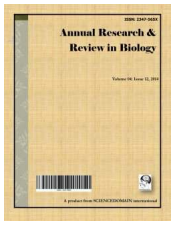

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Contributions of Indigenous Knowledge of Gorilla (*Gorilla gorilla diehi*), Chimpanzee (*Pan troglodytes ellioti*) and Buffalo (*Syncerus caffer*) Conservation, in Waindow, North West Cameroon

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Authors' contributions

This work was carried out in collaboration between both authors. Author TEA designed the study, wrote the protocol and interpreted the data. Author MDC anchored the field study, gathered the initial data and performed preliminary data analysis. While authors TEA and MDC managed the literature searches and produced the initial draft. Both authors read and approved the final manuscript.

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ABSTRACT

Data on the contributions of indigenous knowledge of gorilla (*Gorilla gorilla diehli*), chimpanzee (*Pan troglodytes ellioti*) and buffalo (*Syncerus caffer*) to conservation, in the Black Bush Area of Waindow (BBAW): Menchum south, North West Region of Cameroon, was collected from August to October 2013. The general objective of the research was to establish elicit information on the indigenous knowledge of gorilla, chimpanzee and buffalo which can contribute to their conservation in the study site. Research data were obtained through an interviewer-administered questionnaire survey in five (5) hills of the study site (Attue, Itiaku, Akalieu, Njouhchou and Toukechiachia), purposively selected based on the presence of hunting camps within the hills. Indigenous

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knowledge systems, such as, cultural laws and regulations, gender in hunting wildlife and traditional beliefs / taboos, greatly influences the conservation of these species in the study area. Gorilla, chimpanzee and buffalo meat or body parts were in high demanded for food, medicinal and ritualistic purposes resulting to excessive poaching. Therefore, it is necessary to encourage active community participation, since some of the indigenous knowledge practices placed the remaining species of gorilla, chimpanzee and buffalo under intense threat of disappearing.

Keywords: Forest degradation; community participation; forest management; wildlife conservation.

1. INTRODUCTION

Indigenous knowledge forms part of a holistic world-view, and is inseparable from the indigenous ways of life and their cultural values, spiritual beliefs and customary legal systems [1]. This means that it is vital to sustain not merely the knowledge but the social and physical environment of which it forms an integral part. This is pertinent since the survival of endangered species and ecosystems depends on long-term participation and understanding of local populations [2]. Because of the close relationship between biodiversity and cultural diversity, indigenous knowledge systems often play an important role when developing species conservation and management strategies [3]. For example, the United Nations Convention on Biological Diversity (UNCBD) (article 8j) calls for parties to respect, preserves, and apply knowledge and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity [4].

In Africa, the indigenous practices continue to present a number of challenges. Many African cultures hunt and eat great apes, buffalo and other primates, and hunting remains the greatest threat to species in the wild in many areas [5]. However, some of these species in addition to their food value also play an important role in African tradition [6-9]. For example, the exploitation of some primate species in Africa is largely prohibited because local communities adorned them with ritual meanings, regard them as animal totems, or value them as fetishes or aids to traditional medicine practice [10]. In addition, indigenous knowledge in the form of local taboos that restrict or regulate the exploitation of wildlife is thought to have contributed significantly to preventing the extinction of some wild primates [11]. Unfortunately, present indicators show that these practices are generally on the decline in most parts of Africa [12] due to changes in the belief systems of people with regard to the spread of new influences such as Christianity [5].

Indigenous knowledge is still very prominent in most remote areas, where decisions about exploitation of local natural resources are heavily influenced by traditional authorities. In these areas, traditional institutions are central to the management of common resources, such as wildlife in unprotected communal forests [5]. However, traditional beliefs and practices related to primates and recorded in Cameroon have not always carried a positive potential for the conservation of these species. Even today, those who own bones or skulls of these animals are respected traditionally, and in some cases, are given chieftaincy positions within community social structures areas [5]. Despite the fact that, Cameroon 1994 Law on Forests, Wildlife and Fisheries (Law 94/01) and the supporting decrees on wildlife issued in 1995 prohibits the killing of great apes. *Gorilla gorilla diehli*, which is rarely found in the Waindow areas, classified as Critically Endangered as compare to the commonly seen *Pan troglodytes ellioti* classified as Endangered and *Syncerus caffer* classified as Least Concern on the IUNC Red list [13] are still heavily hunted in the study site. As such, indigenous knowledge is essential for maintaining cultural, biological and social diversity for a better environment [14]. And will only be appropriately valued and protected through integration that brings benefits to both scientists and local people interested in maintaining that diversity [15].

2. MATERIALS AND METHODS

2.1 The Study Area Location

The Black bush area of Waindow is located between latitude 6° N and 7° N and longitude 9° E and 10ºE and is situated in Menchum South of the North West Region of Cameroon. It has an altitude of about 900 m to 2140 m above sea level in the mountains and about 200 m to 600 m in the valleys and a surface area of 97,667 ha. It is situated toward the western boundary of the region which stretches along the international

border between Cameroon and eastern Nigeria. The main rivers that flow through this area are Ivin, Menchum, and Kimbi. All of these join the Kasina-la, which flows into Kasina-la State, Nigeria. Fig. 1 shows the location of the study site in Menchum South, North West Region of Cameroon.

This area constitutes a significant portion of the Bamenda highlands montane forests. It harbours important large mammal species such as Gorilla classified as Critically Endangered, Chimpanzee classified as Endangered and Buffalo classified as Least Concern on the IUCN Red Book data list of threaten species, Olive baboon, Drills, Putty-nosed monkey, White monkey, Mona monkey, Red eared guenon, Bush pig, Bush buck, Duikers, Leopard, Hyena, Hippopotamus which are considered by the Cameroon Wildlife law as critically endangered species [16]. This area is a habitat for a wide variety of birds' species most of which are highly endanger in the IUCN red list of endangered species. Among these birds species a few of them include Banner manna's turaco, pied crow, gray headed sparrow, swallow, collared sunbird, spectacle weaver, owls, hawk, barn owl, osprey, scaly francolin, giant king fisher, and martial eagle [17], which are clear indicators proving the high biodiversity richness of the study area. This area equally contains trees species such as Sapelli, Iroko, Obeche, Pygeum, and Mahogany. Some important plant species such as *Ficus spp* are harvested and used in traditional medicine especially by those who do not have access to modern health facilities. The study site, also provide many non timber products such as very rich honey, djansang, fire wood, charcoal and other which are of great benefit to the local community [17].

2.2 Data Collection and Analysis

The collection of data for this study, was obtained through an interviewer-administered questionnaire survey conducted from August to October – 2013. The main aim of this study was to establish elicit information on indigenous knowledge of gorilla, chimpanzee and buffalo which could contribute to their conservation around the study site. Interviews were carried

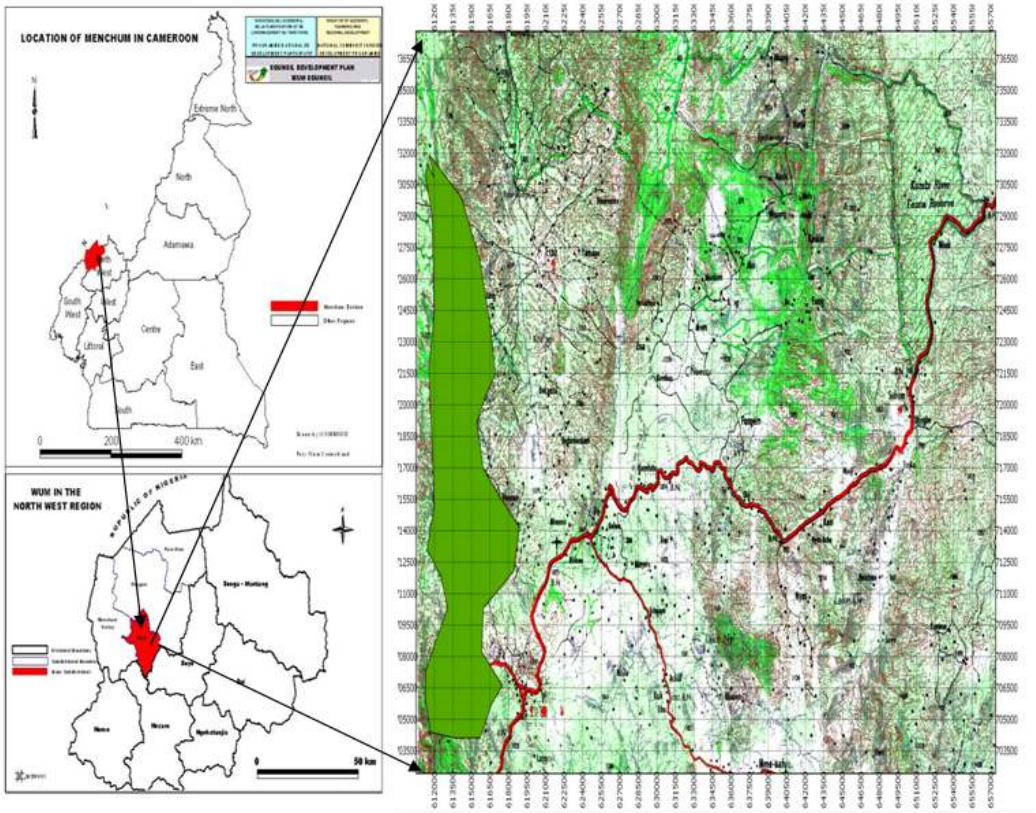

Fig. 1. Map of Cameroon showing location of the study site [17]

out in five hills of the Waindow village (Attue, Itiaku, Akalieu, Njouhchou and Toukechiachia). Purposively selected based on the presence of hunting camps within the hills and the high levels of dependence by the hunters for livelihood. To facilitate data collection, interviews were done with the help of two research assistants employed and trained to assist in data collection, a translator chosen by the chief who could speak or understand the local dialects and a local hunter to lead the group around the sample areas. During the survey proper, thirty (30) individuals (of which 20 were hunters, 5 were farmers and 5 were grazers) out of the filthy (50) individuals who attempted the interview, completely responded to the interviewer-administered questionnaire. During field work, interviews were conducted in all the huts encountered within these hills with the probability of seeing at least an individual in a hut. In cases were more than one person was found in a hut, the oldest person was interviewed and any other contribution from others were considered the same for that interview. Informants were interviewed in the field in line with questions related to the presence of gorillas, chimpanzees, and buffalos. Questions were especially asked to investigate traditional beliefs associated with them and people's attitudes toward these species. At the beginning of each interview, informants were briefed on the subject and objectives of the research. Interviews were conducted in Pidgin English (a language similar to English and used in English-speaking regions of Cameroon). A field guide to large mammals of Africa containing different large mammal's species was used to facilitate the identification of these species within the study site. Field data analysis began by decoding data sheets and information obtained from interviewer-administered questionnaire survey, were entered into Microsoft excels and analyzed in line with the objective. Results were presented in the form of tables and graphs, frequencies, and percentages.

3. RESULTS

3.1 Demography

From a total of 30 interviews, all the participants encountered in the study site (100%) were male. Women hardly hunt in this area couples with the fact that, the distance from the village to these hills are very far. Majority of the respondents (40%) were between the age group 46-55+ years and the remainder between the ages of 36-45 years (37%) and 25-35 years (23%). Up to (67%) of the respondents had attended primary school, (20%) attended secondary school and 13% never attended formal education. The major lively hold of respondents was hunting and farming (63%), the remainder, grazing (17%) and "artisan" (20%), referring to activities such as carving of drums, log exploiter, building and others but of which hunting and farming were part of it. The above result shows that the, sampled population is dominated by people of the old age group (46-55+ years) and the middle age group (36-45 years). This is evident of the fact that many young people who are often engaged in a lot of other activities, found it difficult to travel far distances spending many days in the forest. The old age group (46-55+ years) and the middle age group (36-45 years) undertake illegal activities like poaching in this area as reported by one of the respondents, to acquire traditional titles, for rituals and for medicinal purposes.

3.2 Indigenous Perception toward Traditions Relating to Gorilla, Chimpanzee and Buffalo

A section of the questionnaires was designed to bring out the perception of the interviewees toward tradition relating to gorilla, chimpanzee and buffalo and if they are considered sacred in their different villages. The Figs. 2 and 3 show the percentage distributions of respondents to tradition and sacred relating to these species during interview survey.

From Fig. 2, a good number (73.33%) of respondents were aware of local traditions relating to these species and (26.67%) reported there were no local traditions relating to these large mammals. This result is similar to those reported by [10] in which (75%) responded that local traditions exist. Of the twenty two interviewees who responded positively, some said that, at first, gorilla, chimpanzee, buffalo and Leopard were own by the chiefs and no one was allow to hunt them except if authorize by the chief.

From Fig. 3, only few (26.67%) respondents were aware of sacred relating to this species. while (73.33%) respondents were unaware of sacred relating this species. For the interviewees who reported yes were old people above 50 years with the saying that previously gorillas and chimpanzees were considered sacred and no one was permitted to look at them

directly at the face not to talk of killing them. If anyone hunted them, they became seriously ill or die if not purified by the gods. One of the respondents concluded that these taboos were highly respected in the days of old by everybody but now it is limited only to those families who ancestors were servants of the gods.

3.3 Indigenous Awareness about Hunting of Gorilla, Chimpanzee and Buffalo in the Study Site

Questions were also designed to investigate local perception on whether gorilla, chimpanzee and buffalo were still hunted in the study area. From the result, 13% (n=4) responding for gorilla said yes, 77% (n=23) reporting for chimpanzee said yes and 97 (n=29) accepted that buffalo are still being hunted. Equally respondents were interviewed of the last time any of these species were shot around the study site. Reporting for gorilla, only two persons reported that it was in 1990 and the other reported 2008 in Mbonghozam and Njouhchou respectively. But none of them said anything about the age and the sex of the gorilla. Answering on the same question, 57% (n=17) reporting for chimpanzee and 87% (n=26) reporting for buffalo, were able to remember the last time that each of this species was shot by a hunter in their village. The Tables 1 and 2 shows the local reports on the last time a chimpanzee and buffalo was shot by a hunter in each village.

According to this information and bearing in mind that respondents could be providing information on the same incident, 22 chimpanzees were killed within a period of eleven years (2003-2013) with at least four adults, one adolescent and one infant chimpanzee killed in 2013. This number could be higher than 22 if the question was rather the number of chimpanzee kill per year and could be lesser than 22 if respondents were not reporting on the same incident. For instance the high number of chimpanzees killed in 2013. This result greatly contrast those of [10] for preliminary apes survey in the Fungom and Furuwa area were sixteen animals killed from 1980 to 2004 with at least two adults and one infant chimpanzee killed in 2004.

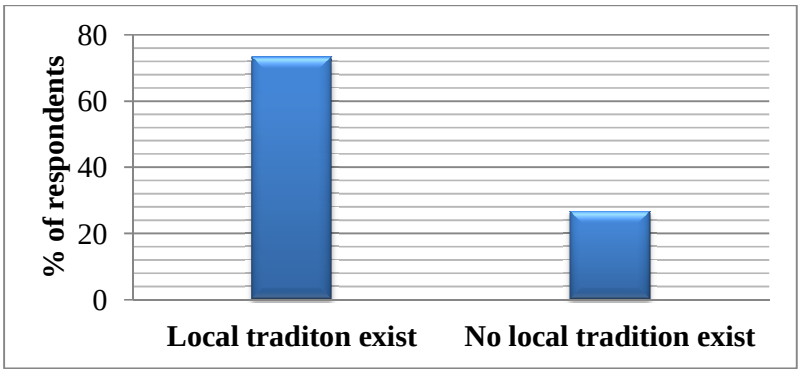

Fig. 2. Percentage distributions of respondents to tradition relating to large mammals species in the study site

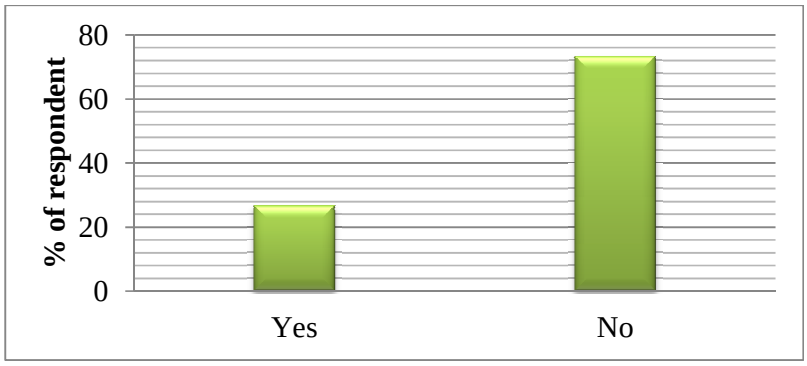

Fig. 3. Interviewees response to sacred relating large mammals in the study site

Table 1. Local reports on the last time a chimpanzee was shot by a hunter in each village

Location	Year										
Local hill name	**2013**	**2012**	**2011**	**2010**	**2009**	**2008**	**2007**	**2006**	**2005**	**2004**	**2003**
Njouchou	A♀ & inf	/	/	/	/	/	A	/	/	/	A
Kechiachia	/	/	/	/	A♂	/	/	/	/	/	/
Touhkechiachia	/	/	/	/	/	Adol♂	/	/	/	/	/
Mbonghozam	/	/	/	A♂	/	/	/	/	/	/	/
Akaliu	A♀	/	/	/	/		/	/	/	/	/
Akanie	/	/	/	/	/	/	/	A♂	/	/	/
Afouhjoujouh	/	/	/	/	/	/	/	A♂	/	/	/
Abouh	/	/	/	/	/	/	/	/	A♂	/	/
Itiaku	/	A♂ & A♀	/	/	/	/	/	/	/	A♂	/
Ntuela nyobi	/	/	(2)A♂ &A♀	/	/	/	/	/	/	/	/
Ikong	/	/	/	A♀	/	/	/	/	/	/	/
Ijouh	A♂& Adol A♀	/	/	/	/	/	/	/	/	/	/
Mbahmbah	/	/	/	A♂	/	/	/		/	/	/
Feibou	/	/	/	/	/	/	/	/	/	/	A♂

Legend: A = Adult; Adol = Adolescent; inf = infant; ♂ = male; ♀ = female; p = pregnant; / = no incident; Numbers in parenthesis "(n)"are the number or reports received

Table 2. Local reports on the last time a buffalo was shot by a hunter in each village or area

Location	Year						
Local hill name	**2013**	**2012**	**2011**	**2010**	**2007**	**2005**	**2004**
Njouchou	A♀p, A♀, (2)A♂ A	A♀	/	/	/	/	/
Kechiachia	/	/	/	/	A	/	/
Touhkechiachia	A♀	/	/	/	/	/	/
Mbonghozam	/	/	/	A♀p,	/	/	/
Akaliu	/	/	Adol A♀	/	/	/	/
Akanie	A♀	/	/	/	/	/	/
Afouhjoujouh	/	A♀	/	/	/	(2)A♂	/
Itiaku	(3)A♂ A		A♂	/	/	/	/
Ntuela nyobi	/	/	/	/	/		A♀
Ikakie	(2)A♂	/	/	/	/	/	/
Ichuent	/	/	/	/	/	/	A♂
Kenyang	/	A♀	/	/	/	/	/
Mbahmbah	/	/	/	A	/	/	/
Feibou	A♂	/	/	/	/	/	/

Legend: Adult; Adol = Adolescent; inf = infant; ♂ = male; ♀ = female; p = pregnant; / = no incident; Numbers in parenthesis "(n)"are the number or reports received

From the information above 29 buffalos were killed within a period of ten years (2004-2013) with at least thirteen adults, and one pregnant female reported killed in 2013. The high number of buffalo killed in 2013, could be due to the fact that informants may have been reporting on the same incidence. This number could be higher than 29 if the question was rather the number of buffalos kill per year and could be lesser than 29 if respondents were not reporting on the same incident.

3.4 Indigenous Role of Gorilla, Chimpanzee and Buffalo Meat or Body Parts

In order to understand the cultural practices relating to gorilla, chimpanzee and buffalo meat or other body parts, questions were designed to bring out the traditional value of these animals. Interviewees were questioned of what happened to the meat or body part of a gorilla, chimpanzee and buffalo when shot or trapped. The Figs. 4, 5, and 6 shows the percentage distribution of interviewees for the indigenous roles of gorilla, chimpanzee and buffalo meat or body part in the study area.

From Fig. 4, in the case of gorilla 7% (n=2) reported that their body parts was used for ritual, and 7% (n=2) said it is use for medicinal purposes. When ask if people do keep body parts of gorillas 13% (n=4) accepted yes. This result contrast those of (5) in which thirty-six percent of (36%) respondents said gorilla body parts have medicinal value.

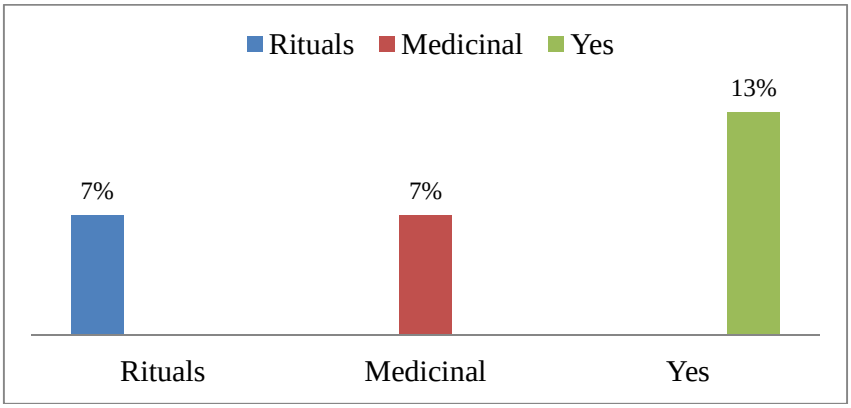

Fig. 4. Percentage distribution of interviewees for the traditional role of gorilla meat

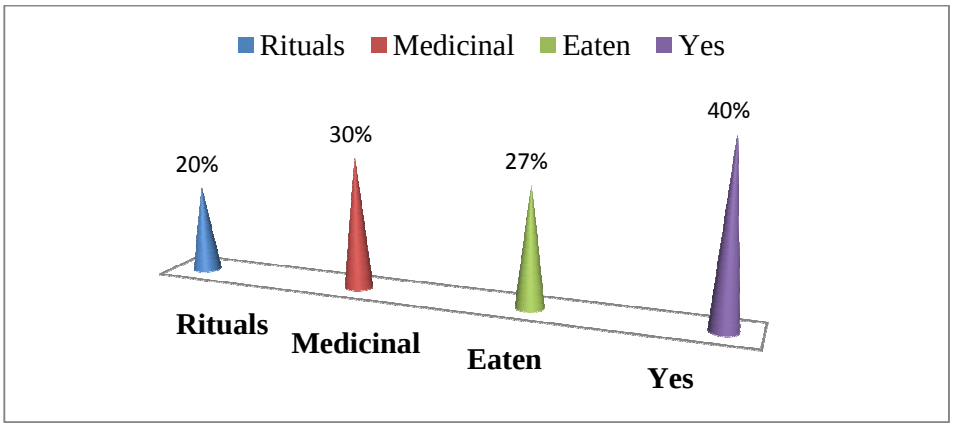

Fig. 5. Percentage distribution of interviewees for the traditional role of chimpanzee meat and body part

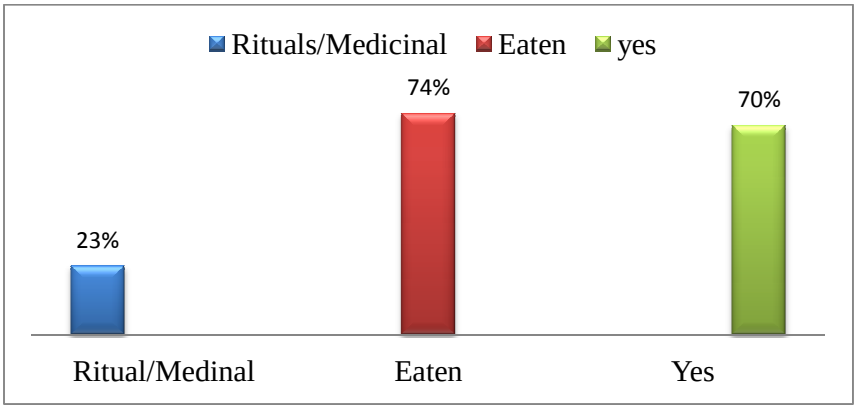

Fig. 6. Percentage distribution of interviewees for the traditional role of buffalo meat and body part

From the Fig. 5, interviewing individuals of what happens to the meat of chimpanzee when shot or trapped, 20% (n=6) reported that it was used for ritual, and 30% (n=9) said it was use for medicinal purposes and 27 %(n=8) simply said it is eaten. When ask if people do keep body parts of chimpanzee 40% (n=12) accepted yes. Chimpanzee meat and body part were reported

to be highly eaten and used for medicinal purposes. Equally hinds, skins and skull were reported to be used by native's doctors during incantation. During questionnaire survey the skull and bone of chimpanzee were seen in some native doctor's huts.

From Fig. 6, answering the question of what happens to buffalo meat, 23% (n=7) reported that it was used for ritual and for medicinal purposes and 74% (n=22) simply said it was eaten. When ask if people do keep body parts of buffalo 70% (n=21) said yes. Buffalo meat and body part were reported to be highly consumed, used for medicinal purposes and in traditional ceremonies, such as the "Ukwang" dance common in Esu. Many buffalo skulls, skin, and other body parts were seen during survey interview in many homes.

4. DISCUSSION

Indigenous knowledge is a powerful factor that greatly influences the conservation of gorilla, chimpanzee, and buffalo species around the study area. This study indicates on one hand, indigenous knowledge that previously prohibited the killing of gorilla, chimpanzee and buffalo species. And on the other hand, lack of interest and support to such knowledge, are now rapidly being abandoned by the elite in the region due to high cultural attachment, bad traditional beliefs and poverty in preference for supposedly modern but unsustainable practices. *Gorilla gorilla diehli*, which is rarely found in the Waindow areas, classify as critically endangered by the International Union for Conservation of Nature [13] as compare to the commonly seen *Pan troglodytes ellioti and Syncerus caffer* classify by IUCN as endangered species [13]. And the fact that, they are largely protected at the national level as article 78 [2] of the law forbids the hunting and capture of totally protected species are under serious threat. The surviving populations located in this non protected area are continuously being hunted for their meat and body parts. Their conservation and survival ultimately depend on the local communities living adjacent to them [18]. Therefore, where the conservation of endangered animals urgently needs the support of local communities, indigenous knowledge of wildlife is crucial [19]. And until these belief systems completely disappear, integrating them into conservation strategies is vital to the day-to-day survival of the species they protect [5].

Indigenous knowledge is still very prominent in most remote areas, where decisions about exploitation of local natural resources are heavily influenced by traditional authorities. In these areas, traditional institutions are central to the management of common resources, such as wildlife in non protected areas [5]. The presence of traditional sacred prohibiting or limiting the exploitation of wildlife species are vital tools for local conservation. Indigenous people in the study area, previously held tradition relating to gorilla, chimpanzee and buffalo species, as were considered to be owned by the chiefs and no one was allow to hunt them except if authorize by the chief. In case were anyone hunted them without being authorized, most hand it over to the chiefs with prove that their actions were not intentional. If proven guilty, he and his house hold were banished out of the village under the claim that he has attempted to kill the chief. Two of the interviewees equally sighted that some large mammal species especially gorilla and buffalo are traditionally related to particular families and no other family or individual who has not been initiated in it can hunt them. For example as one of them added that in such family (in the case of buffalo in Eshimbi), once a male child is born, he is immediately initiated on the day of his circumcision in which a male buffalo is killed for the ritual ceremony. As belief by the members of these families, these ceremonies are traditionally vital since it is aim to fill the child with spiritual power, strength and intelligence to defend and guide the hidden sacred relating to this animal. Defaulters received automatic spiritual sanctions, through illness or may even die if the "god" does not approve their cleansing.

Previously, gorillas and chimpanzees were considered sacred and no one was permitted to look at them directly at the face not to talk of killing them. They hold the belief that these animals were their ancestors who have died long ago and do appear in this form and anyone who see them have seen a ghost. One of the interviewees added that this was just a shallow meaning of it to those who could not understand the secret sayings of the gods. The real meaning, as he continues was to prohibit the hunting of these animals to maintain their traditional values as they were caught in secret and sacrifice to their gods for the cleansing of the village sins and for the protection of the village. One of the respondent said Patas monkeys were considered sacred if they are under the influence of the gods, they can be made to excrete a good quantity of red ants which bites are very painful.

They could be made to appear and disappears behind hills, all with the aim of frightening and attacking human enemies. Gueresa monkeys were equally reported sacred because they are used in many ritual manifestations. Their black–white coloration is a symbol of certain traditional sects (for instance "Nkoh dance and other jujus"). If anyone hunt them he was automatically initiated into the sect and could become seriously ill or die if not purified. One of the respondents concluded that these taboos were highly respected in the days of old by everybody but now it is limited only to those families who ancestors were servants of the gods. Unless the indigenous people are actively introduced to and sensitized about modern-day conservation needs and benefits as a replacement, the survival of the remaining species in the study site is at risk.

In every biodiversity hot spot, there is a high desire for poaching for meat and body parts by the local population either for ritual or festival or medicinal purposes or for other traditional practices. In the absence of modern medical facilities, a considerable number of people living in the rural area rely on traditional medicines [5]. In addition, many diseases are perceived to be caused by loss of ancestral protection and can only be cured by traditional medicine [5]. Traditional and religious beliefs that encourage the killing of gorilla, chimpanzee and other large mammal's species are detrimental to the health of any ecosystem. In such places, the conservation of endangered animals urgently needs the support of local communities, and the indigenous knowledge of wildlife [19]. For instance, interviewees reported that due to the absence of inter-tribal wars and the fear of sacrificing human beings for the "Red Feather Cap Title" as it was the case long ago, people now sacrifices gorillas and chimpanzees if it is hunted half death to obtained traditional titles especially the "Red Feather Cap Title" due to their human like resemblance. More specifically, the traditional role of gorilla's meat, informants indicated that at first, the meat was considered secret. If hunted the carcass was given to the chief and the meat was eaten only by the chief and his elites in a sacred place as it was called "forbidden meat". He ended by saying that this tradition is out of place, today, the meat is either sold to native doctor or eaten by the hunter's family or relatives. One of them said the bones of gorillas were used as traditional medicine to bring fast walking ability to human children. Another equally added that the fur, nails, and bones when burnt and mixed with other concussions are used to treat poison and stomach infections in human. One of them reported that back bones when worm on fire is used to treat waist pain. Skulls were reported to be used by fortune tellers as mediums for the consultation of their gods. Lastly one of them said the skin were used as totems symbols (i.e., place on chief stool, sacred hut, palace walls and other), signifying the strength of the chief, power transition and protection over the thrown.

For those reporting on chimpanzee, one of the respondents reported that the heart and livers of a killed chimpanzee were divided into four equal parts and were secretly offer to the village god as a symbol of thanksgiving during seasons of good harvest. Another person reported that, in cases were a pregnant chimpanzee was hunted, the placental is removed, mixed with other concussions, cooked and the liquor were used to treat infertility in barren women and to reinforce fertility rate in young girls. Chimpanzee bones were reported to treat humans with bone injuries (fractures and breaks). Other reported that skin with fur, and bones, when mixed with camp wood and other concussions, were used to treat children with weak walking ability. Equally hinds, skins and skull were reported to be used by native's doctors during incantation. During questionnaire survey the skull and bone of chimpanzee were seen in some native doctor's huts.

Reporting on buffalo, one of the informant said buffalo meat are highly appreciated in traditional ceremonies, such as the "Ukwang" dance common in Esu, in which the brain, heart and liver are eaten by the native doctor and the rest of the meat is eaten by initiates. Equally, buffalo skins were considered as important meal by some families in Eshimbi during male child circumcision ceremonies as a symbol of fortification of the male child. Some of the respondents reported that the upper part of the head which carries the horns, are used during traditional dance ceremonies called "Ukwang" by many natives' doctors as routes between the gods and the people. The skull as one of them added is also used to detect the pass, predict the future and remove charms buried by witches and wizards and to treat certain spiritual diseases. Another respondent said the hoofs, fur, horns, hearts; bile and bladders when mixed with other concussion were used to produce charms. These charms were given to local soldier in the ancient time during times of war to fill them with courage, strength and the ability to fight tirelessly. To

empower them with spiritual power which enable them transform into human buffalo to defend themselves or flee away when battle became too difficult. Many buffalo skulls, skin, and other body parts were seen in many homes.

In raising awareness about the need to conserve gorillas, chimpanzee and buffalo in the study area is vital. Conservationists have emphasized that the survival of large mammals located outside protected areas will ultimately depend on the local communities living adjacent to these mammals [18]. In such places where the conservation of endangered animals urgently needs the support of local communities, indigenous knowledge of wildlife is crucial [19], and until these belief systems completely disappear, integrating them into conservation strategies is vital to day-to-day survival of the protected species [5].

5. CONCLUSION

The contributions of indigenous knowledge of gorilla (*Gorilla gorilla diehli*), chimpanzee (*Pan troglodytes ellioti*) and buffalo (*Syncerus caffer*) in the study area, have a potential for ensuring the sustainable conservation of these species and other large mammals species in the region. However, interest and support of such indigenous knowledge is fast eroding as the indigenous cultural laws and regulations that formally prohibited the killing of gorilla, chimpanzee and buffalo are rapidly being abandoned by the elite in the region due to high cultural attachment, bad traditional beliefs and poverty in preference for supposedly modern but unsustainable practices. There exist high demand for gorilla, chimpanzee and buffalo body parts and meat as a result of bad indigenous practices for rituals, festival and medicinal purposes and encroachment of Nigerians hunters and traders who comes in with powerful hunting tools. This have led to uncontrolled poaching, as 2 gorillas, 22 chimpanzees and 29 buffalos were reported to have been killed within the period of 1999-2008, 2003-2013, and 2004-2013 respectively. From these points of view, one could deduce that the pressures exacerbated on these animals due to over hunting and bad indigenous practices placed the remaining gorilla, chimpanzees, buffalos and other large mammal populations under intense threat of disappearing. Thus, the loss of indigenous knowledge concerning wildlife in this area is imminent. This could have negative consequences for gorilla, chimpanzee and buffalo conservation couples with the fact that law enforcement is nearly absent and cultural laws and regulations are becoming less practicable. It is therefore necessary to create greater awareness by sensitizing the indigenous people on the importance to respect and protect these species within the study site. Friendship collaboration between indigenous institutions for example village councils, responsible for regulating and enforcing indigenous role and conservationist managers should be a core priority to target the conservation of gorillas, chimpanzees and buffalos species in study site.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX

Field Pictures


Buffalo Dung


Chimpanzee Nests


Trophy of Buffalos

Trophy of Defassa Waterbuck

Killed Bush Buck ready for market

Interview with hunter's of Touhkechiachia

Photo with hunter's of Njouhchouh

The side view of the hills of Njouhchouh

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