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## IMPACT OF HUMAN-WILDLIFE CONFLICTS ON HOUSEHOLDS AND PARK MANAGEMENT IN HOST COMMUNITIES OF OKOMU AND KAINJI LAKE NATIONAL PARKS, NIGERIA

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### Abstract

The study assessed the impact of human-wildlife conflicts on park management and communities surrounding Okomu and Kainji Lake National Parks, Nigeria. Data were collected using two sets of structured questionnaires, personal observation, focus group discussion, and in-depth interview. Data collected were subjected to descriptive analysis. Findings from the study revealed that human-wildlife conflicts (HWC) occur in the study area in both wet and dry seasons in ONP (81.0%) and KLNP (87.0%). *Cercopithecidae* spp ranked highest as animals involved in conflicts around Kainji Lake (92.5%) and Okomu National Park (74.6%) followed by *Aves* spp around KLNP (58.0%) and *Thryonomys swinderianus* (54.5%) around ONP. Also indicated among the vermins were *Papio anubis* (57.0%) in KLNP and *Loxodona africana* (37.0%) in ONP. Crop raiding ranked first as a type of human-wildlife conflict around KLNP (97.0%) and ONP (98.0%). Hunger and poverty were indicated respectively by all (100%) and about 91% of the respondents as major effects of HWC among the households. Compensation for damages topped the list of HWC mitigation strategies proposed by staff of ONP together with households around both parks. Human-wildlife conflict has serious deleterious effects on both human and wildlife in the study area. For effective conservation of biodiversity and cooperation of the communities in the study area, households in selected communities should be properly compensated for damages caused by wildlife species.

**Keywords:** Impact, human-wildlife conflicts, park management, host communities, conservation

### Introduction

Conflict is a ubiquitous phenomenon that can arise in various contexts, ranging from interpersonal relationships to international politics. Human-wildlife conflict has constituted serious threats to the life of both humans and wildlife species because it has resulted into fatalities in both man and wildlife species. Human-wildlife conflict has been in occurrence for a much extended time in Africa and it is as old as agriculture. According to FAO (2009), large animals (both carnivores and herbivores) attacked and fed on humans and their ancestors in Africa for more than four million years ago. In pre-colonial and early nineteenth century history, elephants invaded the human cultivation in so many areas in Africa (Barnes, 1995; 1996; Barnes *et al.*, 1995). The Egyptian Historical Records revealed that in 2000 BC, hippopotamus (*Hippopotamus amphibious*) in the Nile Delta fed on cultivated crops while crocodiles (*Crocodylus spp.*) ate livestock, destroyed fishing gears and occasionally killed humans.

Cultivated crops are raided, livestock depredated, wildlife killed, their habitats destroyed, and worst case, human life lost. Solutions such as guarding, fencing, culling, compensation, and collaring all have their limitations. Thus, there is the need for wildlife managers to employ and propagate an integrated means of combating human-wildlife conflicts.

Human wildlife conflict manifests as an outcome of competition and fight over limited space and resources. As human population increases while resources and space remain limited, there is

pressure on man to diversify and expand in order to improve his livelihood. This further reduces the availability of resources and space required by wildlife species for survival in the wild. As such animals are forced to encroach into human settlements resulting in several forms of conflicts (Asdil *et al.*, 2015). IUCN (2005), in another form, also reports that human-wildlife conflicts occur when wildlife species encroach on human population which generates cost both to human and wildlife. Presently, human-wildlife conflict occurs in different ways in all part of the world (FAO, 2009) as long as man and animals share the available environment and resources. Wild animals responsible for human-wildlife conflicts are not just big games alone but include all animals that impact negatively on humans and the environment. The fact that big games are known to be more aggressive and cause high level of damage to people, prompts researchers to make so much references to them.

Human-wildlife conflict usually occurs when wildlife's requirements overlap with those of human populations, creating costs to residents and wild animals. Direct contact with wildlife occurs in both urban and rural areas, but it is generally more common inside and around protected areas where wildlife population density is higher and domestic animals often stray into adjacent cultivated fields or grazing areas. Globally, protected areas are sometimes instrumental in fuelling social conflicts between groups. Simply put, conservation of wildlife has been a source of conflict in many parts of the world (Warren, 2003). The nature of conflict shows an increasing tendency between humans and wildlife over the use of natural resources mainly land, forests and water. Conflicts are manifested when people are killed or injured by wild animals, loss of livestock through predation, competition for pasture, wildlife invasion of crops in farms and inadequate or lack of compensation for losses. Indubitably, human-wildlife conflicts have grave consequences suffered by indigenes of park host communities, wildlife, and park management. Hence, this paper examined the impact of human-wildlife conflicts on park management and households in park host communities.

## **Methodology**

### **Study Areas**

The study was carried out in Okomu and Kainji Lake National Parks, Nigeria alongside host communities/support zone communities. Okomu National Park covers a total area of 202 km<sup>2</sup>, which is only 15% of the 1200 km<sup>2</sup> area covered by the Okomu Forest Reserve. The park is located approximately between latitudes 6°15' and 6°25' N and longitudes 5°9' and 5°23' E (Lizzie, 2008) (Figure 1). It is the smallest park in Nigeria before the creation of the additional ten national parks. Kainji Lake National Park is a national park in Niger and Kwara States, Nigeria (Figure 1). It was established in 1978 and covers a total area of 5,340.82 km<sup>2</sup> (Kainji Lake National Park, 2012). The park includes three distinct sectors namely Kainji Lake in which fishing is restricted, the Borgu Game Reserve to the west of the lake, and the Zugurma Game Reserve to the southeast. The entire park lies between latitudes 9° 40' N and 10° 23' and longitudes 3° 30 and 5° 50' E (Figure 1).

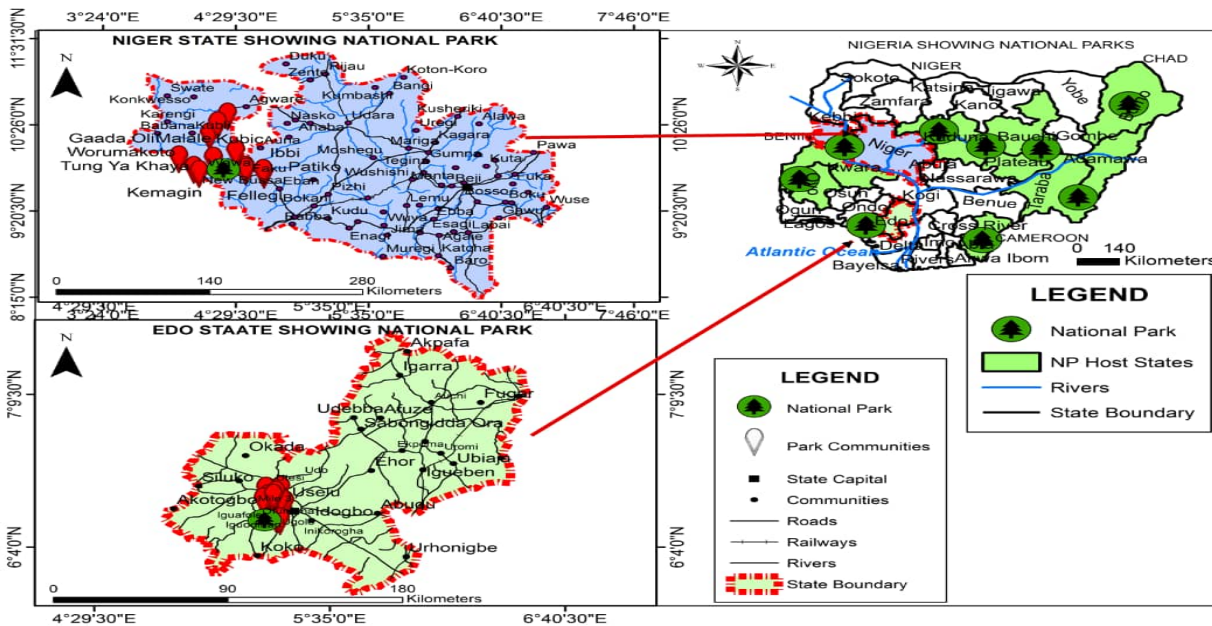


Figure 1: Maps of Okomu and Kainji Lake National Parks showing the host communities

### Methods of Data Collection and Analysis

Both quantitative and qualitative methods of data collection were used to collect data for this study. The methods include reconnaissance survey, administration of questionnaires, field observation, in-depth interview, and focus group discussion. Reconnaissance survey was initially done on the sites for field observations; and to obtain contacts and familiarization with the key informants. In-depth interview and focus group discussion were carried out across 23 selected park host communities to find out the effect of human-wildlife conflicts on households, communities, and park staff. The discussion was focused on individuals (elites of the communities like chiefs), groups, and experienced people living in close proximity with the study attractions. Key informants were obtained from the community chiefs, chief priests/priestess, cave guards, local wildlife officers, youth leaders, kings, town union presidents, and administrative offices and their records. Two sets of questionnaires were administered. The first set was for households - Seven hundred and fifty-seven (757) copies of questionnaire were randomly distributed to 20% of household representatives in the 23 selected host communities. Four hundred copies were administered in 12 communities around Kainji Lake National Park while 362 copies of questionnaire were administered in 11 communities around Okomu. However, only 357 were retrieved and used for Okomu national park. The second set of questionnaires was administered on 20% of staff in both parks being 43 and 56 in ONP and KLNP respectively but only 48 was retrieved in KLNP and therefore used. The host communities were visited and farms destroyed by wild animals were observed and assessed. In-depth interviews were conducted with community chiefs, hunters, and farmers. Secondary data were collected from the parks' administrative record. Data collected were analysed using descriptive statistics in the form of frequency of counts and tables.

### Results

Table 1 shows the species of wildlife involved in human-wildlife conflict as indicated by respondents. *Cercopithecidae spp.* were ranked highest (92.5% and 74.6%) respectively. *Aves spp.* and *Thryonomys swinderianus* were the next highest-ranking species (58.0% and 54.5%) in both study locations.

**Table 1: Wildlife Species found With Noticeable Presence in the Farms of Community Respondents Surrounding Kainji Lake and Okomu National Park**

SN	Wildlife Species	HWC Prevalence				Observable Presence	Features/Noticeable
		Frequency		Percentage (%)			
		KLNP	ONP	KLNP	ONP		
1	<i>Cercopithecidae spp</i>	370	270	92.5	74.6	Sighted, Footprint, Activities, Calls	
2	<i>Aves spp</i>	232	77	58.0	21.3	Sighted, Activities, Dung	
3	<i>Papio anubis</i>	228	—	57.0	—	Activities, Sighted, Footprint,	
4	<i>Hippopotamus amphibius</i>	197	—	49.3	—	Sighted, Activities, Footprint,	
5	<i>Hystrix cristata</i>	196	119	48.9	32.8	Sighted, Activities, footprint	
5	<i>Protoxerus stangeri</i>	188	123	47.0	34.0	Sighted, Activities,	
6	<i>Bovidae spp</i>	180	98	45.1	27.0	Sighted, Activities, Footprint,	
7	<i>Crocodylus niloticus</i>	170	23	42.6	6.4	Sighted, Activities	
8	<i>Syncerus caffer</i>	163	130	40.7	36.0	Sighted, Activities, Dung	
9	<i>Thryonomys swinderianus</i>	153	197	38.2	54.5	Sighted, Activities, Dung	
10	<i>Potamochoerus porcus</i>	145	122	36.3	33.8	Sighted, Activities	
11	<i>Phataginus tricuspis</i>	67	1	16.7	0.3	Sighted, Activities	
12	<i>Serpentes spp.</i>	39	68	9.8	18.8	Activities, Sighted	
13	<i>Loxodonta africana</i>	30	134	7.5	37.0	Activities, footprint, Dung	
14	<i>Tragelaphus scriptus</i>	25	1	6.3	0.3	Sighted, Activities, Calls,	
15	<i>Numida meleagris</i>	20	—	4.9	—	Sighted, Activities, calls	
16	<i>Panthera leo</i>	9	—	2.3	—	Sighted, Activities, calls	
17	<i>Struthio camelus</i>	6	—	1.5	—	Sighted, Activities, footprint	
18	<i>Civettictis civetta</i>	—	19	—	5.2	Sighted, footprint, activities	
19	<i>Varanus niloticus</i>	—	1	—	0.3	Sighted	

Table 2 shows the types of human-wildlife conflict in Okomu and Kainji Lake National Park as reported by community respondents. Crop raiding by wild animals ranked first (1st) in communities surrounding Okomu National Park (98.0%) and communities surrounding Kainji Lake National Park (97.0%) which was followed by threat to wildlife (84.0%) around Okomu National Park and threat to human safety (71.3%) around Kainji lake national park.

**Table 2: Types of human-wildlife conflict in Okomu and Kainji Lake National Parks as indicated by community respondents**

Types of human-wildlife conflict	Frequency		Percentage %		Rank	
	ONP	KLNP	ONP	KLNP	ONP	KLNP
Crop raiding	350	388	98.0	97.0	1	1
Threat to wildlife	338	80	84.0	20.0	2	6
Property damage	200	240	56.0	60.0	3	3
Threat to human Safety	135	285	37.8	71.3	4	2
Livestock depredation	30	195	8.4	48.8	5	4
Road accident	NA	80	NA	39.0	NA	5

Okomu Community Respondent (N = 357); Kainji Lake Community Respondent (N = 400)

**Frequency of Human-Wildlife Conflict Occurrence as Indicated by Household Respondents**

Results on the rate of frequency of human-wildlife conflict occurrence in Okomu and Kainji Lake National parks are presented in figure 2. The results indicate that conflicts in Okomu National Park occurs daily (11%), weekly (5%), monthly (12%), and seasonally (72%), and similarly result on the rate of frequency of human-wildlife conflict occurrence in Kainji Lake National Park indicates that

conflicts in Kainji National Park occurs daily (2%), weekly (2%) monthly (5%), and seasonally (91%). In both parks, conflicts occur majorly on seasonal basis.

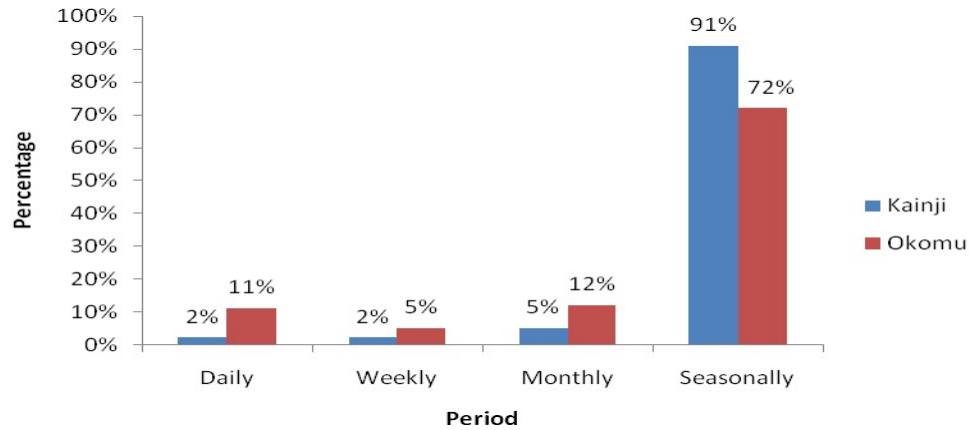


Figure 2: Frequency of human-wildlife conflict occurrence as indicated by household respondents

### Seasonal Variation of Human-Wildlife Conflict as Indicated by Household Respondents

Figure 3 presents results on seasonal variation of human-wildlife conflicts in Okomu and Kainji Lake National Parks. Most household respondents from the surrounding communities of Okomu National Park (81%) and Kainji Lake National Park (87%) indicated that human-wildlife conflicts occur in both dry and wet seasons.

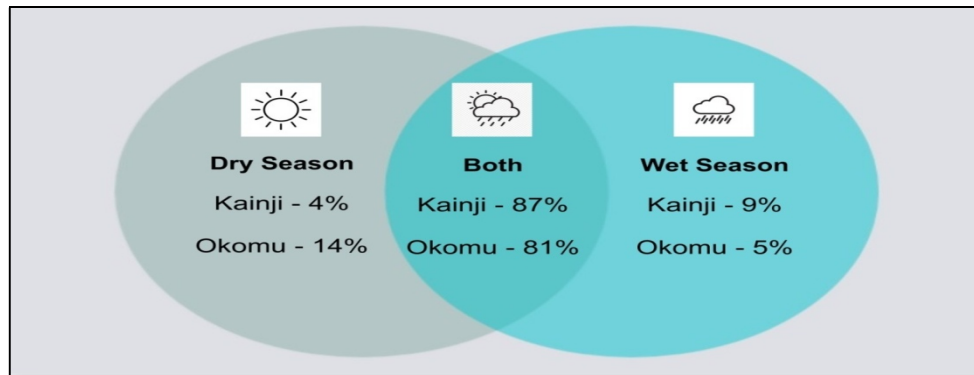


Figure 3: Seasonal variation of human-wildlife conflict around Kainji lake national parks as indicated by household respondents

### Distribution of Human-Wildlife Conflicts across Months in Okomu and Kainji Lake National Parks as Indicated By Respondents

Results in figure 4 indicate that human-wildlife conflict occurs all-round the year from January to December every year in both Okomu and Kainji Lake National Park. Human-wildlife conflict was highest in Kainji Lake National Park in December with a value of 88.5% followed by 77.3% in October and the least was in February with a value of 6.1%. In the case of Okomu National Park human-wildlife conflict was highest in September with a value of 79.9% followed by 79.3% in November and the least was in August with a value of 4.8%.

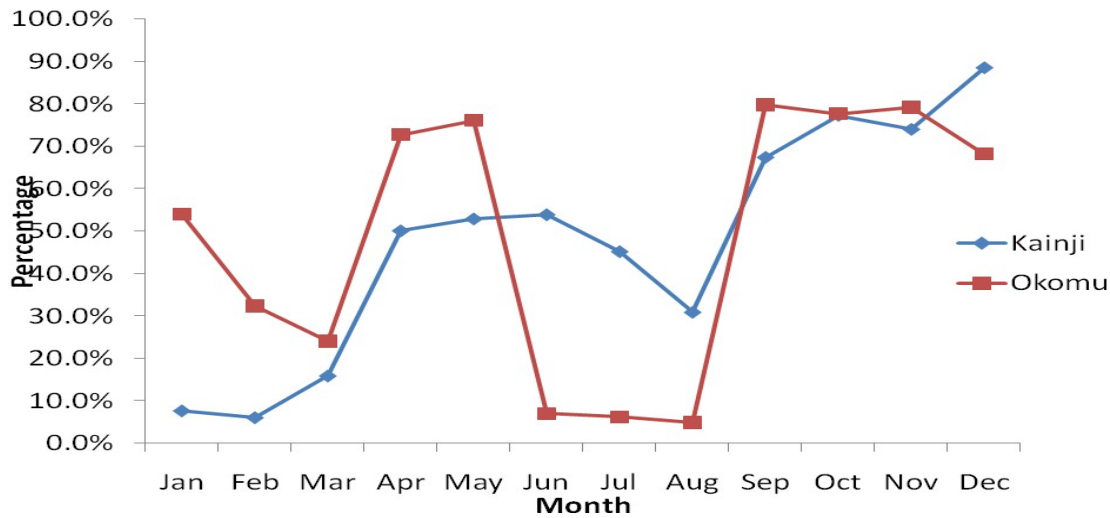


Figure 4: Distribution of human-wildlife conflict across months in Okomu and Kainji Lake National Parks as indicated by household respondents

Table 3 shows the effects of human-wildlife conflicts on households surrounding Okomu and Kainji Lake National Parks. The data in the table indicate that all (100%) the respondents in communities surrounding Okomu and Kainji Lake National Parks agreed that human-wildlife conflicts have resulted in hunger. Most of respondents in both parks agreed that human-wildlife conflicts have resulted in poverty, low standard of living and lack of education for children, high cost of living, family crises and no access to basic amenities for the families. Notwithstanding, only very few respondents claimed that human-wildlife conflicts have resulted in death.

Table 3: Effects Of Human-Wildlife Conflicts on Households in Communities Surrounding Okomu And Kainji Lake National Parks as Indicated By Focused Group Discussants

Park	Effects	F	%	Rank
Okomu	Hunger	11	100	1
	Poverty	10	90.9	2
	Lack of money	9	81.8	3
	Low standard of living	9	81.8	3
	High cost of transportation	8	72.7	4
	Lack of education for children	8	72.7	4
	High cost of living	8	72.7	4
	Family crises	7	63.6	5
	Divorce	6	54.5	6
	Death	2	18.2	7
	Joblessness	1	9.1	8
Kainji	Hunger	12	100	1
	Poverty	11	91.7	2
	Lack of money	10	83.3	3
	Low standard of living	10	83.3	3
	High cost of living	9	75	4
	No access to basic amenities for the family	8	66.7	5
	Disruption of fishing activities	4	33.3	6
	Death	2	16.7	7

Source: Field Survey, 2021; Focused group ONP=11; Focused group KLNP= 12

Table 4 indicates the effects of human-wildlife conflicts on Management of Okomu and Kainji Lake National Parks. The data in the table indicate that all (100%) the Park staff in Okomu Lake National Park agreed that human-wildlife conflicts have resulted in increased logging. Majority of the staff respondents (90%) in Okomu National Park and 93.3% of the park staff in Kainji Lake National Park agreed that human-wildlife conflicts have resulted in increased level of insecurity. In Okomu National Park, majority of the park staff opined that human-wildlife conflicts have led to increased poaching, destruction of park property, lack of tourist visitation, and migration of species. On the other hand, majority of the park staff in Kainji Lake National Park agreed that human-wildlife conflicts have resulted in injury and death of rangers, inadequate Industrial trainee and research students, and death of several wildlife species. While majority (60%) of the park staff in Okomu National Park responded that human-wildlife conflicts have resulted in lack of tourists only 46.7% of the park staff in Kainji Lake National Park accepted that human-wildlife conflicts have negatively affected tourist visitation.

**Table 4: Effects of Human-Wildlife Conflicts on Okomu and Kainji Lake National Parks as Indicated by Staff Respondents**

Park Management	Effects	F	%	Rank
Okomu	Increased logging	10	100	1
	Increased level of threat, injury for rangers on patrol	9	90.0	2
	Increased poaching	8	80.0	3
	Destruction of park property	7	70.0	4
	Lack of tourist visitation	6	60.0	5
	Species migration from the area	5	50.0	6
	Excessive patrol	4	40.0	7
Kainji lake	Additional patrol for rangers	15	100	1
	Increased level of Insecurity	14	93.3	2
	Injury and death of rangers	14	93.3	3
	Inadequate I.T. and research students	13	86.7	3
	Increased level of Insecurity	10	66.7	4
	Death of several wildlife	9	60.0	5
	Wild animal migration	8	53.3	6
	Lack of tourist visitation	7	46.7	7

Source: Field Survey, 2021; Focused group for Park Staff ONP=10; Focused group for Park Staff KLNP=15

**Proposed Strategies to Mitigate Human Wildlife-Conflicts**

Table 5 presents results on strategies that the managements of Kainji Lake and Okomu National Parks have proposed to mitigate human-wildlife conflict. All of the items in the table have received strong support from the management of both parks, with compensation receiving the highest ranking (95.35%) in Okomu National Park and training of park staff receiving the highest ranking (85.4%) in Kainji Lake National Park.

**Table 5: Proposed Human Wildlife-Conflicts Mitigation Strategies by Okomu And Kainji Lake National Park Management**

<b>Strategies in Okomu (N = 43)</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Compensation	41	95.35
Personnel training of park rangers	40	93.00
Provide basic amenities	38	88.37
Provide basic amenities	38	88.37
Employment of community youths	38	88.37
Intensive sensitization on HWC	35	81.40
Dialogue	32	74.42
Buffer zones should be clearly defined	30	69.77
Employment of community youths	38	88.37
Review Park laws	28	65.12
Prevent indigenes from acquiring lands at the limit of the PA	28	65.12
Budgeting for collaborative wildlife control programs	28	65.12
Buffer zones should be clearly defined	30	69.77
Employment of community youths	38	88.37
Review Park laws	28	65.12
Prevent indigenes from acquiring lands at the limit of the PA	28	65.12
Budgeting for collaborative wildlife control programs	28	65.12
<b>Proposed strategies in Kainji Lake (N =48)</b>		
Training of park Staff	41	85.4
Use of surveillance tools to track human wildlife conflict	41	85.4
Dialogue	40	83.3
Intensive awareness on HWC and what to do when in contact with wildlife	40	83.3
Promote community patrolling	40	83.3
Prevent indigenes from acquiring lands at the limit of the PA	39	81.3
Produce crops which are not prone to attacks.	39	81.3
Buffer zones should be clearly defined	39	81.3
Adequate funding from Government	36	75.0
Employment of more park staff	36	75.0
Compensate Farmers	35	72.9
Provide basic social amenities	31	64.6
Budgeting for collaborative wildlife control programs	35	72.9

Source: Field survey, 2021

Table 6 presents the key strategies that the communities in Okomu and Kainji Lake National Park have proposed to mitigate conflict between humans and wildlife. According to household respondents near Okomu National Park, compensation (83.1%) was the most recommended strategy, followed by understanding the locals (71.7%) and moving community members (8.7%). In contrast, compensation for agricultural damages (89.2%) ranked first, followed by moving park from community (75.9%) and farming away from the park (15.6%), as indicated by household respondents near Kainji Lake National Park.



**Table 6: Proposed Human Wildlife-Conflicts Mitigation Strategies by Okomu and Kainji Lake National Parks Surrounding Communities**

<b>Proposed strategies (Okomu communities)</b>	<b>Frequency</b>	<b>Percentages</b>
Compensation for agricultural damages	314	83.1
Understanding local people	271	71.7
Involve community members in conservation	247	64.9
Monitoring situation and reporting	245	64.8
Creating awareness	239	63.2
Surveillance guard	234	61.9
Government intervention	221	58.5
Limits of the National park should be fenced with barb wires	205	54.2
Authorization to trap/kill animals with high reproductive rate	202	53.4
Fencing farm	195	51.6
Park management should relocate farmers	191	50.5
Provide social basic amenities	184	49.2
Change park rangers	89	23.5
Creation of boundary between park and community	66	17.5
Farming away from park	59	15.6
Buffer zones should be re-demarcated	44	11.6
Relocate community people	33	8.7
<b>Proposed strategies (Kainji Lake Communities)</b>		
Compensation for agricultural damages	381	89.2
Relocate park from community	324	75.9
Surveillance guard	260	60.9
Limits of the National park should be fenced with barb wires	218	51.1
Park management should relocate farmers	204	47.8
Understanding local people	197	46.1
Monitoring situation and reporting	181	42.4
Farming away from park	130	30.4
Alternative cropping	89	20.8
Creating awareness	86	20.1
Involve community members in conservation	44	10.3
Provide social basic amenities	75	17.6
Secure farm from bandits	47	11.0

## Discussion

### Wildlife Species that are Highly Involved in Human-Wildlife Conflicts

The study revealed that majority of the respondents in communities surrounding the parks reportedly faced conflicts with wild animals. The animal species of conflict reported the most by respondents was *Cercopithecidae spp* (74.6%), followed by *Thryonomys swinderianus* (54.5%), *Loxodona africana* (37.0%), while Pangolin (0.3%) was amongst the least species reported to be involved in conflict at Okomu National Park (ONP). In Kainji Lake National Park (KLNP), with a response percentage of 92.5%, *Cercopithecidae spp* was still the most reported conflict species, followed closely by *Aves spp* (58.0%), and *Papio anubis* (57.0%). With a response percentage of 1.5%, *Struthio camelus* was the least reported conflict species (1.5%).

The aforementioned findings align with the findings of Ogunjobi and Adeola (2016), which revealed that 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 was perpetrated by primates with the highest raid carried out by *Cercopithecidae spp.* The thirteen primary species of conflict reported across both study areas were monkey, grasscutter, buffalo, elephant, pangolin, crocodile, snake, porcupine, squirrel, birds, red river hog, antelope, and bush buck. Primates were the main and most common crop raiding animals due to their high population in the study area as they are the flagship of the protected area. The destructive raiding activities of monkeys and baboons are aggravated by their gregarious behaviour and intelligence in operation. This finding corroborates the reports of Ijeomah (2022) and Eniang *et al.* (2011), which implicated baboons and monkeys as the major crop raiders and causes of other forms of human-wildlife conflicts in communities bordering Pandam wildlife park, and Gashaka Gumti national park respectively. Grasscutter feed destructively on crops as observed in the destruction of tender palm trunks in Agekpukpu community, ONP.

Hippopotamus (*Hippopotamus amphibius*), elephant (*Loxodonta africana*), buffalo (*Syncerus caffer*), duiker (*Cephalophinae spp.*) and porcupine (*Hystrix cristata*) were also identified by households as problematic wildlife. The activities of these species may not be as pronounced as that of the primates in the study area because of their relatively less population. However, a single raid by elephants and buffalos could be quite obvious. In Musawa community, KLNP, hippopotamus sometimes remain in a lake that is the only source of water for the communities Kainji Lake National Park for many hours, thereby disturbing both fishing activities and harnessing of water for domestic use. No top predator was included among the causes of human-wildlife conflicts in the study area unlike in the findings of Hill (2004) which listed that some top predators and other wildlife species as principal causes of human-wildlife conflicts. Identification of these species as vermins in the study area agrees with the findings of Distefano (2015) that large mammals such as monkeys, elephants, and other smaller wildlife such as cane rat, squirrel, porcupine, snakes, birds, duiker, antelope etc. are the animals involved in human-wildlife conflict.

Some respondents (42.6%) indicated that crocodile was also a cause of human wildlife conflict. In Musawa community, KLNP, Crocodile has several times destroyed fishing nets of households. This may be attributed to the aquatic nature of the environment and the associated occupation of respondents. This agrees with the findings of Lamarque *et al.*, (2009) that conflicts by crocodiles are more common and account for the most deaths and destruction of fishing nets in Africa and is easily encountered in the Niger Delta environment especially by fishermen during fishing expedition and farming in swampy areas. Onuchukwu, Ijeomah and Nchor (2021) also reported the destruction of fishing nets by crocodile in Andoni local government area of Rivers state.

Majority of the respondents in both Okomu National Park (89.8%) and Kainji Lake National Park (93.5%) were aware of the existence of human-wildlife conflict in the communities, with crop raiding being the most popular type in both parks. The high level of awareness of human-wildlife conflict especially crop raiding is due to the frequency of occurrence and negative effects on households, who are mostly farmers in the area. Crop raiding can lead to significant economic losses for farmers and contributes to food insecurity in affected communities. This agrees with the findings of Southwick (2015) in areas close to the Kakum Conservation area of Ghana, where 500 households annually lose about 70 percent of their crops to elephant raids. Other types of human-wildlife conflict identified by respondents include threats to wildlife in ONP, and threats to human safety in KLNP. Due to consistent destruction of crops in park host communities, households in Okomu presently embark on killing of wildlife species which has resulted in series of conflicts between the communities and ONP management. In the case KLNP the abundance of wildlife species has led to many conflicts (wildlife attacks on humans) resulting to human injuries and property losses. Wildlife depredation being identified among the less known type of human-wildlife conflicts is an indication of the smaller number of predators in the park. More so rearing of farm animals (animal husbandry) is more practiced among households around KLNP unlike ONP where the households concentrate on cultivation of crops. The findings on the types of conflict experienced in the park environment is in agreement with the study of Irandu (2003) who listed human safety, crop raiding, property damage, and livestock predation as types of conflicts. The finding is also in line with the

finding of Webber *et al.* (2007) which showed that the most common type of human-wildlife conflict is crop-raiding by wild animals.

### **Occurrence and Distribution of Human-Wildlife Conflicts**

The study revealed that in communities surrounding Okomu National Park and Kainji Lake National Park, human-wildlife conflicts occur daily, weekly, monthly, and seasonally. They occur in both dry and wet seasons. Wildlife species such as the elephant and buffalo feeds year-round. This results in conflicts as such species destroy farmlands in the course of searching for food. The occurrence of human-wildlife conflict is complex and can be influenced by various seasonal patterns. Because both study areas are agricultural regions, conflicts between wildlife and humans often increase during crop harvesting seasons. As crops ripen and become available, they can attract wildlife such as elephants, grasscutter, squirrel, buffalo, birds, and monkeys, which may cause damage to crops and livelihoods. This is in consonance with the works of Mkanda and Kumchedwa (1997) who reported that conflicts occurred throughout the year in all areas but showed an overall seasonal pattern, with an annual peak generally during period of crop ripening in most parts of the country.

### **Effects of Human-Wildlife Conflicts on Communities**

The study revealed that hunger, poverty, lack of money, low standard of living, high cost of transportation, high cost of living, family crises, divorce, death, and joblessness were the general effects of human-wildlife conflict on households in the communities surrounding Okomu and Kainji Lake National Parks. These indicators of hardship result due to destruction of crops and fishing nets which are households' means of survival. This is in agreement with the works of Thirgood *et al.* (2005) that living next to wildlife can come with a number of high costs for the local population, such as damage to livestock or game, crop raiding, or destruction of food supplies, all of which can result in lower living standards and other related crises. The study also revealed that the effects of human-wildlife conflicts on communities were inadequate access to road, disruption of farming activities, no development, increased cost of farm produce, and no basic amenities. The aforementioned findings suggest that human-wildlife conflicts in the understudied communities resulted in direct economic losses for households. This is because wildlife damage crops, livestock, and property, thereby leading to reduced agricultural productivity, decreased income, and increased financial burdens. This implies that due to human-wildlife conflicts, households' livelihoods and food security are undermined.

Households affected by human-wildlife conflicts in most cases still incur additional costs to protect their crops, livestock, or property from wildlife. Installing fences, using deterrents, or hiring guards to check wildlife activities can impose financial burdens and create added stress for households, particularly those with limited resources. The presence of wildlife in close proximity to households can pose risks to human safety. Dangerous species or large animals can cause injuries or threaten the well-being of household members, especially children or vulnerable individuals.

Moreover, human-wildlife conflicts can have psychological and emotional impacts on households, as constant stress, fear, and anxiety associated with wildlife threats can affect mental well-being, and social dynamics within households. Persistent conflicts can create a sense of helplessness and erode community cohesion. In severe cases, human-wildlife conflict can lead to changes in land use patterns or even displacement of households. Continuous conflicts may force households to abandon or relocate from their land and homes leading to disruption of social networks, community ties, and cultural identity.

Households' experiences of human-wildlife conflicts can impact their perception and trust in conservation authorities or protected area management. Negative encounters with wildlife and perceived inadequate support or compensation can strain relationships, leading to a sense of alienation and disengagement from conservation efforts. Human wildlife-conflict could result in deaths of animals and sometimes, human. Human death, leads to serious hunting and retaliatory

killing of the wildlife species in the study area. Human-wildlife conflict can lead to different forms of injury. Injuries can be incurred while sighting a wild animal, or as a result of attack by the animal.

### **Effects of Human Wildlife Conflicts on Park Management**

Human-wildlife conflict can have significant impacts on protected area management. These conflicts can pose challenges to the conservation goals, sustainability, and effectiveness of protected areas. The general effect of human-wildlife conflicts on park management as revealed by this study were increased logging, increased level of threat to and injury on rangers on patrol, increased poaching, destruction of national park properties, lack of tourist visit, species migration, and excessive patrol, increased level of insecurity, injury and death of rangers. This is in line with FAO (2009) who reported that Human-wildlife conflicts can have severe consequences on wildlife population and wildlife conservation efforts by protected areas which rely considerably on support from adjoining local communities who might consider them as destructive pests and threats to their livelihood thus retaliate by destroying park's properties or attacking park rangers. The study also revealed that human-wildlife conflicts can impose financial burdens on protected area management authorities. Compensation for livestock losses, crop damage, or property destruction caused by wildlife can strain limited resources, diverting funds away from conservation efforts and management activities.

Also, human-wildlife conflicts can strain relationships between protected area management authorities and local communities. Conflicts over crop raiding, livestock predation, or threats to human safety can lead to resentment and hostility towards protected area authorities. In ONP, most host communities have had serious conflicts with the park management. This is in consonant with the works of Dickman (2008) who opined that wildlife damages to crops and human properties are the main reason for hostility and antagonism toward park management. This can undermine community support and cooperation, hindering effective conservation and management efforts. Again, when conflicts persist and grievances are not addressed, communities may view protected areas as barriers to their livelihoods and development. This can lead to increased resistance, non-compliance with regulations, or even illegal activities within protected areas.

### **Proposed Park Management Strategies towards Mitigating Human-Wildlife Conflict**

Compensation is the first on the list of strategies proposed by the management of Okomu national park unlike in Kainji Lake National Park where training of park staff topped the list. The indication of compensation by majority of the staff respondents in Okomu cannot be unconnected with the consistent conflicts between the park staff and households of host communities in connection with non-compensation for valuable agricultural crops destroyed by wildlife species. The conflicts have lingered and aggravated to the level of households supporting increased poaching of wildlife species and logging as a retaliatory action. Similarly, Ayivor *et al.* (2013) reported that many farmers traditionally compensate for losses by hunting, consuming, and selling the animals that damaged their crops.

More so, households can attack park staff as a way of protesting for the wanton destruction caused by wildlife species in the farms, which were not compensated for. With the extent of the conflict park staff has realized that any strategy without adequate compensation component, cannot be effective as households may not be willing to accept it. Although the households in KLNP are complaining about the disastrous effects of human-wildlife conflicts, they are yet to resort to poaching and logging as a retaliatory strategy- the tolerance limit of the households has not been exceeded. Besides, households of KLNP host communities have a more cordial relationship – at least they park staff are not being attacked by households of host communities. Other strategies proposed by park management were training of park staff, provision of basic amenities, clear definition of buffer zone, discouragement of acquisition of land titles at park limits, and amendment of park laws were the strategies proposed by the understudied parks to mitigate human-

wildlife conflicts in the communities surrounding Okomu and Kainji Lake National Parks. The strategies for human-wildlife conflicts mitigation proposed by the communities surrounding the two parks are similar with that proposed by park staff at ONP. This finding is in line with Sekhar (1998) who says that benefits derived from compensation influence the attitudes and perceptions of rural residents. In reducing the intensity of human-wildlife conflicts in the communities surrounding parks, community patrolling should be promoted and forestry and wildlife law should lay more emphasis on human-wildlife conflict as suggested by the findings of this study. Also, community members should be educated on what to do when they come in contact with wildlife. The aforementioned are measures mostly suggested by this study to reduce the intensity of human-wildlife conflicts. Use of surveillance tools to track human-wildlife conflict was the second measure highly recommended by administrators as revealed by this study. The indigenes should be educated on the different types of wildlife species and their behaviours. This approach will help the communities to better interact with the wildlife and ameliorate their negative attitudes towards wildlife as time passes by while wildlife portrays their economic value, aesthetic importance, and recreational advantages for touristic purposes.

### Conclusion

Conclusively, human-wildlife conflict was highly evident in the communities surrounding Okomu and Kainji Lake National Parks. The causes of human wildlife conflict were human settlement, agricultural expansion, illegal grass collection, over grazing by livestock, and deforestation in parks. Human-wildlife conflict has a great negative impact on wildlife conservation. The conflict also has grave consequences on the economic well-being of communities and it also threatens human life in the communities. Owing to the grave economic, social, and health consequences of human-wildlife conflict, there is need for appropriate measures to be swiftly taken to arrest or minimize human-wildlife conflict with a view to protecting not only lives of humans and wildlife, but also the economic life of host communities. Based on the findings of the study it is therefore recommended that crisis mitigation strategies for the enhancement of peaceful co-existence between human and wildlife should be urgently put in place in the understudied communities which play host to parks. Sensitisation campaigns on cost-effective methods of addressing human-wildlife conflicts should be carried out in the park host communities. Park personnel should be continuously trained on park management with special emphasis on human-wildlife conflicts. Local approaches and techniques should be developed to efficaciously forestall and manage human-wildlife conflicts. To avoid heavy economic losses or high mitigating investments, highly palatable seasonal crops such as maize, ground nuts, and sweet potatoes should not be grown near the forest edge. The law on forestry and wildlife should be reviewed by the relevant authorities in collaboration with park host communities. The law should maximally protect both wildlife and households in park host communities. An effective co-monitoring programme should be embarked upon.

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