 < ER< 0.29 (rose colour)). This was probably due to the presence of numerous water bodies and swamps with soft grass which serves as food. Very few signs of buffalo presence were found in the South and South East sections (0.01<ER<0.09 (dark purple colour)). This was probably due to the presence of anthropogenic activities (grazing).

The NE compartment of the K-FNP was completely void of buffaloes probably because of the high rate of grazing, hunting and transhumance from Nigeria and also due to the fact that this section was never a part of the former Fungom Forest Reserve or the Kimbi Game Reserve.

Geo-Spatial Distribution of Bushbuck In the NE and SE of the K-FNP

The Geo-spatial distribution of bushbuck in the K-FNP was influenced by availability of food, habitat presence and preponderance of predators (see figure 5 below).

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

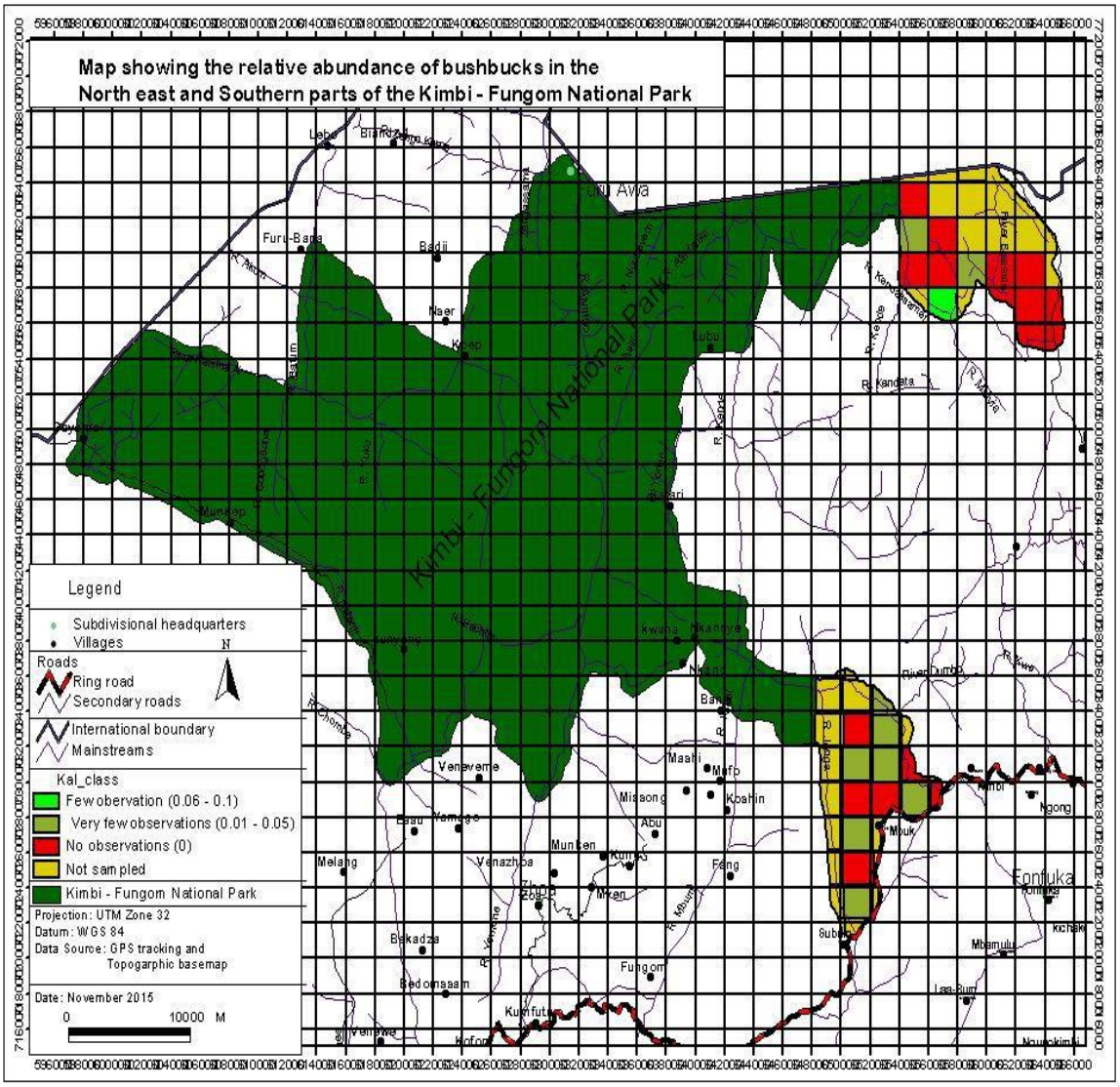


Fig.5: Geo-spatial distribution of Bushbuck in the NE and SE of the K-FNP

From figure 5, the bush buck was evenly distributed in the SE compartment of the Park with a relatively very low density (0.01<ER<0.05) indicated with the lemon green colour. This was probably due to the availability of food (since research was carried out in the rainy season), forest galleries with numerous streams and to a lesser extent hunting (which was the only anthropogenic activity that was noticed to be taking place here during the rainy season). In the south west of NE compartment of the K-FNP, we noticed a relatively higher density (0.06<ER<0.1) of bushbucks (green colour). This was certainly due to abundant food, closeness to a large river and difficult topography. In the East we did not notice any signs because of the high numbers of anthropogenic activities and closeness to the "Bebe farms". Note should also be taken that this compartment before the creation of the K-FNP was not a protected area. This could also have accounted for the poor density in this area.

Anthropogenic Activities in the NE and SE of the K-FNP

After the lake Nyos disaster of 1986 many families were resettled within the peripheries of the study area. Over the years the population has tremendously increased leading to an enormous pressure on natural resources which has in turn lead to forest degradation. This research shows an increasing demand on natural resources in and around the K-FNP. These demands range from forest trees for firewood, medicines: animals for bush meat and proteins: and Park land for grazing and agriculture. These activities are therefore very important for the livelihoods of the people living around the K-FNP who depend on it.

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

3.7. Relative Abundance of Anthropogenic Activities in the NE and SE of the K-FNP

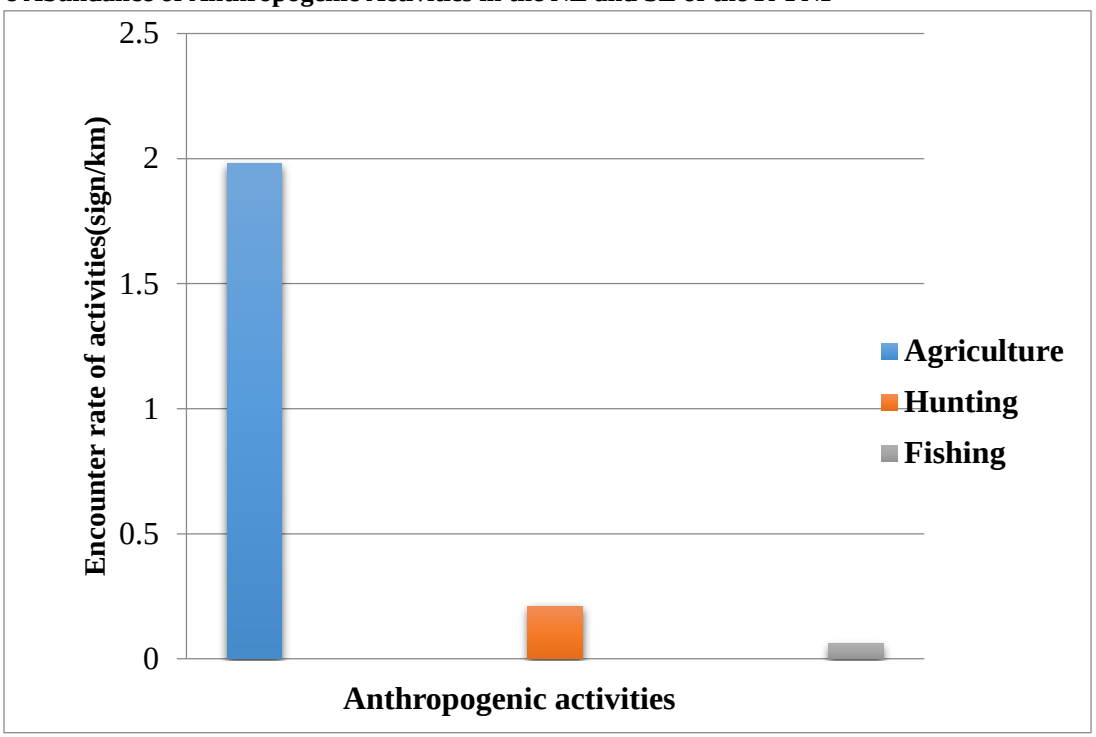


Fig.6: Anthropogenic activities recorded in the NE and SE of the K-FNP

Figure 6 shows that agriculture (1.98 sign/km) (89.05%) was the most prevalent activity in the K-FNP. This was closely followed by hunting (0.21sign/km) (8.76%) and lastly fishing (0.06 sign/km) (2.19%). Amongst the agricultural activities, grazing was the most important agricultural activity as could be seen in the study area with numerous amounts of cattle dung, tracks and resting sites found almost throughout the study area. Numerous grazing hurts, fire places, used torch light batteries, spent insecticide sachets, prayer grounds for Muslims, old shoes and old dresses were also noticed in the study zone.

Growing of crops was the second agricultural activity and was mostly found around the NE compartment of the park where we recorded many farms with maize, groundnut, cassava, sweet potatoes, sugar cane, plantains, bananas, farm houses and the presence of some farmers.

Hunting activities were second to agriculture with the following signs recorded; spent cartridge cases, wire traps, hunting trails, hunting camps, used torch light batteries. The highest hunting signs recorded were wire snares. According to Waller & Reynolds (2001) gorillas and chimpanzees have a high rate of snaring, injury, crippling, infection, or death. This was followed by the use of guns as gun sounds were also heard and spent cartridges found. Appendix shows some bush meat seized by the Chief of post for Kimbi in the Su-bum market during his regular patrols. And finally fishing was last with a few fishermen seen carrying out the activity. They mostly use hooks and nets, but the net sizes were found to be very small as it caught almost everything in its path. The fish (see appendix) they caught was sold in the markets of Sabongida, Kimbi, Su-bum and even out of the division as many people enjoy the fish.

Geo-spatial distribution of anthropogenic activities in the NE and SE of the K-FNP

Within the Northeastern and Southeastern compartments of the park, anthropogenic activities were recorded in almost all the quadrats sampled. Within the Northeastern compartment we realize that more anthropogenic activities were recorded, with an encounter rate ranging from between 0.3-0.39 and 0.1-0.19. This was probably because the area was relatively flat with plenty of grass for cattle. It may also be high because of its close proximity with Nigeria.

In the southeastern compartment, we were able to record encounter rates of between 0.2-0.29 and 0.1-0.19 in the northern portion of the Zone. The south portion of this zone showed a relatively very low ER of 0.01-0.09. The high presence in the northern portion of the southeastern compartment of the NP is probably due to the fact that it is not usually easy for Park guards to reach there because of their few numbers (within the period of this research the park had only one staff and the conservator) and accidental nature of the terrain which permit grazers to hide for months without being noticed. Meanwhile in the south portion, the very, very low ER may be due to the fact that grazers could easily be seen by guards patrolling with bikes on the ring road which is relatively long. During focus group discussions it was estimated that about 10.000

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

cattle usually grace in the South Eastern compartment (former Kimbi Game reserve) of the park. Figure7 shows the spatial distribution of all anthropogenic activities in the K-FNP.

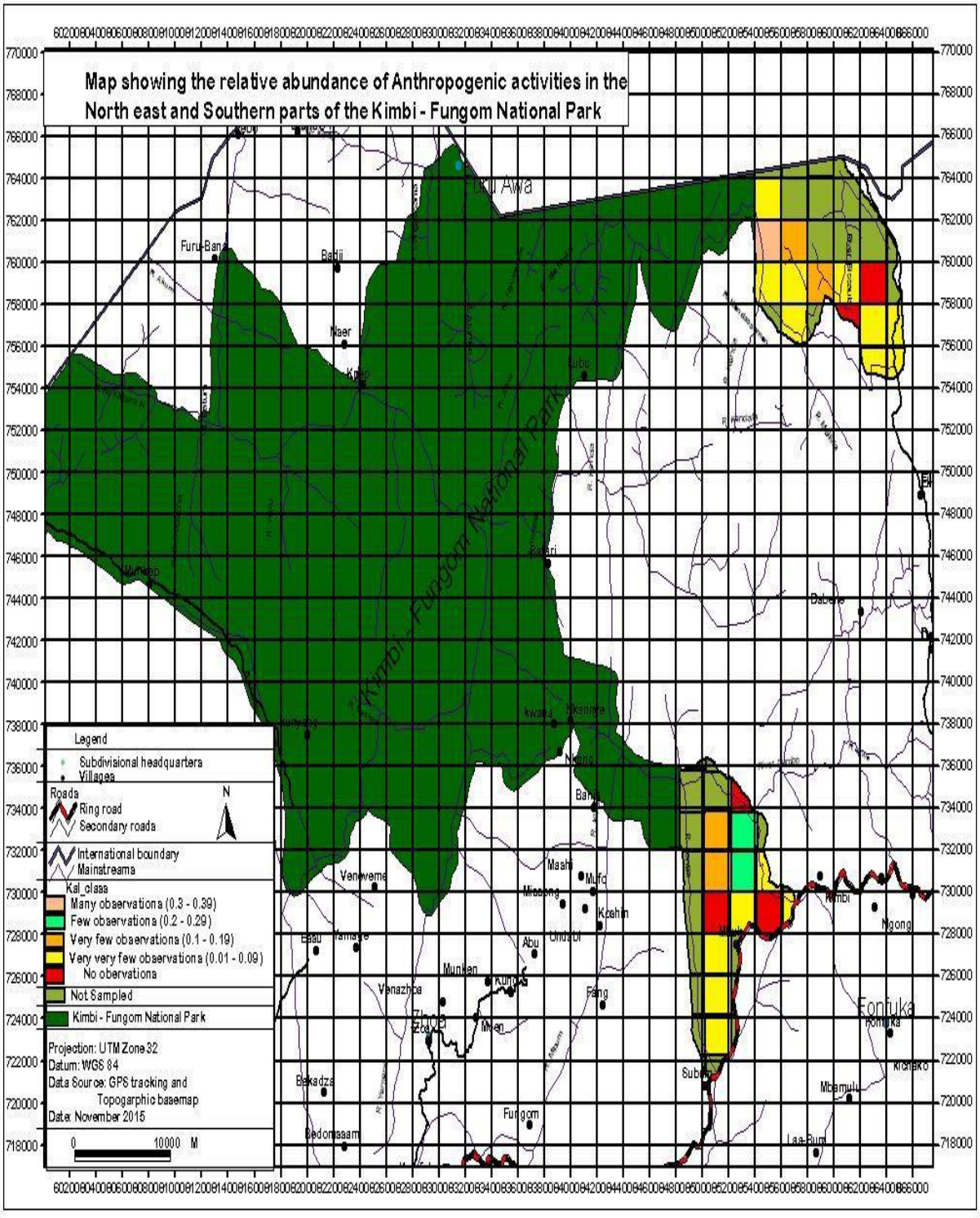
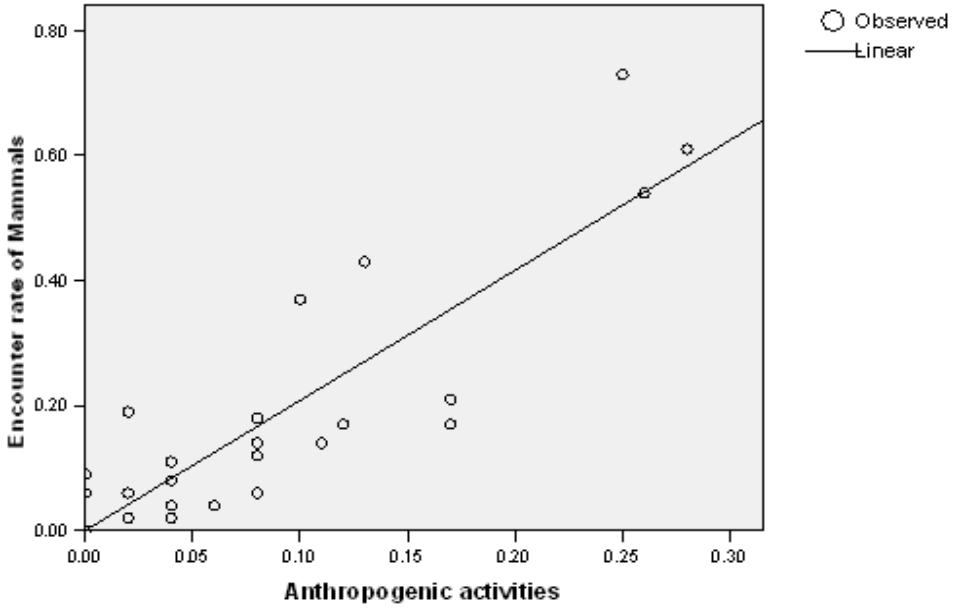


Fig.7: Anthropogenic activities in the NE and SE of the K-FNP

Effects of anthropogenic activities on the distribution of mammals

Using the encounter rate of mammals and anthropogenic activities, the coefficient of determination R^2 was calculated. The scatter diagram of the fitted regression line for the encounter rates of mammals and anthropogenic activities is presented on figure 8.

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*



The equation= a+b1X+B2X+B3X + Error

$$Y = -.020 + 2.096X1 + 5.704X2 - 2.987X3 + .028$$

Where Y=Mammal, X1=Agriculture, X2=Fishing, x3=Hunting

Fig.8: Fitted regression line of the encounter rates of mammals and anthropogenic activities in the K-FNP

Figure 8 shows a strong relationship between mammals and human signs in K-FNP. This coefficient of determination ($R^2 = 0.792$) shows that 79.2% of changes in mammals distribution are provoked by changes in agriculture, fishing and hunting. These results are different from those of Fotang (2014) (who reported an R^2 of 0.375 from Mbi crater in the North West region) and Fonkwo *et al.* (2011) in the Bakossi landscape in the South West Region of Cameroon (who also showed a non-significant correlation (r^2 = 2.33 %) between large mammals and human activity). Among these anthropogenic activities, agriculture had the highest effect on the distribution of mammals in K-FNP followed by hunting and then fishing as shown on the regression equation. Grazing was the most important form of agriculture with an ER of 1.66sign/km. This was followed by crop farming with an ER of 0.32sign/km.

Perception of Local Population towards K-FNP

The perception of the Local population is key to improving the relationship between protected area management and local people because of the provision of guidance for policy and decision making (Parry and Campbell, 1992; Hill, 1998).

Demographic factors of respondents

This section describes the characteristics of respondents sampled in this study by educational level, occupation and age. The level of education of a respondent has a remarkable effect on his/her perception of the conservation of biodiversity (McClanahan *et al.*, 2005). Figure 9 analyses the level of formal education of respondents.

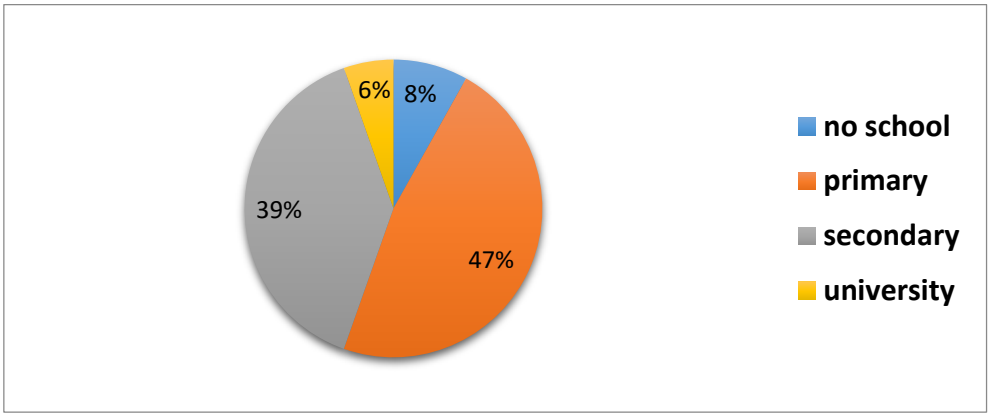


Fig.9: Educational level of respondents

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

From figure 9, 91.87%) of the respondents were literate. The bulk of the literate people ended at the level of primary school. This was noticed in their inability to fill questionnaires on the field. This result agrees with those reported by Fotang (2014) from Mbi Crater who recorded 80.7%. Level of education also ease awareness and perception of conservation practices as more educated people easily embrace change while less educated people always have a propensity to be more conservative. The occupational structure of the people living in and around the K-FNP has an effect on the people's activities and perception vis-à-vis the forest. Figure 10 shows the occupation of respondents.

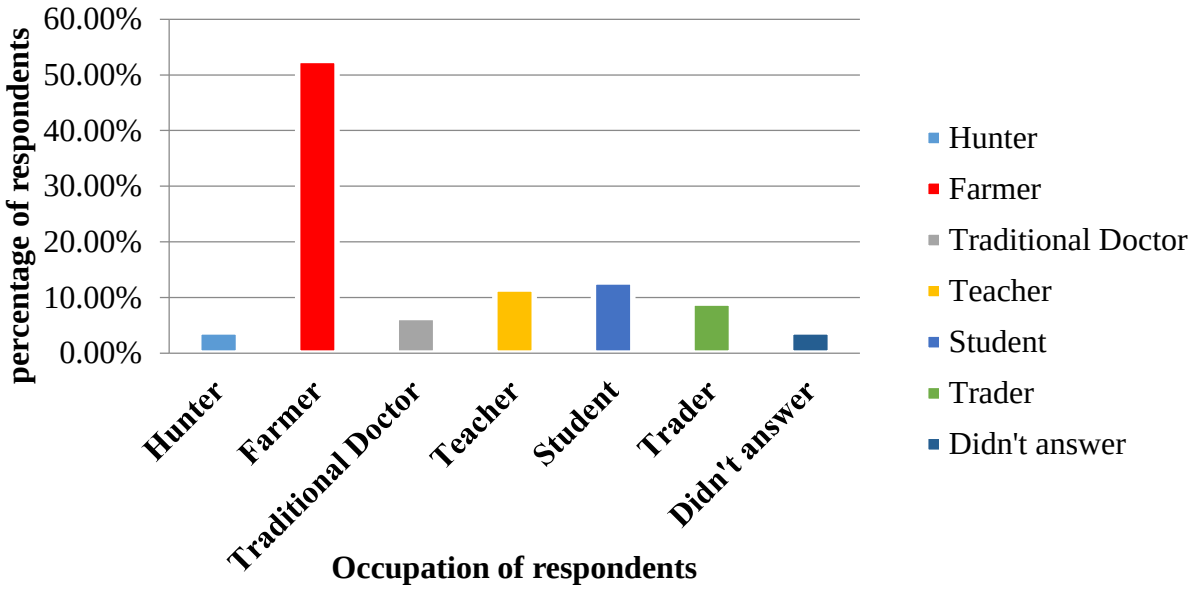


Fig.10: Distribution of respondents by occupation

More than half of the population in and around the NE and SE of the NP are made up of farmers (53%). This reveals that farming is an important economic activity in the area. Encroachment into the NP is therefore eminent if appropriate measures are not taken. Next to farming were students (12.80%) followed by teaching (11.50%). After farming, the next economic activity was trading (9%) followed by traditional doctors (6.4%). Hunting is equally an important activity although represented by only 4% of the respondents. During group discussions, most people said they preferred the taste of bush meat to domestic meat, indirectly implying hunting is an important activity. The low percentage of hunters could probably be because some hunters did not want to identify themselves as hunters for fear of the unknown. Figure 11 summarizes the age characteristics of respondents in the study area.

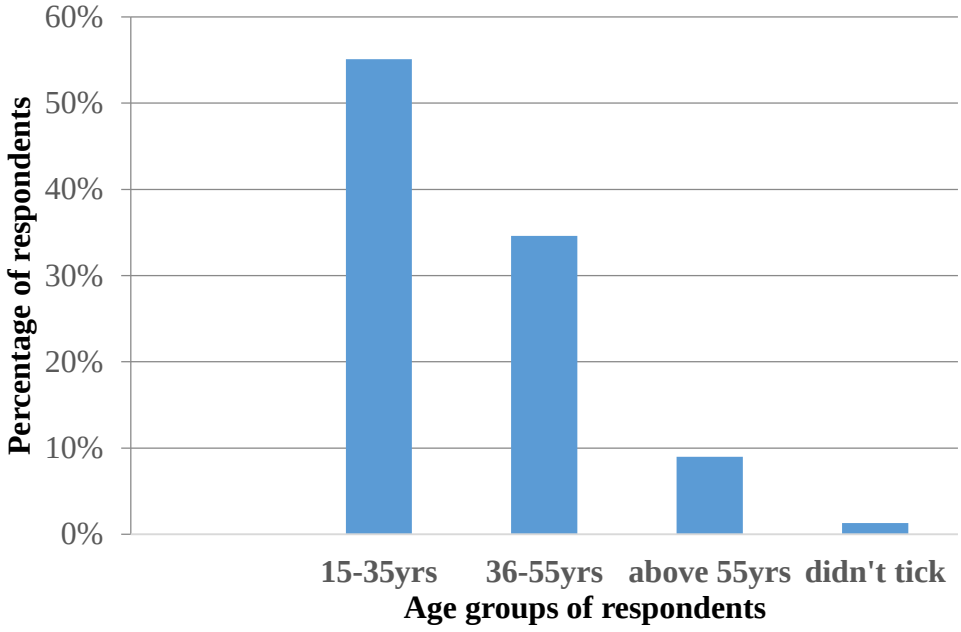


Fig.11: Distribution of respondents according to age group

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

Majority of the respondents (55.10%) were of the 15-35year age group followed by the 36-55year age group with 34.60% and the 55+ age group with 9%. This shows that the sampled population is dominated by people of the young age group (15-35years) and the middle age group (35-55years). It is these age groups that are often engaged in a lot of activities which include poaching to earn a living.

Awareness, ownership and control of the K-FNP

What the people of Bum, and Misaje subdivision perceive as to who owns and control the K-FNP is very important for its protection and management. Figure 12 presents respondents view on who owns and controls the K-FNP.

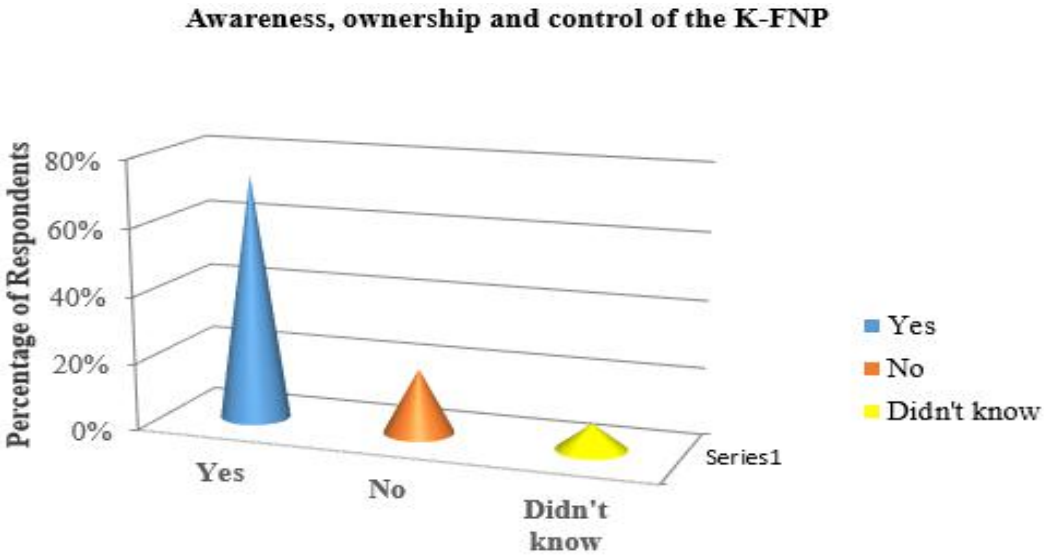


Fig.12: Awareness, ownership and control of the K-FNP as perceived by local population

Up to 73.10% of the respondents were aware of the existence of the K-FNP and that it was owned and controlled by the government of Cameroon because of the presence of game guards. They also indicated that they do not have access but do not respect the boundaries which prohibit entering and hunting in the NP. Focus group discussions further revealed that majority of the people saw the Park as too government centered, with them, the local population haven benefited too little from its creation. Focus group discussions also revealed that the boundary at the NE compartment was not known to the local population. The recent reclassification of this former game and forest reserves into a national park and appointment of a Conservator and more echo guards has however come to solve this problem.

Perception on Wildlife conservation and community implication in managing K-FNP

Free acceptance of indigenous people in conservation ventures usually facilitates the task of management (Tsi *et al.*, 2006) as objectives are easily attained. Unwillingness of some stakeholders like indigenes frustrates conservation efforts. Figure 13 below summarizes the attitudes of people in and around the K-FNP.

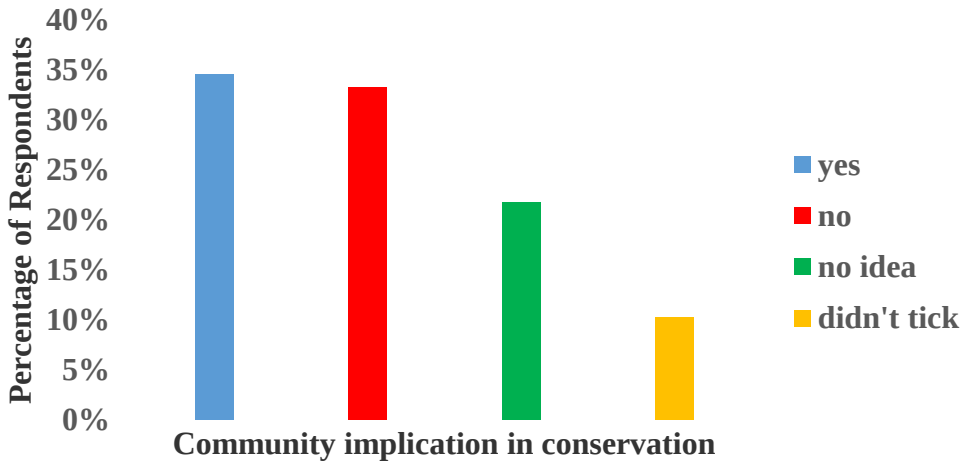


Fig.13: Attitudes of the respondents towards conservation

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

The result show that (34.60%) of the respondents held positive attitudes towards the conservation of resources in K-FNP while 33.30% portrayed a negative attitude toward the conservation of resources. According to Akwo, 2015 in the Kom-Wum forest reserve this low Perception on Wildlife conservation and community implication may 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. Information from focus group discussions revealed that since creation of the reserves (Kimbi Game Reserve and Fungom Forest Reserve) they have benefited nothing or very little from the reserves. Most people interviewed, where for conservation but at the same time were afraid the sacrifice of their land may not bring them much in return since the law states that they no longer had any right to harvest, fetch wood, trespass and farm or graze in the park or around the Buffer Zone.

Most hunted animal

A question was designed to find out the animals commonly hunted for bush meat. The results are presented on figure 14.

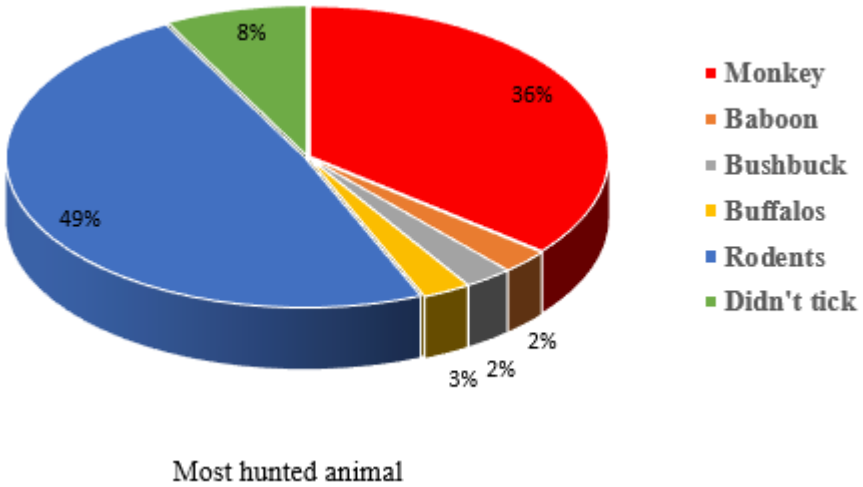


Fig.34: Animals hunted for bush meat in the K-FNP

The figure 14 shows that Rodents (49%) followed by Monkeys (36%) were the most hunted animal species. This was followed by the Buffalos (3%), and Baboons and Bushbuck with 2% each appearing as the least hunted animals species. Results during focus group discussions revealed that the rodents were highly demanded in restaurants and during other ceremonies. Most of the hunters said they killed every animal they met in the bush. This implies that the low numbers attributed to buffalos and bushbucks are probably due to the reduced numbers of these species in the NE and SE compartments of the park. During focus group discussions most people said that most of the animals died during the 1986 Lake Nyos disaster and the little that survived, their numbers have since then been reducing. This, they said was because after the disaster most echo guards ran away from the former Kimbi game reserve leaving the area for poachers.

Importance of the K-FNP as perceived by respondents

As important as the need to conserve biodiversity is to the conservation community all over the world, local communities that reside in protected areas also depend on the available resources for their basic needs (Borrini-Feyerabend *et al.*, 2004). Figure 15 shows the respondent's perception towards importance of the K-FNP.

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

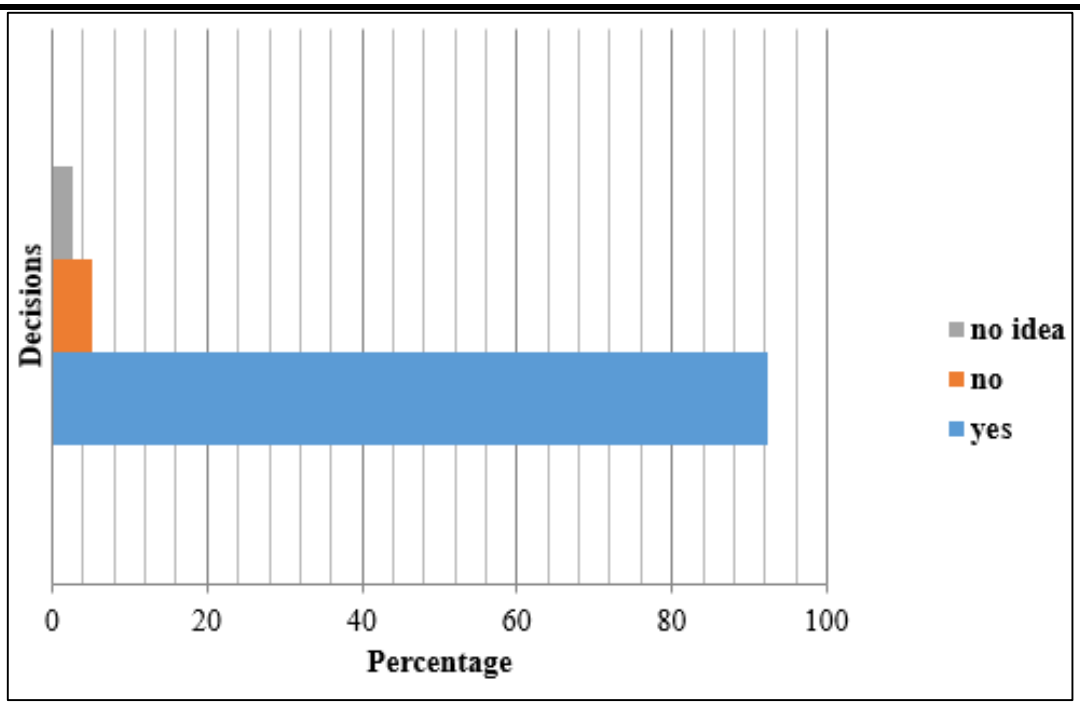


Fig.45: Percentage distribution of respondent's perception towards the importance of K-FNP

Figure 15 above reveals that majority of the respondents (92.31%) agreed that the K-FNP was important because of the abundance of resources it provided to them. Respondents gave reasons that they survived on the NP through involvement in various activities such as collection of NTFP's (34.60%) (for most forest-living communities, non-timber forest products (NTFPs) either serve as the main source of income or act as an important safety net during seasons of low agricultural output (Ingram et al. 2012)), hunting of Bushmeat (12.80%), fuel wood gathering (7.70%), religious activities(6.40%), agricultural land (5.10%), harvesting of medicinal plants(5.10%), source of clean water (5.10%), traditional rituals (3.80%) and traditional medicine harvesting (2.6%). These resources were summarised in figure 16.

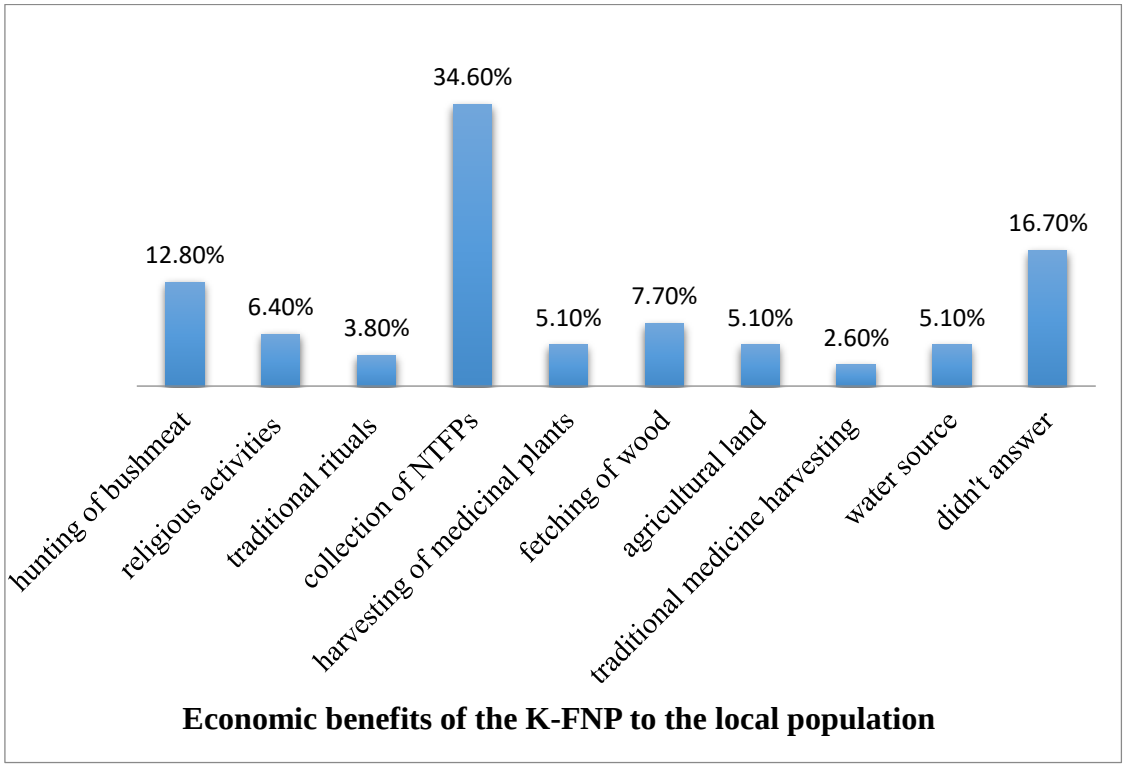


Fig.16: shows some natural resources present in the NP and their degree of harvesting by the local population.

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

A small number of respondents (5.13%) said that the reserve was not important to them and more of a liability because farming, grazing, fishing and hunting inside had been prohibited by the parks authority. They therefore complain of limited land for farming and want such lands to be freed for settlement and cultivation (Fortang, 2014). Some respondents during interviews denied that the reserve has not benefited them since its creation because access to certain plant and animal species which were of great cultural value to them had been denied by the government. These results are in line with those obtained by Kepo (2006) in Uganda where a majority (83.6%) of respondents did not perceive the importance of the Ajai wildlife Reserve and Fortang (2014) in the Mbi Game Reserve (15%) where they considered it as a liability to the communities of its environs because of loss of land for cultivation and grazing. Meanwhile 2.56% had no idea probably because they were visitors in the area or they were withholding information for fear of being regarded as trespassing in the park.

IV. CONCLUSION

The Kimbi-Fungom National Park still holds a lot that still needs to be discovered. This research focused on the area that formerly was the Kimbi Game Reserve and the newly added portion in Donga Mantum division which was formally made up of some virgin forests, gallery forests and some farmlands (The NE and SE compartment of the K-FNP). From this study we found that thirteen (13) species of mammals were identified during inventory in the K-FNP belonging to 9 families. Buffalo and Bushbuck were the most abundant among these species. In the North Eastern and South Eastern compartment of the K-FNP, one would identify less than one mammal sign for every kilometer walked. K-FNP is therefore poor in game abundance and diversity.

The Buffalo had a higher density in the North East of the South East compartment of the park while the bushbuck had higher densities in the south west of the North East compartment of the National Park. Anthropogenic activities recorded in the K-FNP were enormous with Grazing being the main driver towards the decline in abundance, distribution and encounter rate of mammals. These activities forced the buffalos to move towards Marshy during transhumance and only return during the rainy season when human interference is really low. Many of the respondents were not aware of community implication in managing the K-FNP, consequently, local people perceived wildlife conservation as a problem rather than an economic and social status advantage. This therefore makes wildlife conservation efforts to be perceived as being contradictory to the socio-economic welfare of the local communities. This strongly gives reasons for encroachment into the NP. K-FNP is poor in species abundance, richness and flagship species. Associated benefits from ecotourism are far-fetched coupled with encroachment by grazers.

The various stakeholders must therefore work in synergy in other to reduce habitat loss due to grazing, food crop farming and habitat fragmentation as this is the only way which will enable these mammals to remain in their natural habitat. Without this the objectives of creation of this new national park will not be reached. This therefore implies that all the stakeholders have to be mobilized in order to sustainably manage this new national park for the benefit of the present and future generations.

Recommendations and Perspectives

To MINFOF

- Increase the number of eco-guards in the K-FNP
- Place salt licks in strategic places for wildlife in other to attract and maintain animals in the NE and SE compartments.
- Involve the local population into Park management (co-management).

To the Local Population

- Participate actively in the conservation of mammals by not grazing or poaching in the NP.
- Cooperate with park authorities, NGOs and the government in order to gain the full benefits of having the NP at their back yard.

To NGO's

- Carry out further research on the status of buffalo and bushbuck in NE and SE compartments of the K-FNP in the dry season in order to compare the results with those obtained in the rainy season
- Carry out this same research in the West, North, South and Central compartments of the NP (i.e. the Fungom compartment).
- Educate and sensitize local population on the importance and benefits of conserving large mammals.
- Support and finance income generating activities and write up projects that will benefit the local communities and bring substantial advantages to the local community.

CONFLICT OF INTEREST STATEMENT

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

ACKNOWLEDGEMENTS

I give God all the Glory for giving me the will power, knowledge and strength to move on despite many challenges. I will like to extend my heartfelt thanks to all those who contributed in one way or the other to the success of this work. My immense thanks and appreciation

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

goes to all the wildlife authorities and their dynamic staff that harbors the study areas for their encouragement and provision of vital information. My sincere gratitude equally goes to the chiefs and villagers especially the respondents for their gallant cooperation and unconditional support during my stay with them. Thanks Thanks Thanks!!!

REFERENCES

[1] **Akwo, C. E. (2015).** Status of Blue Duiker (*Cephalophus monticola)* and Bushbuck (*Tragelaphus scriptus*) in Kom -Wum Forest Reserve, North West Region, Cameroon.

[2] **Alpert, P. (1993).** Conserving biodiversity in Cameroon.Ambio, 22: 33 – 1071

[3] **Amariei, Liviu, (2005).** Legal Compliance in the Forestry Sector. Case study: Cameroon Final report 7 January 2005.

[4] **Borrini, G., Kothari, A., and Oviedo, G. (2004).** Indigenous and local communities and protected areas towards equity and enhanced conservation. *World commission in protected areas*, Series number 11.

[5] **BUCREP, (2005).** 3éme RGPH 2005-Répertoire actualisé des villages du Cameroun Cameroon law number 94/1 of 20th January 1994 to lay down forestry, wildlife and fisheries regulations.

[6] **Chuo, M.D., Tsi, E.A., 2017c.** Indigenous people conflicts on chimpanzee (Pan troglodytes ellioti) crop raiding and natural resource exploitation, case study: Kimbi-Fungum National Park and Kom-Wum Forest Reserve NW, Cameroon. *International journal of Rural Development, Environment and Health Research* 1(3), pp.32-50

[7] **Chuo, M.D., Tsi, E. A., Chefor, F., Fru, B.S., 2017e.** Estimation of Chimpanzee's (Pan Troglodytes Ellioti) Abundance in the Kimbi-Fungum National Park and Kom-Wum Forest Reserve, Nw, Cameroon. J Biodivers Manage Forestry 6:3.

[8] **Chuo, M.D., 2018.** Gorilla, Chimpanzee and Bufallo Conservation in the Black Bush Area of Waindow Northwest Region of Cameron *M.Sc Thesis*: University of Dschang, *Scholar Press*.

[9] **DEVERS, D. & VANDE WEGHE, J.P. (eds.) (2007).** Les forêts du Bassin du Congo: état des forêts 2006. Partenariat sur les Forêts du Bassin du Congo.

[10] **FAO (2003).** Forestry Outlook Study for Africa. Sub regional report Central Africa.

[11] **FAO (UN Food and Agriculture Organization) (2006).** Global Forest Resources Assessment 2005: progress towards sustainable forest management.

[12] **Fein, J., (2003).**"Learning to Care: Education and Compassion", Australian Journal of Environmental Education 19: 1–13. Available: http://www.griffith.edu.au/__data/assets/pdf_file/0018/314613/fien03.pdf. Accessed: May 31, 2014.).

[13] **Fomete Nembot, T. & Tchanou, Z. (1998).** La gestion des écosystèmes forestiers du Cameroun à l'aube de l'an 2000, Volume 1. International Union for the Conservation of Nature/Conference on Moist Forest Ecosystems of Central Africa, Yaoundé, Cameroon.

[14] **Fominyam, N.C.T. (2015).** Kimbi-Fungom National Park Presentation. March 2015. (Unpublished).Pioneer conservator.CUPGR-UK.Forestry Engineer.

[15] **Fonkwo, N.S., Tsi E. A. and Mpoame M. (2011).** Abundance and distribution of large mammals in the Bakossi landscape area, Cameroon. *Journalof Soil Science and Environmental Management* Vol. 2(2), pp. 43-48, February 2011.

[16] **Fotang, C. (2014)**. Status of Blue duiker (*Cephalophus monticola)* and Bushbuck (*Tragelaphus scriptus*), in MbiCcrater game reserve, North West Region, Cameroon The University of Dschang.pp 101.

[17] **Ingram V, Ndoye O, Iponga DM, Tieguhong JC, Nasi R (2012).** Non-timber forest products: contribution to national economy and strategies for sustainable manage- ment. In: de Wasseige C, de Marcken P, Bayol N, Hiol Hiol F and others (eds) The forests of the Congo Basin— state of the forest 2010. *Publications office of the Euro- pean Union, Luxembourg, p 137–154.*

[18] **Jurgens, C.R., (1993).** Strategic planning for sustainable rural development. Landscape and Urban Planning, 27:253-258.

[19] **Kepo, R. (2006).** Conflicts between local communities and Uganda wildlife authority in Ajai Wildlife Reserve.

[20] **Kwanga, M.J.,(2006).** Wildlife management: Case Study of Kimbi Game Reserve. BSc. Long Essay (Unpublished),Yaounde: University of Yaounde.

[21] **Macleod, H., (1986).** The Conservation of Oku Mountain Forest.Cambridge: ICBP Project Report.

[22] **Mahop, J.P. (2007).** Densité, abondance et distribution spatio- temporelle des grandes et moyens mammifères diurnes dans la ZICGC9. *Rapport WWF-Jengi.49P*.

[23] **McClanahan, T., Davies, J. and Maina, J. (2005).** Factors influencing resource users and managers' perceptions towards marine protected area management in Kenya. Environmental Conservation 32, 42–49.

[24] **Ministry of forests and wildlife. (2008).** Indicateurs FORAF pour le suivi de l'état des forêts d'Afrique centrale.

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

[25] **Ministry of Environment and Forests & United Nations Development Programme.(1999)**. Etat des lieux, stratégie et plan d'action national de la diversité biologique (SNPADB).

[26] **Ndenecho, E. N.,(2009).** Ecological Planning and Ecotourism Development in Kimbi Game Reserve, Cameroon.Geography Department, University of Yaounde I, ENS Annex Bambili, P.O. Box Bamenda North West Province, Cameroon. E-mail: ndenechon@yahoo.com(© Kamla-Raj 2009 . J Hum Ecol, 27(2): 105-113 (2009)).

[27] **Parry, D. and Campbell, B. (1992).** Attitudes of rural Communities to animal and wildlife and its utilization in Chobe Enclave and Mababe Depression, Botswana. *Environmental conservation*, 19:245-252.

[28] **Stuart, S.N., (1986).** Conservation of Cameroon Mountain Forest. Cambridge: ICBP Project Report.

[29] **Tata, F.T. (2015).** The Kimbi-Fungom National Park; -A situation report. Green works company Ltd. P.O. Box, Bamenda, Cameroon<bankomtata@yahoo.com>.

[30] **Tsi, E.A. (2006).** Status of wildlife and its utilization in Faro and Benoué National Park North Cameroon: Case study of the Derby Elands (*Taurotragus derbianus)* signs (Gray 1847) and African Wild Dog (*Lycaam pictus)* (Temminck 1820), Ph.D thesis

[31] **UN, (2011).** "UN 1982 General Assembly World Charter for Nature: 48th Plenary meeting". United Nations.13 September 2011.).

[32] **Waller JC, Reynolds V (2001).** Limb injuries resulting from snares and traps in chimpanzees (Pan troglodytes schweinfurthii) of the Budongo Forest, Uganda. Primates 42: 135−139.

[33] **White, L., and Edwards, A., (2000).** Conservation research in the African rain forests: a technical handbook. Wildlife Conservation Society, 218 pp.

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

APPENDICES

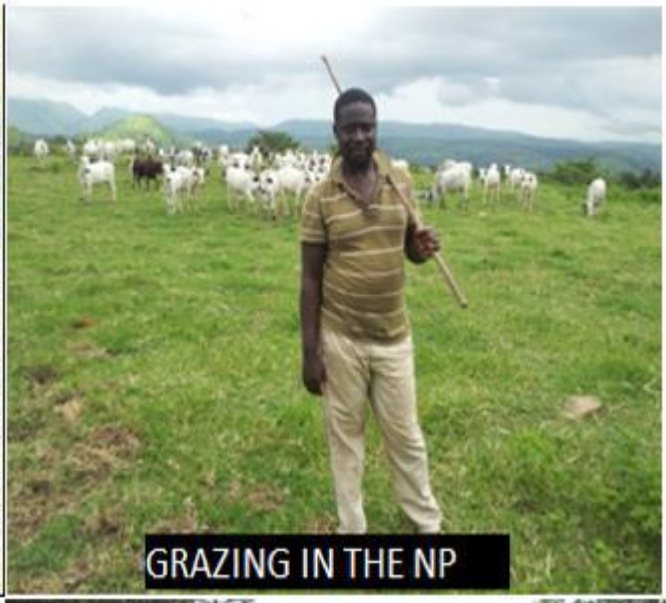
Appendix 11: Field pictures

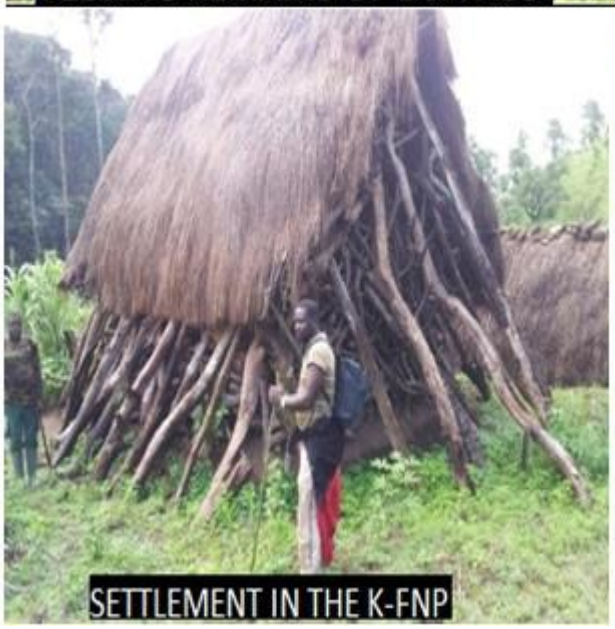
https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

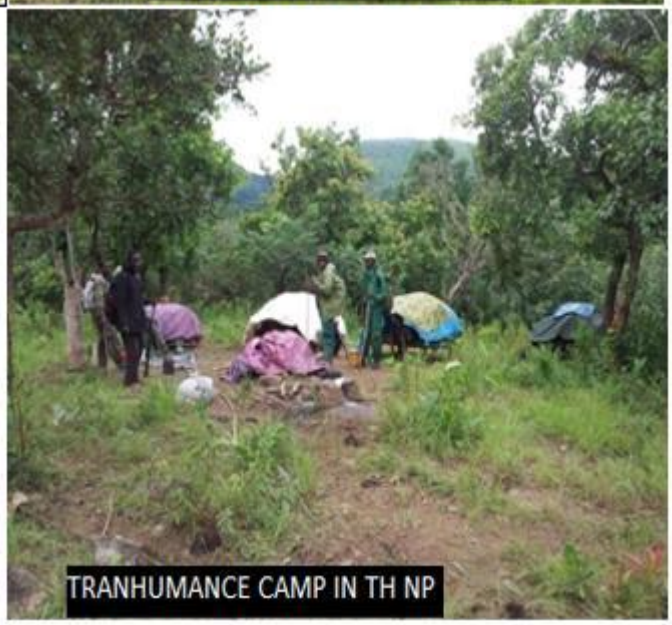
https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*

https://dx.doi.org/10.22161/ijfaf.2.3.2 *ISSN: 2456-8791*


IFEEDING REMAINS OF BUFFALO


GRAZING IN THE NP


SETTLEMENT IN THE K-FNP


TRANHUMANCE CAMP IN TH NP


RESEARCHERS AND A NIGERIAN FAMILY PRACTISING TRANSHUMANCE IN THE NP