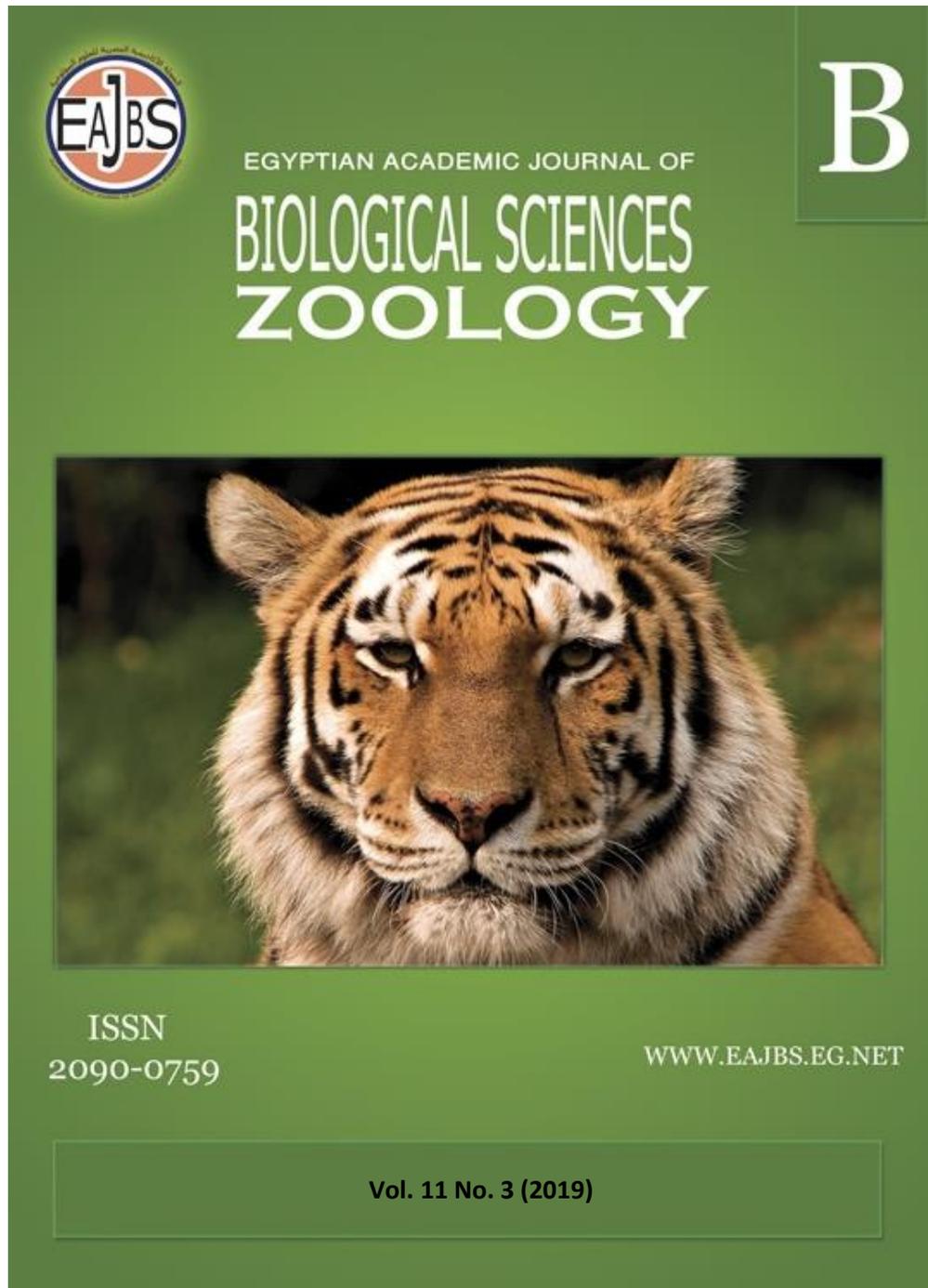


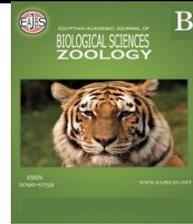
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Conservation Attitudes and Challenges: A Study of Forest Elephants In Southern Nigeria Forests

Queen O. Omoregie¹; Bola O. Oboh²; and Rosemary I. Egonmwan¹

1. Department of Zoology, University of Lagos, Nigeria.
2. Department of Cell Biology and Genetics, University of Lagos, Nigeria.

E.Mail: queenomoregie@yahoo.com

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ABSTRACT

Elephant populations in Southern Nigeria are small and most of them exist in forest islands isolated by farms, monoculture plantations, and human habitations. Their close proximity to communities often results in Human-Elephant Conflicts (HEC). Awareness of, and attitudes towards the conservation of elephants in four elephant ranges in Southern Nigeria were determined using field observations, questionnaires, and interviews. The major threats to the species' sustainability were development in and around the forests (24.1%), logging (22.0%) and hunting activities (20.0%). Incidences of HEC as a result of crop-raiding/damage, non-payment of compensation to farmers whose crops were raided and perceived highhandedness of protected area staff were some of the factors responsible for the negative attitude of the respondents to elephant conservation. Conservation education, alternative means of livelihood and effective mitigation methods could help change the attitude of communities and also serve as a means for sustainable conservation strategy of these relict elephant populations

INTRODUCTION

African Elephants, the largest living terrestrial mammals (Thouless *et al.*, 2016), are keystone species that play a pivotal role in structuring both plant and animal communities (Stephenson, 2007). They are closely associated with the social and cultural aspects of people; a factor that could be harnessed to promote its conservation (Reddy and Workneh, 2014). Elephant numbers and ranges have declined greatly and most elephant populations in Nigeria are in small, fragmented, relict populations (Obot *et al.*, 2005; Blanc *et al.*, 2007; Ikemeh, 2009; Amusa *et al.*, 2013; Thouless *et al.*, 2016).

Wildlife and their threatened habitats face many challenges that often lead to interaction with people and this result in conflicts (Prasad *et al.*, 2011). Mutually supportive relationships between communities and the nearby Protected Areas (PAs) are critical to the long-term success of conservation efforts (Tessema *et al.*, 2007). Survey methods should, therefore, include socioeconomic factors, which most often influence species distribution and density and may also be key drivers of conservation threats (de Boer *et al.*, 2013). Results from such research will help conservation managers become aware of the most urgent threats when planning conservation strategies (de Boer *et al.*, 2013).

The study sites, Omo Forest Reserve (OFR), Okomu National Park (ONP), Cross River National Park, Oban Division (CRNP_Ob) and Cross River National Park, Okwango Division (CRNP_Ok) are some of the richest biodiversity hotspots in Southern Nigeria. ONP, CRNP_Ob and CRNP_Ok have some relatively undisturbed high forest ecosystems (Ofem *et al.*, 2012; Olaleru and Egonmwan, 2014; Abanyam, 2015). OFR which houses the first Strict Nature Reserve and the only Biosphere Reserve in Nigeria is highly degraded and fragmented due to anthropogenic activities such as monoculture plantations, logging, hunting, farming and a dense human population that is apparent all over the reserve (Oates *et al.*, 2008; Ikemeh, 2009).

Fauna present in the study sites include Forest Elephant (*Loxodonta cyclotis*), Chimpanzee (*Pan troglodytes ellioti*), Gorilla (*Gorilla gorilla delhi*) (CRNP), Buffalo (*Syncerus caffer nanus*), Red River Hog (*Potamochoerus porcus*), Bush Buck (*Tragelaphus sylvaticus*), Red-capped Mangabey (*Cercocebus torquatus*), African Civet (*Civettictis civetta*), Mona Monkey (*Cercopithecus mona*) and Maxwell Duiker (*Cephalophus maxwelli*). Others are the white-throated monkey (*Cercopithecus erythrogaster*), which is endemic to ONP, Bush pig (*Potamochoerus porcus*) and Pangolin (*Phataginus tricuspis*) (Oates *et al.*, 2008; Akinsorotan *et al.*, 2011; Ofem *et al.*, 2012; Olaleru and Egonmwan, 2014; Abanyam, 2015).

This study, a part of a larger study of forest elephants in Southern Nigeria, was aimed at determining the awareness of, and attitudes toward the conservation of the elephant populations in Southern Nigeria. The results obtained from this study will provide baseline information on Human-Elephant Conflict (HEC), resolution and mitigation. It will also help sensitize and raise awareness on the importance and plight of these relict elephant populations in Southern Nigeria.

MATERIALS AND METHODS

Study Areas

This study was carried out in some elephant ranges in Southern Nigeria shown in Figure 1. These are Omo Forest Reserve (OFR), Okomu National Park (ONP), Cross River National Park, Okwango Division (CRNP_Ok) and Cross River National Park Oban Division, (CRNP_Ob), an elephant range which has not been accounted for in the African Elephant Study Report (AESR). Authorisation to carry out research in ONP, CRNP_Ob, and CRNP_Ok was obtained from the National Park Services, Abuja and from the Nigeria Conservation Foundation (NCF), Lekki, Lagos, for the use of OFR.

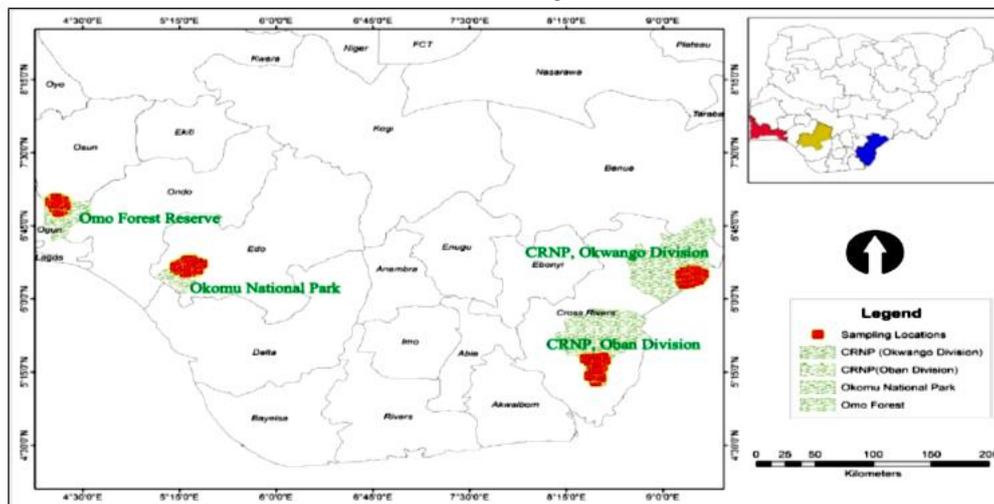


Fig. 1: Map of study locations

A total of 240 questionnaires, 60 in each location were enumerator administered. Respondents were interviewed individually to prevent audience effect bias. It was stated at the start of each questionnaire interview that there was no right answer (Newing *et al.*, 2011) as the process required respondents to report their experiences. The semi-structured, closed and open-ended questionnaire enabled quantitative and qualitative analysis of data gathered. The effective implementation of management objectives of the PAs was assessed by the respondent’s perception of the awareness of the value of nature conservation and PA managers’ role in nature conservation. Data were analysed with non-parametric descriptive and inferential statistics using Statistical Package for the Social Sciences (SPSS, version 20). Chi-square tests and correlation analysis were applied to test the influence of socio-economic factors as independent variables with the perception of the communities in the study sites.

RESULTS

Respondent’s Biodata:

The summary of respondents’ biodata on Table 1 shows that 79.2% of the respondents were males while 20.8% were females. CRNP_Ok (7.1%) and CRNP_Ob (3.3%) had the highest and least percentage of female respondents respectively. The majority of the respondents (45.8%) were within the 21 – 40 years age range in all study sites, except in CRNP_Ob, where respondents in age group 41 - 60 years were highest (11.7%). Respondents (26.2%) who have resided in the study areas for 6 – 10 years were the most and CRNP_Ok had the highest percentage of respondents (6.2%) who have resided there for over 21 years. 60.0% of the respondents had acquired formal education and 72.1% of them were farmers.

Table 1: Biodata of the respondents

Demography	Categories	Percentage frequencies				
		Omo Forest Reserve	Okomu National Park	Cross River National Park, Oban Division	Cross River National Park, Okwango Division	All study sites
Gender	Male	19.2%	20.4%	21.7%	17.9%	79.2%
	Female	5.8%	4.6%	3.3%	7.1%	20.8%
Age	<20 years	0.8%	1.7%	0.0%	1.2%	3.8%
	21-40 years	10.4%	12.1%	11.2%	12.1%	45.8%
	41-60 years	9.2%	8.8%	11.7%	10.4%	40.0%
	>61 years	4.6%	2.5%	2.1%	0.01%	10.4%
Length of residency	1-5 years	5.0%	7.9%	7.1%	5.8%	25.8%
	6-10 years	10.0%	6.2%	7.1%	2.9%	26.2%
	11-15 years	3.3%	5.4%	3.8%	5.0%	17.5%
	16-20 years	2.9%	0.4%	2.9%	5.0%	11.2%
	>21 years	3.8%	5.0%	4.2%	6.2%	19.2%
Education	Non formal	12.9%	7.9%	13.3%	5.8%	40.0%
	Primary	8.3%	8.8%	7.1%	10.0%	34.2%
	Secondary	2.9%	5.8%	3.8%	7.1%	19.6%
	Tertiary	0.8%	2.5%	0.8%	2.1%	6.2%
Occupation	Farmer	19.6%	17.5%	18.3%	16.7%	72.1%
	Trader	2.5%	1.2%	1.2%	3.3%	8.3%
	Hunter	1.2%	0.0%	3.8%	1.2%	6.2%
	Driver	0.8%	0.4%	0.0%	0.0%	1.2%
	Park Staff	0.0%	2.5%	1.7%	2.1%	6.2%
	Palmwine Tapper	0.0%	0.4%	0.0%	0.4%	0.8%
	Logger	0.0%	2.1%	0.0%	0.0%	2.1%
	Student	0.8%	0.8%	0.0%	1.2%	2.9%

Awareness of the Value Of Nature Conservation:

A total of 98.8% of the respondents agreed that plants and animals were nature's gift to man but would cease to exist if they were killed indiscriminately (60.4%). About 72.1% of the respondents confirmed that some plants and animals previously found in these forests were no more present and 86.7% of them want the forests to be preserved for future generations. Respondents (82.9%) would desire communities to be involved more actively in nature conservation.

Table 2 shows the assessment of the respondent's perception of the awareness of the value of nature conservation. Education ($P = 0.000$), occupation ($P = 0.002$) and forest location ($P = 0.000$) significantly affected the respondents' level of awareness of the value of nature conservation in all study sites. Their level of education significantly affected their awareness of the value of nature conservation in OFR ($P = 0.022$), ONP ($P = 0.014$) and CRNP_Ob ($P = 0.022$) while their occupation significantly affected it in ONP ($P = 0.011$) and CRNP_Ob ($P = 0.034$).

Table 2: Respondents' perception on the value of nature conservation

Variables	All study sites		Omo Forest Reserve		Okomu National Park		Cross River National Park, Oban Division.		Cross River National Park, Okwango Division	
	r	Inference	r	Inference	r	Inference	r	Inference	r	Inference
Age	0.517	NS	0.613	NS	0.591	NS	0.267	NS	0.893	NS
Length of residency	0.663	NS	0.433	NS	0.785	NS	0.216	NS	0.275	NS
	χ^2	Inference	χ^2	Inference	χ^2	Inference	χ^2	Inference	χ^2	Inference
Gender	0.822	NS	0.722	NS	0.975	NS	0.422	NS	0.552	NS
Education	0.000	S	0.022	S	0.014	S	0.030	S	0.608	NS
Occupation	0.002	S	0.757	NS	0.011	S	0.034	S	0.547	NS
Forest	0.000	S								

S – Significant; NS - Not significant

The Role Of Protected Areas In Nature Conservation:

Of all the respondents, 66.7% and 94.2% agreed that traditional and civil laws guided the use of the forests respectively while 80.0% asserted that communities were not involved in the protection of the forests. Though 85.0% of the respondents said they were not regularly educated to value wildlife, 81.7% of them confirmed that the PAs boosted nature conservation and 52.1% of the respondents agreed that PAs served the purpose of protecting wildlife.

The respondents' perception of PA managers' role in nature conservation is shown on Table 3. Their occupation ($P = 0.003$) and forest location ($P = 0.000$) significantly affected their perception towards PA managers' role in nature conservation in all sites while their gender ($P = 0.017$) and occupation ($P = 0.038$) affected it in ONP.

Table 3: Respondents' perception of the roles of protected area managers in nature conservation

Variables	All study sites		Omo Forest Reserve		Okomu National Park		Cross River National Park, Oban Division		Cross River National Park, Okwango Division	
	r	Inference	r	Inference	r	Inference	r	Inference	r	Inference
Age	0.514	NS	0.889	NS	0.055	NS	0.837	NS	0.875	NS
Length of residency	0.193	NS	0.591	NS	0.284	NS	0.221	NS	0.452	NS
	χ^2	Inference	χ^2	Inference	χ^2	Inference	χ^2	Inference	χ^2	Inference
Gender	0.069	NS	0.754	NS	0.017	S	0.820	NS	0.414	NS
Education	0.091	NS	0.605	NS	0.070	NS	0.502	NS	0.292	NS
Occupation	0.003	S	0.154	NS	0.038	S	0.066	NS	0.891	NS
Forest	0.000	S								

S – Significant; NS - Not significant

Factors Influencing Habitat Loss And Forest Fragmentation In The Study Locations:

About 92.5% of respondents attested that their settlements were legal and park officials verified that settlements around ONP, CRNP_Ob, and CRNP_Ok were gazetted. Apart from farming, respondents used the forest majorly for collection of Non-Timber Forest Products (NTFPs) (71.5%), hunting (16.2%) and logging (5.4%). The anthropogenic activities which constituted major threats to sustainability of wildlife and key drivers of habitat loss and forest fragmentation in the study sites included development in and around the forests (24.1%), logging activities (22.0%), hunting activities (20.0%), bush fires (14.6%), population growth (12.5%), farming (4.1%), rock blasting (2.0%) and mono-plantations (0.7%) - Oil Palm, Teak, Gmelina and rubber plantations. Rock blasting is exclusive to Cross River National Park. Table 4 shows the highest threats to sustainability of wildlife in each study site.

Table 4: Threats to sustainability of wildlife in each study site

Protected area	Highest threat	Second highest threat	Third highest threat
Omo Forest Reserve	Development in and around the forest (21.7%)	Logging activities (21.7%)	Bush fires (21.7%)
CRNP – Oban division	Development in and around the forest (25.0%)	Logging activities (22.5%)	Hunting activities (8.3%)
Okomu National Park	Hunting activities (24.2%)	Development in and around the forest (20.4%)	Logging activities (19.2%)
CRNP – Okwango division	Hunting activities (8.3%)	Population growth (7.1%)	Development in and around the forest (6.7%)

Evidence Of Poaching In The Study Locations:

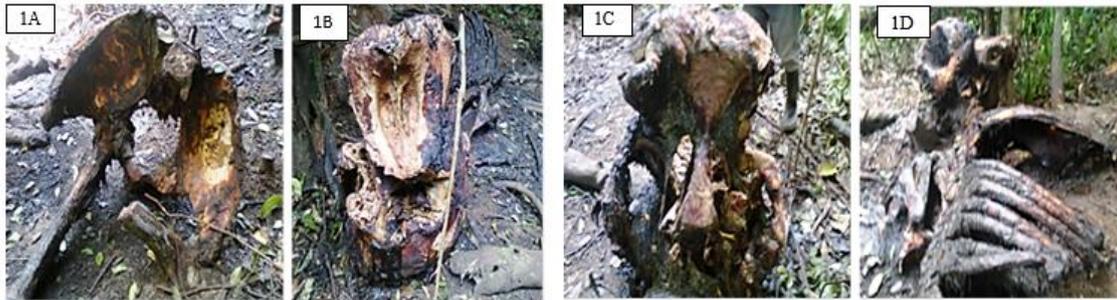
Field observations and interviews showed that illegal hunting of wildlife persisted in the study sites and some of the pieces of evidence are shown on Plates 1A – 1B and 2A – 2B. Poaching of elephants was recorded in OFR in 2012 and 2013. Respondents in ONP agreed that poaching is a threat to wildlife but not to the elephants in ONP, despite the hunters' sheds seen within ONP, because no elephant has been poached in ONP in over a decade. Poaching and deforestation were some of the reasons identified for the decline/disappearance of elephants in the study sites.

Human - Elephant Conflict (HEC) And Mitigation In The Study Locations:

Though the PAs had rich flora diversity, results from interviews and direct observations, verified the movement of elephants into farmlands to raid crops. The major farm crops raided by elephants included plantains, bananas, and pineapples. Cocoa farms were avoided and in cases where elephants passed through them, the trees were only pushed aside but not eaten. Constructed scarecrows were the only form of mitigation observed in farmlands (Plates 3A and 3B). Apart from elephants, other animals that damaged/raided crops in the study areas included monkeys, bush pigs, and buffalo.

Elephant activities (Plates 4A - 4D) were most prominent on the farmlands on the fringes of the ONP especially in Babul range where a road separates the Park from farmlands as ONP has no buffer zone. Strong emotions, in the form of anger, were displayed by most of the respondents especially those whose crops were recently raided. They blamed the Park officials for not taking their cases to the appropriate authorities because no one has ever received compensation for crops raided or damaged.

The results of the questionnaire analysis showed that elephants have raided crops on farmlands of 45.0% of respondents (OFR, 15.8%; ONP, 14.2%; CRNP_Ob, 4.2%; CRNP_Ob, 10.8%) and destroyed properties of 13.3% of respondents (OFR, 4.2%; CRNP_Ob, 1.2%; CRNP_Ok, 7.9%). 85.4% of the respondents attested that since no compensation has ever been paid, most farmers do not bother reporting crop-raiding incidences to PA officials.



Plates 1A - 1D: Charred bones of an elephant poached in Omo Forest Reserve



Plates 2A and 2B: Evidence of hunting in Okomu National Park: A) Hunter's hut B) A hook snare



Plates 3A and 3B: Scare crows in Okomu National Park



Plates 4A - 4D: Signs of elephant activities in Okomu National Park: 4A – Path created by elephants; 4B – Uprooted tree; 4C – Elephant dung and 4D – Elephant footprint

DISCUSSION

Protected areas (PAs) in Nigeria were established to preserve, conserve, protect and manage biodiversity (Mohammed *et al.*, 2013). Forest Reserves were upgraded to National Parks after human settlements were established around them, making the forests inaccessible to communities who once relied on them for their sustenance. The loss of access and perceived harsh enforcement actions by Park staff were found to be contributory factors to the negative attitude towards wildlife and the PAs in this study. This puts the flora and fauna continually under threats of depletion and extirpation.

The respondents in this study were aware of the value of nature conservation and the role of PAs to boost the conservation of natural resources. Their education, occupation and forest location had a significant effect on their awareness of the value of nature conservation. Education and forest location significantly affected their attitude towards PA managers' role in nature conservation in all study sites, gender and occupation did in only ONP. The need for regular conservation education, which is lacking in these communities, cannot be overstressed as studies by Ogunjinmi *et al.* (2012) and Mohammed *et al.* (2013) affirmed that association of a positive conservation attitude with literacy confirms the importance of conservation education and awareness.

Communities, therefore, need to be included in the protection of PAs either by directly employing them or having them in advisory positions. This could help preserve local knowledge, which is slowly being eroded, serve as a means for sustainable conservation measures, change their negative attitude (Reddy and Workneh, 2014) and probably elicit their cooperation in the conservation efforts. It would enhance biodiversity conservation in Nigeria's PAs and also contribute to her achieving Aichi Biodiversity Target 1 which requires that people are not only aware of the values of biodiversity but also need to be aware of the actions to be taken to conserve and sustainably use them.

The key factors influencing the occurrence of elephants in the study areas included development in and around the forests due to the growing human population, hunting and collection of NTFPs. Conversion of lands to settlements, farmlands and monoculture plantations, where elephant foods are limited also result in habitat loss and forest fragmentation. Theuerkauf *et al.* (2001) and Mamo *et al.* (2012) indicated that the main influences on the distribution of elephants were human presence and habitat structure. The decline or loss of natural forest cover and land-use change may have restricted the ranges of the elephant populations in this study limiting them to only a portion of the forests.

The study by Adedeji and Adeofun, (2014) in the Omo-Shasha-Oluwa Forest Reserves showed that between 1986 and 2002, natural forest habitats decreased by 10% while plantations and non-forest areas increased by 6% and 5% respectively. This rate of loss of natural forests need to be curbed as the condition of natural habitats is important for biodiversity and degraded or fragmented habitats are less likely to be able to support their full complement of species (Aichi Biodiversity Target 5) especially a wide-ranging keystone species like the forest elephant. To solve the effect of fragmentation, vanAarde and Jackson, (2007) proposed the management of fragmented populations as metapopulations. This would combine and analyse the results of different surveys to increase their reliability. This approach would be a good strategy to conserve these fragmented elephant populations in Southern Nigeria forests.

Hunting persists in all the study locations as evidenced by the presence of hunters' sheds, traps and spent cartridges. This threat to biodiversity conservation is consistent with studies in PAs in Nigeria - ONP (Olaleru and Egonmwan, 2014), CRNP (Adetola

and Adetoro, 2014) and Kainji National Park (Ijeomah and Ogbara, 2013). Respondents in ONP, however, asserted that hunting was not a threat to *L. cyclotis* as there has been no reported case of poaching in over a decade but that the road constructed through ONP by the Niger Delta Development Cooperation (NDDC) endangered the wildlife. The lack of political will to update and enforce appropriate conservation laws may be one of the reasons poaching, encroachment into the PAs and other threats continued unabated. Meduna *et al.* (2009) reported that the arrest of offenders did not deter them from illegal activities because the punitive measures imposed by wildlife laws were not heavy enough to deter re-occurrences.

Continued hunting activities could be due to insufficient incentives and non-involvement of communities in the management of the park. The findings agree with the views expressed by Ogogo *et al.*, (2014), where people living around the CRNP claimed not to be involved in its management and the Park continued to face the threat of poaching. Empowering the inhabitants living as neighbors to PAs through alternative means of livelihood will probably help to elicit their cooperation in Nigeria's conservation efforts (Mohammed *et al.*, 2013).

Crop raiding by wild animals is one of the major causes of HEC (Ojo *et al.*, 2010). Studies have shown that losses involving crop-raiding can generate negative attitudes towards wildlife and conservation in general (Eniang, *et al.*, 2011; Datiko, and Bekele, 2013). In communities with little subsistence economy, such as communities in and around OFR, ONP, CRNP_Ob and CRNP_Ok, where majority of the people are farmers who cultivated mainly Plantain, Banana, Cocoa, Kola nuts and Cassava, even small losses could be of economic importance. In a study by Datiko and Bekele, (2013), the African elephant was rated as one of the most destructive crop-raiding animals. This is because they are able to destroy a farm in a single night raid.

Non-payment of compensation for crop losses arising from raids or destruction by elephants in the study locations contributed to the negative attitude towards its conservation. Compensation was also not paid to farmers in Gashaka-Gumti NP, where crops were damaged by Tantalus monkeys (Eniang *et al.*, 2011) and for crops raided by Baboons in CRNP (Andrew-Essien and Bisong, 2012). Eniang *et al.* (2011) asserted that non-payment of compensation can be attributed to the fact that there is no policy provision by the Federal Government of Nigeria on payment of compensation to farmers or communities for crops raided or properties destroyed by wildlife. This contravenes Target 3 of the Aichi Biodiversity Target, which encourages developing and applying incentives as a means of safeguarding biodiversity.

Mile 3 and Nikrowa communities in ONP had the most cases of crop-raiding in this study. Farmlands were located very close to the Park as there is no buffer zone around the Park. This corroborates reports by Adjewodah *et al.* (2012) and Datiko and Bekele (2013) which showed that close proximity between farms and the Red Volta Valley, Ghana and the Chebera Churchura National Park, Ethiopia respectively resulted in high levels of conflict.

A major finding in this study was that elephants most often clearly avoided cocoa farms. In cases when they passed through them, the cocoa was not eaten. The presence of cocoa farms on most of the boundary perimeter between Shasha FR and OFR might be one of the reasons for the extirpation of elephants in Shasha FR. Theuerkauf *et al.* (2001) observed a similar trend in the Bossematié FR in Ivory Coast where elephants avoided coffee and cocoa plantations. Their study stated that the avoidance of these plantations by the elephants was due to lowered habitat quality of the plantations. Further studies to determine why elephants avoided cocoa plantations need to be carried

out. Results from the studies would determine if cultivation of cocoa could serve as a HEC mitigation method.

Mitigation methods like community awareness programs for HEC, diversified livelihood opportunities, payment of compensation for raided/damaged farmlands and properties, acoustic deterrents, bees and chilli pepper (Perera, 2009, Chang'a *et al.*, 2016) used around the world should be introduced to these farmers to prevent or reduce losses due to crop raids. This will replace the current ineffective scarecrows being erected around the study sites.

Conclusion

Issues raised in this study such as lack of regular conservation education, non-payment of compensation for crops raided, non-involvement of communities in the management of the Park and perceived highhandedness of PA staff are some of the factors leading to the negative perception of communities around the study sites. Future studies should quantify the level of these damages, proffer solutions to manage and respond to incidents of damages done by elephants.

Most of the elephant populations in the study sites are small and exist in forest islands isolated by farms and human habitation. Though sighting these elephants is rare, their effect is felt by the damage they leave behind when they go to through farmlands in search of food and water. If a commensurate means of compensating the people is not put in place, as the pressure is continuously building up, the resultant conflict may become too complex to manage.

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