

Section: Biotechnology

Assessment of Wildlife Species Mostly Involved in Human-Wildlife Conflict around Yankari Game Reserve, Bauchi State, Nigeria

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Abstract:

The present study assessed the species of wildlife mostly incriminated in human-wildlife conflicts around Yankari Game Reserve (Bauchi State, Nigeria). Three districts of Alkaleri Local Government Area were selected for the study viz; Duguri, Fali and Gwana districts. A total of 113 respondents comprising of 44 staff of Yankari Game Reserve and 69 local community members formed part of the study's sample size selected through Systematic Random and Purposive sampling techniques. The study made use of the Descriptive Survey method involving mixed methods using self-made open ended questionnaire with multiple choice questions as well as Structured Interview Guide. Demographic characteristics of the local people indicated that the majority of them lack the basic formal western education and were mainly farmers. Study findings showed that 8 different species of wildlife were mainly involved in human-wildlife conflict along the Game Reserve. These were: Buffalo, Tantalus monkey, Patas monkey, Roan antelope, Western hartebeest, Bush buck, Waterbuck and African elephant. However, the number of these species of wildlife was also found to be declining fast in the area mainly due to anthropogenic factors such as reprisal attacks on the animals by the local communities in vengeance of damages caused by the animals. Thus, if unwanted contacts between the wildlife and the surrounding communities are not checked, human-wildlife conflict in the area will continue to escalate and many of these animals can be killed. Some are already on the endangered species list. Hence, strict measures should be adopted with the aim of minimizing the rate of encroachment of the wildlife into surrounding communities in order to stop human-wildlife conflict in the area.

Key Words: Species of Wildlife, Human-Wildlife Conflict, Yankari Game Reserve, Bauchi.

Introduction:

World Conservation Union (IUCN) defined human wildlife conflict as an occurrence when wildlife requirements encroach on those of human population with costs to both residents and wild animals (IUCN, 2005). According to Decker et al., (2000) human wildlife conflict is defined as the interaction between humans and wildlife where negative consequences, whether perceived or real, exist for one or both parties. According to the United States Geological Survey (2007), human wildlife conflict is defined in two contexts: firstly, in the perspective of how wildlife conflicts with human goals, i.e., life, livelihood and life-style; and, secondly, in the context of how human activities threaten the safety and survival of wildlife. Increase in human population especially around protected areas encourages direct competition for natural resources by both human and wildlife. Competition for land resources between human and wildlife had resulted to human-wildlife conflict between wildlife manager and people living around protected areas (Hill, 1999 sighted in Ogunjobi and Adeola, 2016). However, in both cases, outcomes are decided by human responses to the interaction (Cline et al., 2007). With respect to the causes of this conflict, Suleiman (2014) stated that, there are many causes of human wildlife conflicts in Africa; the major areas are encroachment into the forests, development projects, livestock grazing, human population expansion, effect of climate change as well as damage to properties.

A set of global trends relating to human populations, habitat evolution and animal distribution and behaviour has contributed to the escalation of human-wildlife conflict worldwide (F. Lamarque, 2009). These can be grouped into human population growth, land use transformation, species habitat loss, degradation and fragmentation, growing interest in ecotourism and increasing access to natural reserve, increasing livestock population and competitive exclusion of wild herbivores, abundance and distribution of wild prey,

increasing wildlife population as a result of conservation programmes, climatic factors as well as stochastic events. Particularly in Africa, the major causes of human-wildlife conflicts are diverse and have strong links to resources use. Some of these causes according to F. Lamarque (2009) include migration of peoples for reasons of security or food safety. Drought, floods, civil unrest, natural disasters or war disrupt the normal production and distribution of food, resulting in famines. This phenomenon is on the increase; the number of food emergencies in Africa each year has almost tripled since the 1980s. These factors spur the continuing migration of rural people into areas where resources could be obtained, and which are frequently occupied by wildlife. The resultant occupation of the habitat of wild animals by humans leads to conflict.

Another possible cause is the attitudes and perceptions of the people. In general rural Africans have little sympathy for wildlife and see animals purely in terms of their meat value. This is illustrated by the fact that, in several Bantu idioms, the word nyama used for wildlife also means "meat". Rural communities consider wildlife, particularly large mammals, as threats to their safety and food security. Specific activities such as Growing interest in ecotourism and the increasing presence of humans in protected areas are exacerbating conflict between humans and wildlife. Besides, habitat factors can also be a cause of human-wildlife conflicts as well. The gradual loss of habitat has led to increasing conflict between humans and wildlife. As wildlife range becomes more and more fragmented and wildlife is confined into smaller pockets of suitable habitat, humans and wildlife are increasingly coming into contact and in conflict with each other. In the Kakum Conservation Area in Ghana, the forest area available to elephants has decreased by about half since the 1970s. This explains why the density of elephants (about 0.6/km²) is now higher than in most other West African forests, thereby resulting

in increased crop-raiding activities (Barnes et al., 2003).

Natural factors such as droughts, bush fires, climatic changes and other unpredictable natural hazards can contribute to a decrease in suitable wildlife habitat and therefore affect the occurrence and extent of human-wildlife conflicts. Similarly, the seasonal modification of habitats due to rainfall can also have an impact on human-wildlife conflict. So also, natural characteristics of wildlife do also contribute to occurrence of human-wildlife conflicts in Africa. The intrinsic characteristics of wildlife, such as food preferences, migration patterns, wariness or predation behaviour can influence human-wildlife conflict. Some particularly palatable food items can attract wildlife over rather long distances. For example, In Benin, elephants raiding maize and groundnuts were found to be attracted by mature wild fruits such as shea nuts (*Vitellaria paradoxa*) and *Parkia biglobosa* pods growing in the crop fields (Kidjo, 1992; Mama, 2000). Likewise elephants are attracted by wild fruits growing alongside cultivated fruits such as mangoes (*Mangifera* sp.) or guavas (*Psidium* sp.)

Similarly, another major source of conflict between wildlife and farmers in Nigeria and the world at large is crop raiding (Distefano, 2010). Crop raiding by wildlife is neither a new phenomenon nor a rare one. Until recently, there has been little attention given to vertebrate species that damage crop with exception of elephants and rodents (Damiba and Ables, 1993). In communities with little subsistence economy even small losses can be of economic importance and can generate negative attitudes toward wildlife and conservation in general (Oil et al., 1994). According to Ojo et al., (2010), crop raiding by wild animals is one of the major causes of human wildlife conflict which involve wildlife moving from their natural habitat on to agricultural land to feed on the produce that humans grow for their consumption.

Conflict between wildlife and people, particularly those that share the immediate boundaries with protected areas, are common phenomenon all over

the world (Shemweta and Kidegesho, 2000). Human-wildlife conflict situations often have long histories of competition between man and wildlife from time immemorial in various parts of the world (Hill et al., 2002). In zones surrounding National Parks and protected areas, borders between “human” and “wild” space have become blurred. Wild animals frequently leave protected areas and enter nearby human settlements the resulting human-wildlife conflict (HWC) e.g. Crop damage, livestock predation, property damage, and attack of human often undermine local support for conservation. Such lack of support is evidenced by damage inflicted upon wildlife by humans; including habitat degradation or “retaliation” killing in which waterholes, crops, or baited carcasses are deliberately poisoned (Bagchi and Mishra, 2006; Sifuna, 2005).

Conflict between wildlife and humans is a major conservation problem which conservation organizations all over the world are faced with (WSC, 2010) Human wildlife conflict is one of the major threats to conservation in Africa. It occurs in different setting such as increasing land scarcity, hunting prohibition and wildlife induced damage to property and they constitute factors that may create local hostility toward wildlife and protected areas (Dublin, 1995).

Human-wildlife conflict, particularly human-carnivore conflict is a growing problem in today’s crowded world, and can have significant impacts on both human and wildlife populations. For instance, species most exposed to extinction because of injury and death caused by human are either accidental (such as road traffic and railway accident, capture in snares set for other species or from falling into farm wells) or intentional (such as those caused by retaliatory shooting, poison or capture) (Ogada et al., 2003). Such human-induced mortality affects not only the population viability of some of the most endangered species, but also has broader environmental impacts on ecosystem equilibrium and biodiversity preservation (Ogada et al., 2003). Human-wildlife conflict undermines

human welfare, health and safety, and has economic and social costs. Most often, nuisance from encounters with small animals, exposure to zoonotic diseases, physical injury or even death caused by predator attacks have high financial cost for individuals and societies in the form of medical treatment to cure and prevent infections transmitted. Humans can be economically affected through destruction and damage to property and infrastructure (e.g. agricultural crops, orchards, grain stores, water installation, fencing and pipes), livestock depredation, transmission of domestic animal diseases, such as foot and mouth. Negative social impacts include missed school and work, additional labor costs, loss of sleep, fear, restriction of travel or loss of pets (Hoare, 1992).

According to a report by the Daily Trust (2015), the indiscriminate wildlife activities in and around the Game Reserve coupled with the dwindling natural resources perhaps due to climate change and some other anthropogenic, communities surrounding the Yankari Game Reserve are affected as the animals invade farms and raid crops during rainy seasons. Conflict between elephants and nearby communities as a result of crop damage has negatively affected people's socioeconomic lives as well as the communities' support for the Game Reserve and encouraged the locals to aid poachers from outside the region. As a result, the numbers of wildlife in the reserve have declined seriously due to lack of care and protection (Daily Trust, 2015). In spite of efforts by the government and the authorities of the Game Reserve to curtail the situation, these problems still persist; therefore the need to conduct researches to study the situation.

Materials and Methods:

The study was conducted between the months of February – April, 2018 to assess the species of wildlife mostly incriminated in human – wildlife conflicts around Yankari Game Reserve in Bauchi state, Nigeria. Three districts of Alkaleri Local Government Area were selected for the study viz; Duguri, Fali and Gwana districts. A total of 113 respondents comprising of 44 staff of Yankari

Game Reserve and 69 local community members formed part of the study's sample size selected through Systematic Random and Purposive sampling techniques. The study made use of the Descriptive Survey method involving both qualitative and quantitative approaches using self-made open ended questionnaire with multiple choice questions as well as Key Informant Interview while data was analyzed in SPSS Version 20 using Descriptive Statistics.

Study Area:

The Yankari Game Reserve (YGR) covers an area of 2244 square km and is situated in the Duguri, Gwana and Pali Districts of the Alkaleri Local Government Area in Bauchi state, Nigeria. By virtue of the landscape, which is open woodland rising from 215-369 metres above sea level, it offers a beautiful environment for visitors to see wildlife in its natural habitat undisturbed by excessive human activities. Yankari is a region of rolling hills, mostly between 200 m and 400 m with Kariyo hill having the highest point of 640 m (Bryant et al., 1997). Two major habitat types namely dry Savannah Woodlands and Riparian vegetation occur which includes areas of Fadama (Floodplains). Annual rainfall in the reserve is between 900 mm and 1,000 mm and rainy season is from May to September.

The Yankari Game Reserve (YGR) is located some 113 km south east of Bauchi town, and about 40 km from the River Gongola at Dindima bridge off the Gombe-Bauchi road. The whole reserve is situated on sedimentary rocks from which five springs - Wikki, Mawulgo, Tungan Maliki, Gwang and Dimil emerge. The Reserve's tourist centre (Wikki camp) is situated 71 km from Dindima, along Bauchi-Gombe road with its main entrance at Mainamaji village, 29 Km from Dindima. The Wikki Warm Spring after which the only and most important camp is named, is about 13.0 metres wide and 1.9 metres deep. It is used for sunbathing and canoeing. The temperature of the spring water remains relatively constant during both day and night at about 31.1°C (Olekusisi, 1990). The temperature is

constant all the year round which makes it the most fascinating sites of the reserve. Mean temperature ranges between 18 - 35°C (Abdullahi et al., 2007).The Tungan Maliki is the only cold spring while the others are warm. The Gwang is the largest, followed by Dimil, while the smallest is the Mawulgo. However, only Wikki has been developed, and used for recreation (Olekusisi, 1990). It is home to several natural warm water

springs as well as a wide variety of flora and fauna. It lies in the southern part of Sudan savannah zone of the country at latitude 9° 50' N'' and longitude 10° 30' E. The Reserve was designated in 1956 and opened to public in 1962 and has become one of the most popular eco-destinations in West Africa. The Park is bisected by Gaji River but that is not the only source of water in the reserve.

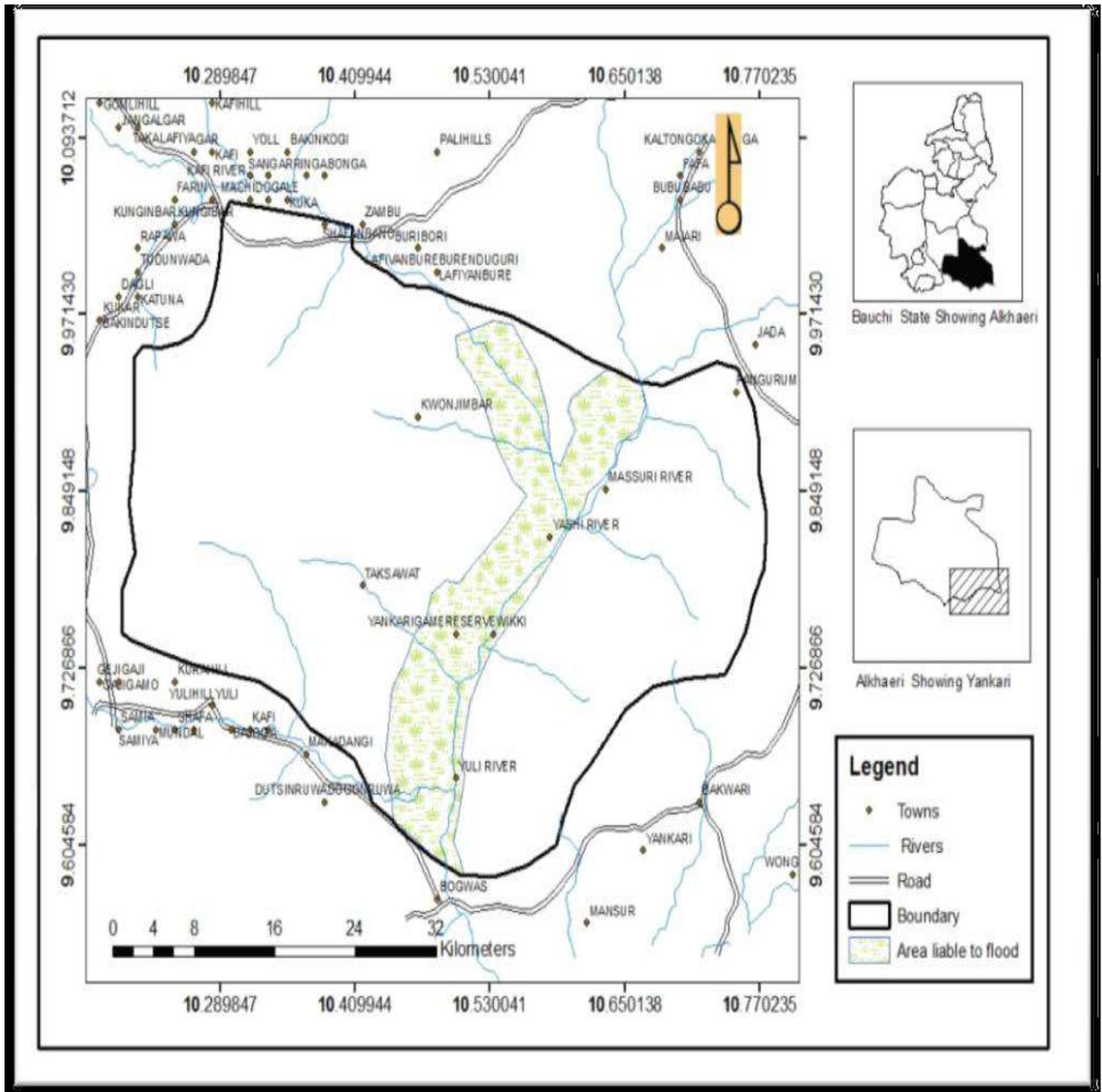


Fig 1: Map of Yankari Game Reserve in Bauchi state, Nigeria.

Results:

Table 1: Demographic characteristics of respondents from the host communities

Variable	Frequency	Percentage
Gender		
Male	51	73.9
Female	18	26.1
Age		
≤ 20 years	5	7.2
21- 30 years	21	30.4
31 – 40 years	23	33.3
41 – 50 years	16	23.2
Above 50 years	4	5.8
Tribe		
Hausa	21	30.4
Fulani	19	27.5
Others	29	42.0
State of origin		
Bauchi	29	42.0
Gombe	13	18.8
Yobe	2	2.9
Adamawa	8	11.6
Borno	0	0
Taraba	13	18.8
Others	4	5.8
Educational Qualification		
Primary	12	17.4
Secondary	15	21.7
Tertiary	3	4.3
Others	39	56.5
Occupation		
Civil Service	8	11.6
Crop farming	18	26.1
Livestock farming	19	27.5
Trading	7	10.1
Fuel wood harvesting	9	13.0
Hunting	6	8.7
Others	2	2.9

Demographic characteristics of the host communities indicate that the majority of the local people were male (73.9%) with female constituting

only 26.1%. Large proportion of them (63.7%) was also within the youthful age of 21-40 years. Unsurprisingly, the majority of them (56.5%) lack

basic western education with only 17.4% of them claiming to have undergone primary education. As it is the case in many African rural areas, considerable number of the respondents (53.6%) were either crop or livestock farmers while another 13.0% and 8.7% were fuel wood harvesters and hunters respectively.

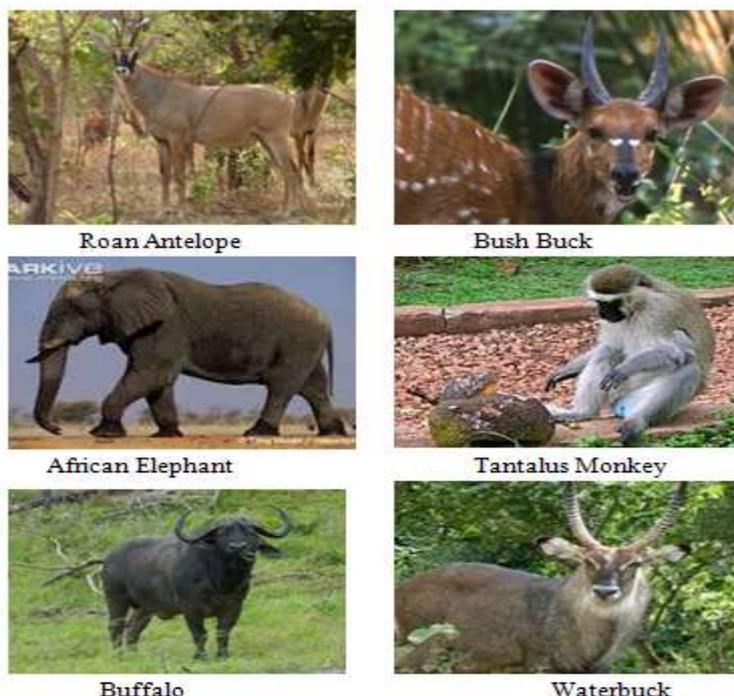
Species of wildlife involved in human – wildlife conflict around Yankari Game Reserve:

Based on the information obtained from the respondents (host communities), eight different species of animals were identified as the animals usually incriminated in human – wildlife conflicts around the Game Reserve. The Table below shows these species of animals as well as the frequencies and percentages of the respondent who mentioned them. Multiple choice questions were used in the questionnaire such that all respondents who mentioned a particular animal species were summed up together and the percentage determined.

Table 2: Wildlife species involved in human – wildlife conflict identified by the host communities (n = 69)

Animal species identified				
English name	Scientific name	Local name	Frequency	Percentage
Buffalo	<i>Syncerus caffer</i>	Bauna	39	57
Tantulus monkey	<i>Chlorocebus tantalus</i>	Kirka	49	71
Patas monkey	<i>Erythrocebus patas</i>	Jan biri	41	59
Roan antelope	<i>Hippotragus equinus</i>	Gwanki	18	26
Western Hartebeest	<i>Alcelaphus buselaphus major</i>	Kanki	5	7
Bush Buck	<i>Tragelaphus scriptus</i>	Mazo	36	52
Waterbuck	<i>Kobus ellipsiprymnus</i>	Gwambaza	26	38
Elephant	<i>Laxodonta Africana</i>	Giwa	8	12

Source: Field study, 2018.





Western Hartebeest



Patas Monkey

Table 2 above indicates the species of animals usually involved in human – wildlife conflict around the Game Reserve as identified by the host community. From the Table it can be seen that Tantalus Monkey (*Chlorocebus tantalus*) was the most problematic animal among all the animals in the communities bordering the Reserve as 49 respondents representing 71% of the total respondents affirmed that the animal had been disturbing them for many years. Patas Monkeys was also identified as the second most problematic animal after Tantalus Monkey as 41 respondents representing 59% of the total respondents from the host community confirmed that. Similarly, a good number of the respondents (39.6%) acknowledged that buffalos around the Reserve also threatened the peace of the communities for long threatening their lives and properties especially their crops. In addition, 36 respondents representing 52% were of the views that Bush Bucks do also create a lot of problems to the surrounding communities.

Furthermore, Water Buck and Roan Antelopes were also mentioned as being part of problematic animals around the Game Reserve as stated by 26 respondents (38%) and 18 (26%) respectively. Although Western Hartebeest and Elephants were also identified as nuisance by 7% and 12% respectively, they seem not to be as problematic as the species of animals stated earlier.

Host Communities’ view on level of encroachment of problematic animals into their settlements

It was also found to be important to determine the get respondents’ views on the level of encroachment of the animals identified as nuisances into their settlements including farmlands.

Table 3: Views of the respondents on the level of encroachment of wildlife into their settlements

Views of the host communities		
Response	Frequency	Percentage
Yes	62	90
No	7	10
Total	69	100
Views of the staff of the Game Reserve		
Response	Frequency	Percentage
Yes	18	41
No	26	59
Total	44	100

The Table 3 showed that 10% of respondents from the host communities were of the opinion that there was no encroachment of animals identified as nuisance into the communities around the Reserve. However, quite contrary to this, 90% of them stated that there were lots of encroachments of these animals into the settlements surrounding the Reserve. Therefore, the majority of the respondents were of the opinion that problematic wildlife do encroach into the communities around the Game Reserve.

Although, majority of the staff of the Game Reserve opined that there was no encroachment of wildlife into communities around the Game Reserve, significant members of the staff thought otherwise. Results on the staff views in this regard showed that 41% of the respondents were of the opinion that there was encroachment of wildlife into peoples’ settlements around the Reserve while 59% of them stated that wildlife from the Reserve do not encroach into the communities surrounding the Game Reserve.

According to Odebiyi and Alarape (2018), some of the measures used by farmers to control crop raiding along the Kainji Lake National Park, Nigeria, include poisoning 8.5%, shooting 13.67%,

setting traps 36.8%, beating drums 33.3%, scare crows 29.1%, guarding 27.4% and driving away 70.9%. The figure below shows the different methods used by local communities to control human-wildlife conflict around Yankari Game reserve.

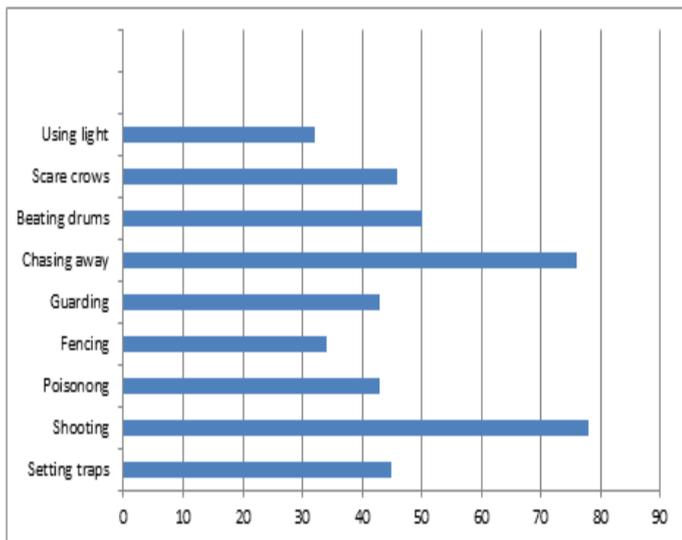


Figure 1: Measures used by host communities to control human-wildlife conflict

Among all the species of wildlife incriminated in human-wildlife conflict around Yankari Game reserve, Patas Monkey, Tantalus Monkey, Bushbuck and Buffalos were the most problematic species involved mainly in crop raiding destroying varieties of crops. The figure below shows the types of crops mostly raided by these species of animals around the Game reserve.

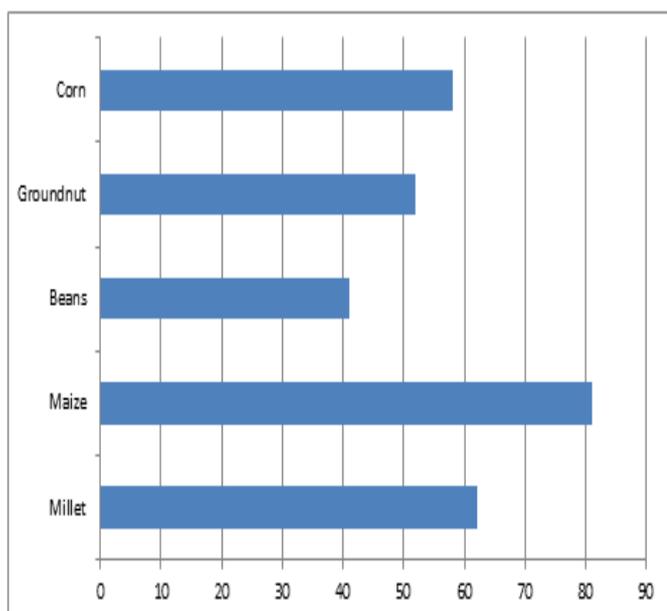


Figure 2: Types of crops mostly raided Wildlife population in the Game Reserve

With respect to the population of wildlife in the Game Reserve, it was discovered that surely the number of wildlife species in the Reserve was dropping. The majority of the local people (68.1%) and 65.9% of the staff the Game Reserve affirmed to that.

Discussions:

In Africa, a large percentage of the population depends on natural resources for their source of livelihoods. Clearing of the forest areas for food and crop production destroys the natural habitats of wildlife. Besides, in countries such as Nigeria, development projects were conceived and executed without a standard Environmental Impact Assessment (EIA) (Suleiman, 2014). Consequently, in communities where projects such as Game reserve have been constructed, human – wildlife conflicts ensue due to encroachment by humans into wildlife habitats or encroachment by wildlife into human habitations.

This study was able to discover that surely certain species of wildlife in the Yankari Game Reserve were incriminated in Human – Wildlife conflicts with the surrounding communities. These animal species were Buffalo, Tantalus monkey, Patas monkey, Roan antelope, Western Hartebeest, Bush Buck, Waterbuck and Elephant. These findings do agree with those of Eniang et al., (2011), who conducted a study on Assessment of Human – Wildlife Conflicts in Filinga Range of Gashaka Gumti National Park, Nigeria. His finding indicated that Tantalus monkeys were one of the major sources of Human - Wildlife conflicts in Filinga range of Gashaka Gumti National Park because of its relative abundance. According to him, although Baboons and other species were also involved, but more blames were on Tantalus monkeys in the range.

Considering the findings made by this study with regards to the types of problems caused by wildlife species identified as problematic around the Yankari Game Reserve, results indicate that 94% of the damage caused by the problem-animals was targeted at crops and farm produce, while the

remaining 5% was damage on lives and properties. It was also gathered that Groundnut (peanut), Maize, Millet, beans and Guinea corn were the crops mainly raided by the identified wildlife around the Game Reserve with response rate of 84.1%, 75.4%, 71%, 59.4% and 66.7% respectively. Economic losses due to crop raiding by wildlife species can sometimes be so enormous. For instance, Naughton-Trevez (1997), analysed the incidence of socio-economic variables on local perception of the conflict around the Kibale National Park, where 54% of the land within 1Km

from the National Park's border is cultivated. He reported that farmers lost an average of 4-7% of their crop per season. In a study by Ogunjobi and Adeola (2016), the common wild vertebrates raiding farmlands identified by the farmers around the Kainji Lake National Park, Nigeria comprised of nine species belonging to three orders (primates, rodentia and aves). Large percentage of the raids (43.53%) was perpetrated by primates with the highest single raid carried out by *Papio anubis*. Wildlife attack humans during such clearings as humans encroach into their territories.

Table 4: Tabular presentation of nature of human-wildlife conflict around Yankari Game Reserve

Wildlife Species Involved	Nature of Conflict	Crop Raided	Property Destroyed	Season of conflict
Elephant	Crop Raiding, Destruction of Properties, Attacks on Human and animals	All kinds of crops with long erect stems like maize, millet and corn	Housings, Granaries, Farm fences	All year round
Pantas Monkey	Crop raiding	All kinds of crops; standing like maize and underground such as peanut	Farm fences	Mostly wet season
Tantalus Monkey	Crop raiding	All kinds of crops; standing like maize and underground such as peanut	Farm fences	Mostly during wet season
Roan Antelope	Crop raiding, Attacks on humans and animals	All kinds of crops with long erect stems like maize, millet and corn	Farm fences, huts	Mostly during dry season
Buffalo	Crop raiding, Attacks on humans and animals	All kinds of crops with long erect stems like maize, millet and corn	Granaries, Farm fences, huts	All year round
Western Hartebeest	Crop raiding	All kinds of crops with long erect stems like maize, millet and corn		Mostly during dry season
Bush Buck	Crop raiding, Attacks on humans and animals	All kinds of crops with long erect stems like maize, millet and corn		Mostly during dry season
Waterbuck	Crop raiding, Attacks animals	All kinds of crops with long erect stems like maize, millet and corn		Mostly during dry season

Some species of wildlife animals identified as those involved in Human – Wildlife conflicts in other

areas as reported by other scholars were not part of the findings made by this study. These species of

animals include hyena, cheetah, leopard, baboon, hogs, felines and crocodiles. The absence of these species of animals around the Yankari Game Reserve can be attributed to the peculiar environmental factors found there that naturally do not favour the existence of such animal species. Animals such as leopards and cheetahs are usually found in areas with thick forests thus, the environment around Yankari Game Reserve could not be a convenient place for such animals. However, many studies have also reported that species of animals such as Buffalo, Tantalus monkey, Bush Buck, Waterbuck and Elephant were those usually incriminated in Human – Wildlife conflicts elsewhere such as in Kenya, South Africa, DRC etc.

Similarly, many studies have revealed that one of the most important bone of contention between wildlife and humans were farmlands where food crops palatable to the wildlife were grown. As long as there is abundance of food in the area, destructions by wildlife would not cease because animals are attracted by what they want – food. Food would always be abundant because of the high fertility of the soil in forests where Game Reserves are constructed coupled with the fact that the agrarian households commonly found to surround Game Reserves were continuously cropping into the wildlife habitats clearing it for food cultivation. Crop raiding by wildlife is neither a new phenomenon nor a rare one. Until recently, there has been little attention given to vertebrate species that damage crop with exception of elephants and rodents. In communities with little subsistence economy even small losses can be of economic importance and can generate negative attitudes toward wildlife and conservation in general (Oil et al., 1994). According to Ojo et al., (2010), crop raiding by wild animals is one of the major causes of human wildlife conflict which involve wildlife moving from their natural habitat on to agricultural land to feed on the produce that humans grow for their consumption.

Crop raiding stands out among the factors responsible for conflicts between humans and other primates. According to Odebiyi and Alarape (2018), along the Kainji Lake National Park in Nigeria, Olive baboons raided crops more in the wet season (97.4%) with troop size of 35.0 ± 17.75 . Crops frequently raided were maize (77.8%), guinea corn (29.9%) and yam (20.9%). Crop raiding incidence reported by farmers was 16.6 ± 11.7 years. Around the Yankari Game Reserve as discovered by this study, crops mostly raided by the wildlife species were maize, Millet, corn, peanut and beans. Africa has a sizeable proportion of its people that were traditionally livestock rearers. According to WWF leopards still kill sheep within 100km of Cape Town, South Africa and lions kill cattle around those outskirts of Nairobi, Kenya (Lamarque et al., 2009).

Furthermore, another finding made by this study was that, about 76% of the local people stated that wildlife species within the Yankari Game Reserve do also encroach into the settlements of the communities living around the Reserve where they cause lots of destructions. This is common wherever humans and wildlife live side by side and a lot of studies have confirmed that. However, quite a good number of the staff respondents (44%) was not in agreement with this fact. Akua (2010) conducted a study on investigating Human-Wildlife conflict management around Kakum Conservation Area, Ghana. Findings indicated that, 99% of the communities had experienced problems with animals involving 17 species: elephants (99%), rodents (22%), primates (14%), hogs, antelopes, birds, felines (10% each). Crop raiding only (86%), crop raiding plus damage to infrastructure (12%), and no reported loss of life. Cassava, plantain, maize and cocoa were raided (60%), Yam, cocoyam, orange, oil palm, other fruits and vegetables (41%).

Wildlife have caused extensive damage to properties which include people's homes, huts, storage bins, crops, domestic animals, exotic vegetation and human infrastructures. In villages,

wildlife like elephants are known to have destroyed people's homes, huts storage bins that they come across as they raid villages and farmlands. According to Odebiyi and Alarape (2018), the three main aspects of human-wildlife conflicts in Africa that are often reported are crop raiding, livestock predation and attack on human, others include destruction of farm infrastructure, spread of diseases to livestock, competition for water between wild animals and livestock Elephants also damage infrastructures such as ponds tracks and water installations (Lamarque et al., 2009). Lions and other large carnivores attack and kill cattle belonging to farmers and pastoral herdsmen particularly in East Africa. Baboons and monkeys are known to have caused damage to banana plantations and gardens. Crocodiles are involved in theft of fish from fishing nets and associated damage to fishing gear (Suleiman, 2014). Thus, as wildlife range becomes more and more fragmented and wildlife is confined into smaller pockets of suitable habitats, humans and wildlife are increasingly coming into conflict with each other (Lamarque et al., 2009).

Besides, Ogada and Ogada (2004), revealed the species of wildlife responsible for killing livestock in the AWF Samburu Heartland. According to him, such deaths were due to: lions (35%) of reported deaths, leopard (35%), hyena (18%), baboon (4%), elephants (3%), buffalo (2%), wild dog (2%) and cheetah (1%). However, wildlife species mostly incriminated in the killing of humans around the Game Reserve were Buffalo and Elephants mostly as a result of clashes during crop raiding when farmers try to scare or chase away these animals from their farms. WWF SARPO (2005), stated that however, the larger herbivores (elephant, buffalo, and hippopotamus), large mammalian carnivores (lion, leopard, cheetah, spotted hyena, wild dog), and the crocodile are traditionally defined as problem-causing animals and are responsible for most of the human-wildlife conflicts.

Another finding made by this study was that seasonal variability affects the movement of

wildlife in the Game reserve. According to the local communities, occurrence of human-wildlife conflict around the Game reserve involving different wildlife species varies across different seasons. This means that, species of wildlife incriminated in conflicts during dry seasons may vary from those wreaking havoc during wet seasons. However, wildlife species like elephants tend to be problematic all year-round. For instance, monkeys tend to cause lot of problem during wet season when different types of crops are grown in and around the Reserve destroying maize, millet, groundnut, beans etc. while conflicts involving animals like waterbucks are more frequent during dry seasons when many bodies of water dry up as a result of which the animals move around in search of water. It should be noted that wildlife animals do not move around in search of food only but other factors are also responsible. Water, food, cover, mineral requirements and burning practice were identified as the main factors influencing the movements and distribution of animals especially during the dry season (Afolayan and Ajayi 2008). It was also revealed that clashes between wildlife, livestock farmers and hunters is more frequent during dry seasons when farmers go deep into the bush to graze their animals or to water them while human-wildlife conflict as a result of crop raiding especially involving species of monkeys mostly occur during wet seasons.

Many scholars have reported variations in the impacts of human-wildlife conflicts with regards to differences in people's demographic characteristics such as gender and occupation. According to F. Lamarque et al., (2009), most of the people killed by large mammals are men, and many of these incidents occur at night. In Kenya, alcohol was found to be a key factor in one third of the deaths; victims were drunk and returning home from the bar. Others died protecting their crops, herding cattle, walking at night between neighbouring villages or even taking the prey of large felines. An analysis of conflict with lions in the United Republic of Tanzania showed that, above ten years

of age, men are at much greater risk of being attacked by a lion than women. This is because men are more likely to tend cattle or forage for bushmeat and they are more likely to walk around alone at night. Men are also attacked when trying to retaliate against man-eating lions, often relying solely on nets and spears. Although men are more at risk overall than women, both men and women are almost equally at risk when working in fields or near their homes (Packer et al., 2006 sighted in F. Lamarque 2009). Attacks on men however were often less lethal than attacks on women and children. Possibly this could be due the fact that men were more physically fit to defend themselves than women and children. In an interview with some of the respondents from the host communities in the areas studied, men were more often attacked by the wildlife animals mostly in encounters during crop raiding or in their efforts to chase away the animals while destroying properties such as granaries, huts etc. Similarly, farmers, hunters and fuel wood harvesters were much affected by wildlife attacks more than others engaged in other socioeconomic activities. These groups of people were mostly attacked in the bush while going to or working in farms, collecting fuel wood or engaged in hunting activities. It should be noted that, the majority of the local people were crop farmers, livestock farmers, fuel wood harvesters or hunters. This means that the majority of the hoist communities were very much vulnerable to attacks by wildlife animals.

Although one of the most important rationales behind every Game reserve including the Yankari Game reserve is the conservation of wildlife especially the endangered species, due to some reasons not studied, this research was able find out that the number of wildlife in the reserve was significantly dropping. According to the respondents whose views as well as available records at the Game Reserve formed the basis for this finding, number of wildlife in the area especially elephants had dropped considerably. Although the local people claimed not to have any

record of these animals population in the reserve, they confirmed that they believed the population of the species of animals in the reserve had dropped because of the significant drop in the frequency of encroachment of these animals into their settlements as well as the drop in frequencies of attacks and destructions caused by the wildlife. Although numerous strategies and financial resources have been used to enhance wildlife conservation, there is rampant population decline of numerous species throughout Kenya such as the African elephant (*Laxondota africana*), black rhino (*Diceros bicornis*), gray zebra (*Equus grevyi*), and large carnivorous especially lion (*Panthera leo*) and cheetah (*Acynonix jubatus*), various species of monkeys, hiora antelops among others (Western et al., 2009 sighted in Mosses et al., 2016).

Based on the findings made, the number of wildlife species especially that of the African Elephant around the Reserve is dwindling. This was confirmed by both the host communities as well as the officials of the Game reserve. Numerous studies have examined the causes of decline of wildlife populations in different parts of Kenya. Collectively, these studies revealed that a myriad of, anthropogenic factors such as human – wildlife conflicts, illegal wildlife poaching, bush meat activities, increase in human population, alienation or inadequate involvement of locals in conservation initiatives and programmes, proliferation of inappropriate land use like agriculture which compromises wildlife survival and its conservation are responsible for the decline of wildlife (Mosses et al., 2016) Considering the findings made by other related studies with respect to the causes of decline in wildlife population, the reasons for the dropping number of wildlife in the Yankari Game reserve could not be different. Major National Parks and Wildlife reserves across Africa lost up to 60% of their lions, giraffes, buffalos and other large wild animals between 1970 and 2005, raising the specter of wildlife on the continent soon being confined to isolated pockets dependent on international money for protection (www.theguardian.com). Although

reasons for the dwindling population of wildlife in the reserve were not studied, it could perhaps be attributed to poaching, climate change, habitat destruction, bush meat activities, poor management etc. Such are some of the factors responsible for the dropping population of wildlife in the world.

Finally, in order to bring a lasting solution to the menace of human-wildlife conflict around the YGR, stringent measures have to be employed. An atmosphere of love and affection should be created between the host communities and wild life in the reserve so as to ensure peaceful coexistence; Public enlightenment campaigns through radio and television jingles, talk shows, town hall meetings, symposiums etc. should be organized for the inhabitants of the surrounding host communities so that they will be enlightened on issues relating to the best method of avoiding human-wildlife conflict around the Game Reserves. Besides, authorities of the Reserve should ensure that every necessary measure is taken to minimize the rate of encroachment by wildlife into surrounding communities. Appropriate land use programme should also be provided such that interests of the host communities are considered.

Conclusions:

Conclusively, this study highlighted the potential conflicts caused by 7 species of wildlife including Buffalo, Tantalus monkey, Patas monkey, Roan antelope, Western Hartebeest, Bush Buck, Waterbuck and Elephant were the species usually involved in Human – Wildlife conflicts around Yankari Game Reserve in Nigeria and that these animals do encroach into surroundings mostly inhabited by local communities around the Game Reserve. However, the most worrisome finding made was that the wildlife population in the Game Reserve was significantly dropping. Taking into consideration the sensitivity of the various reasons responsible for the decline of wildlife population in different parts of the world, if concrete and effective control measures are not taken in order to ensure the survival and conservation of wildlife species in the Reserve, many of the wildlife will soon go into

extinction. Besides, the uncontrolled encroachment of wildlife into the premises of the communities surrounding the Reserve will further escalate human – wildlife conflict in and around the reserve possibly with devastating consequences. In such cases, the local people retaliate by killing those wildlife animals coming into contact with them there by further decreasing their numbers in the Reserve. Similarly, demographic characteristics of the local communities surrounding the reserve showed that the majority of them were crop or livestock farmers, hunters or fuel wood harvesters meaning, their livelihood was solely dependent on the forest resources hence, the people must come into contact with species of wildlife roaming around the reserve. In such situations, human – wildlife conflicts are inevitable.

Recommendations:

Based on the findings made by this study and the conclusions drawn, the following recommendations are hereby proffered:

1. The Management of the Yankari Game Reserve should do more in educating their staff most especially guards on the best ways to tame trouble animals in the reserve so that they don't encroach on the properties of the host communities. This will reduce casualties on the part of the animals and the host communities.
2. Government should adequately equip the reserve workers most especially the Game rangers with the latest technology in wildlife tracking and management system as well as the latest communication technologies, Global Positioning System (GPS) and satellite imaging systems which will go a long way in enhancing information delivery thereby improving the peaceful coexistence of human and wildlife around the reserve area.
3. An atmosphere of love and affection should be created between the host communities and wild life in the reserve so as to ensure peaceful coexistence.
4. Public enlightenment campaigns through radio and television jingles, talk shows, town hall

meetings, symposiums etc. should be organized for the inhabitants of the surrounding host communities so that they will be enlightened on issues relating to the best method of avoiding human-wildlife conflict around the Game Reserves.

5. There should be the protection of wildlife particularly in the reserves so that they do not move out to cause any harm or damage to people's properties. Wildlife outside reserves should be protected through enacting appropriate laws and legislation to reduce those who consider wildlife as bush meat especially in countries like Nigeria.
6. There is the urgent need for proper and effective land use planning whereby various land uses are specified and clearly demarcated. This is to ensure that settlements and other forms of human development projects do not encroach into lands and areas that are used by wildlife. This is important as in many African countries there is increasing encroachment into areas that were over the years used by wildlife.
7. There should be compensation payment by the government to the poor rural farmers that have suffered damage of crops and properties due to wildlife. This is vital in order to stop revenge killings and provide a consolation to the affected farmers who in many instances cannot deal with the problem or bear the loss.
8. There should be dissemination of wildlife awareness that is aimed at emphasizing the value and importance of wildlife the ecosystem, tourism and overall development. This awareness is to stop the negative attitude of the African rural people who see animals purely in terms of their meat value or pests that have to be eliminated.

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