WILD ANIMAL-CROP RAIDING CONFLICT: A CASE STUDY OF OLD OYO NATIONAL PARK, NIGERIA

Adebowale T.K.[1], Oduntan O.O[1], Ijose O.A.[2] and Onamade B.B.[1]

[1]Department of Forestry and Wildlife Management, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria
[2]Yaba College of Technology Lagos, Department of Leisure and Tourism Management
*Corresponding author: *adebowaletk@funaab.edu.ng; +234 803 0420 767*

ABSTRACT

The study focused on the assessment of crop raiding activities in community's adjacent Old Oyo National Park, Nigeria. The study identify the species of wild animals that raid farms, farm produce that were affected in the area, seasons such activities occurred and level of destruction to farm products in the study area . Stratified sampling technique was used to select Marguba and Tede ranges out of the five ranges at OONP due to the prevalence of agricultural practices and crop damage. Furthermore, twelve communities were selected purposively based on their proximity to park boundary i.e. communities that fell within 20km distance away from the park buffer zone. Non probability snowballing method was used in the selection of the respondents. A total of 60 copies of questionnaires were administered to farmers in villages at Marguba Range while 170 copies of questionnaires were administered to farmers in villages at Tede Range. Data were analysed using descriptive statistics and Input-Output Ratio Model. The findings from this study revealed that Erythrocebus patas and Sus scrofa were the prominent crop raiders with occurrences ranging from 44.3% and 31.7%. Also, an average of ₦1141251±111078, ₦1995640±104967, ₦902500±38456, ₦40000, ₦6500±3250, losses worth of Yam, Maize, Cassava, Tomato, Pepper respectively were incurred by famers due to crop raiding activities by wild animal in the study area. Due to the emergence of conflicts resulting from crop raiding activities in communities adjacent Old Oyo National Park, the government and all conservation associated stakeholders should foster efforts together to ensure that compensation schemes are been put in place to address the losses incurred by the affected farmers before they start taking laws into their own hands.

Keywords: Natural habitat, Conservation, Wildlife, Antagonistic and Attitude

INTRODUCTION

Crop raiding has been described as the movement of wild animals from their natural habitat into agricultural land to feed on the crops that humans grow for their own consumption (Sillero-Zubiri, 2001). Crop raiding around protected areas is one of the major challenges facing conservation efforts. Conserving the wildlife species is one objective, while ensuring local community benefits from the conservation is an important but controversial objective. The impact of crop raiding on attitudes of local communities towards protected areas can undermine efforts to gain their support for conservation, even when the

programmes provide substantial economic benefits (Nyhus *et al.,* 2000). Crop-raiding by wild animals is increasingly known to be a source of conflict between the animals and humans perhaps especially along the boundaries of protected areas (Gillingham and Lee, 2003; Linkie *et al.,* 2007; Riley, 2007). The conflict is set to increase as Africa's human population keeps growing at a high rate and encroachment of Agriculture into land containing wildlife habitats continues (Hill, 2000). The losses incurred by farmers may make communities living close to protected areas antagonistic and intolerant towards wildlife, which can undermine and impede conservation strategies (Nyhus *et al.,* 2000). Farmers in developing countries often have limited access to cash and are rarely compensated for their losses while the individual economic losses suffered from crop-raiding can be relatively high (Nyhus *et al.,* 2005; Linkie *et al.,* 2007; Warren *et al.,* 2007). Continuous increase in human population has been identified has one of the driving force for deforestation leading to decline in wildlife population and habitat (Joseline, 2010; Mwamidi *et al.,* 2012). This encroachment into forest and wildlife habitat does not exclude wildlife reserves; as farmers in neighbouring communities cultivate farm crops on boundaries and buffer zones of National Parks. These pressures on land resources and reduction of core habitat for wild animals and elimination of corridors for migration increase the probability of contact, and possibly create conflict between farmers and wild animals (Quirin, 2005). This study investigated wild animal species responsible for crop raiding and its economic implication on farmers living in communities' adjacent Old Oyo National Park in Nigeria.

MATERIAL AND METHODS
Study Area
This study was conducted in Old Oyo National Park, Oyo State. The Park is located across northern Oyo State and Southern Kwara State of Nigeria. It is rich in plant and animal resources. The Park is easily accessible from Southern and Western Nigeria. The nearest cities and towns adjoining the Park include: Saki, Iseyin, Igboho, Sepeteri, Tede, and Igbeti which have their own commercial and cultural attraction for tourism. The National park originated from two earlier native administrative forest reserves namely; Upper Ogun established in 1936 and Oyo-ile established in 1941. These were converted to Game Reserves in1952, then combined and upgraded to the present status of a National Park in 1979.Old Oyo National Park is made up of 5 ranges which are: Oyoile, Sepeteri, Yemoso, Tede and Marguba ranges.
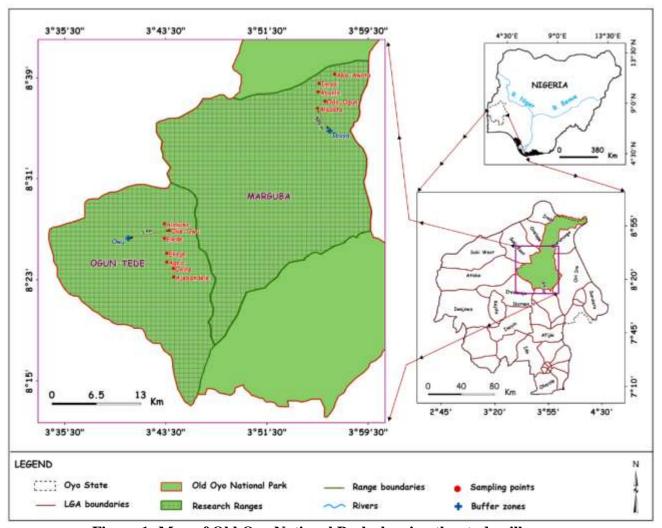
Figure 1: Map of Old Oyo National Park showing the study villages

Data Collection

Data were collected through administration of structured questionnaires to the affected farmers in the study area. Twelve (12) communities were selected due to intensive agricultural activities and prevalence of crop damage in the existing support zones communities in Old Oyo National Park. These communities are: Imodi, Alapata, Abanla, Aba Owotu, Odo Ogun, Elede, Oke Owu, Ekeje, Agric, Ajebandele, Alakuko, Onire. Two hundred and thirty (230) copies of

Questionnaires were administered in all. Non probability snowballing method was used in locating and sampling affected respondents. Snowball method technique is a non-probability sampling method used when desired sample characteristics is rare as used by Oduntan *et al.* (2012) until 25 affected farmers were sampled in each villages. However except in villages where the farmers were not up to 25.

Table 1: Sampling Plan for the Study Area

Selected Ranges	Total respondents	Communities	Number of respondents
Marguba	60	Imodi	25
		Alapata	15
		Abanla	8
		Aba Owotu	6
		Odo Ogun	6
Tede	170	Elede	25
		Oke owu	25
		Ekeje	25
		Agric	25
		Ajebandele	25
		Alakuko	25
		Onire	20

Data Analysis

Descriptive statistical techniques such as bar chart and pie chart were used to depict the animals implicated in crop raiding. Also, the frequency of invasion of farmlands was rendered descriptively. The input-output ratio model was used to assess the economic damage by the animals. Economic damage was calculated by deducing the difference between expected and actual income. Expected income would have been the total monetary value if no crops were damaged by these animals while actual income is the monetary value of marketable crops after removing the damaged crops. This was calculated using the formula:

Estimated amount of plant damage = Expected income - Actual income ….. 1

Expected income = Number of Plant Stand on Farmland x Price of Plant Stand … 2

Number of Plant Stand on Farmland = Size of Farmland (m^2)/spacing …. 3

Actual income = Number of Plant Stand in the % Farmland Destroyed x Price of Plant Stand

The estimated amount of Price of Plant Stand is as follows Maize ₦40, cassava ₦150, yam ₦200, tomato ₦50, pepper ₦30.

RESULTS

The socio-economic characteristics of the respondents in table 2 indicated that 42% of the respondents were in the age group of 31-40. It was observed that most of the respondents were male (87.4%) and married (78.7%). Most of the respondents were yorubas and higher percentage of the respondents had no formal education (67.4%). The household size shows that 44.8% of the household had 4-6 persons while 4.8% had household size of 9 persons. The respondents were Christians 52.6%, 43.5% were Muslims while 3.9% were traditionalists. On occupational status, the respondents were predominantly farmers while others were involved in other activities. More than 40.9% of the respondents have spent at least 16-20 years living in the neighbouring communities.

The result in table 3 shows that 96.1% of respondents farmlands were <10km away from the park boundary while 3.9% were >10km farther from the park.The response of respondents on raiding of agricultural crops by wild animals in the neighbouring villages in the study area is shown in Table 4. About (74.8%) of the respondents indicated that their farmlands were raided by wild animals while 25.2% of the respondent's farmlands were not raided. The result in table 5 shows that 94.8% of the

respondents owned <4 acres of land while 5.2% owned >4 acres.

The wild animal species involved in agricultural crop damage were presented in table 6. Wild animal species identified as notorious crop raiders were Patas monkey (*Erythrocebus patas*), Wild pig (*Sus scrofa),* Senegal parrot (*Poicephalus senegalus*), Duiker (*Sylvicapra grimmia*) and Bush buck (*Tragelaphus sylvaticus*) by 44.3%, 31.7%, 15.7%, 4.3% and 4.0% of respondents respectively. The result in table 7 shows the agricultural crop damaged in the study area. Yam (*Dioscorea alata),* Maize (*Zea mays*), Cassava *(Manihot esculenta*), Pepper (*Capsicum species),* Tomato (*Solanum lycopersicon*) were identified by 44.5%, 33%, 17.8%, 3.0% and 2.6% of respondents respectively. Table 8 shows the economic damage caused by the wild animals in the study area. The result shows that an average of ₦1141251±111078, ₦1995640±104967, ₦902500±38456, ₦40000, ₦6500±3250, losses worth of Yam, Maize, Cassava, Tomato, Pepper respectively were incurred by famers due to crop raiding activities by wild animal in the study area. Figure 2 shows the method of control used by the farmers to mitigate effects of crop raiding activities. The control measures used by the respondents included scarecrow (33%), guarding (30%), gun (7%), bottle (3%), cassette tape (2%) and gong (2%). Furthermore, 2% adopted the combination of scarecrow and guarding while 21% do not use any of the technique. The effectiveness of the control measures adopted in the study area was presented in fig 3. The result shows that (46.1%) of the respondents control measure effectiveness was observed to be poor while (33.5%) were observed to be fair and (20.4%) were observed to be good.

Table: 2 Socio-Economic Characteristics of the Respondents

Variables	Frequency n=230	Percentage (%)
Age (years)		
15-30	49	21
31-40	97	42
>41	84	37
Gender		
Male	209	87.4
Female	21	12.6
Marital status		
Single	31	13.5
Married	181	78.7
Others	18	7.8
Educational status		
Primary	58	25.2
Secondary	15	6.5
Tertiary	2	0.9
No formal	155	67.5
Family size		
1-3	100	43.5
4-6	103	44.8
7-9	16	7.0
0thers	11	4.8
Religion		
Muslim	100	43.5
Christian	121	52.6
Traditionalist	9	3.9
Ethnic		
Yoruba	180	78.3
Igbo	1	0.4
Hausa	6	2.6
Others	43	18.7
Primary occupation		
Farming	213	92.6
Trader	4	1.7
Craft maker	1	0.4
Livestock keeping	2	0.9
Hairstylist	2	0.9
Caterer	1	0.4
Teacher	2	0.9
Pastor	1	0.4
Student	3	1.3
Okada rider	1	0.4
Residence (Years)		
1-5	10	4.3
6-10	15	6.5
11-15	22	9.6
16-20	94	40.9
>20	89	38.7

Table 3: Proximity of Farmland to National Park Boundaries

Distance (Km)	No of respondents	Percentage (%)
<10Km	221	96.1
>10Km	9	3.9
Total	**230**	**100**

Table 4: Invasion of Wild Animal on Farmlands

Response	Frequency	Percentage (%)
Yes	172	74.8
No	58	25.2
Total	**230**	**100**

Table 5: Size of Farmland Owned by the Farmers

Size (Acre)	Frequency	Percentage (%)
<4	218	94.8
>4	12	5.2
Total	**230**	**100**

Table 6: Wild Animals Involved in Crop Raiding in the Study Area

Animal involved	Frequency	Percentage (%)
Patas monkey (*Erythrocebus patas*)	102	44.3
Wild pig (*Sus scrofa*)	73	31.7
Senegal parrot (*Poicephalus senegalus*)	36	15.7
Duiker (*Sylvicapra grimmia*)	10	4.3
Bush buck (*Tragelaphus sylvaticus*)	9	4.0
Total	**230**	**100**

Table 7: Mostly Raided Crops in the Study Area.

Crop involved	Frequency	Percentage (%)
Yam (*Dioscorea alata)*	100	43.5
Maize (*Zea mays*)	76	33
Pepper (*Capsicum species)*	7	3.0
Cassava *(Manihot esculenta*)	41	17.8
Tomato (*Solanum lycopersicon*)	6	2.6
Total	**230**	**100**

Table 8: The Loss Incurred on Each Crop by the Damage

Row Labels	Sum of Expected Income (₦:K)	Actual Income (₦:K)	Sum of Estimated Amount of Damage (₦:K)	Average Sum of Damage (₦:K)	Standard Error
Cassava	12,141,575	10,546,575	1,595,000	902,500	38,456
Maize	32,380,575	26,953,575	5,427,000	1,995,640	104,967
Pepper	674,460	659,460	15,000	6500	3,250
Tomato	974,220	934,220	40,000	40,000	0
Yam	40,839,700	35,140,200	5,699,500	1,141,251	111,078
Grand Total	**87,010,530**	**74,234,030**	**12,776,500**	**3,085,891**	**257,751**

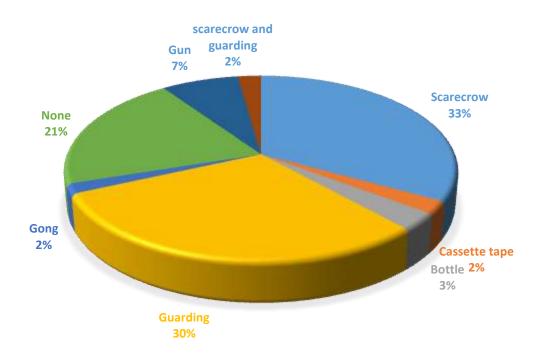*** Amount of damage= Expected Income – Actual Income*

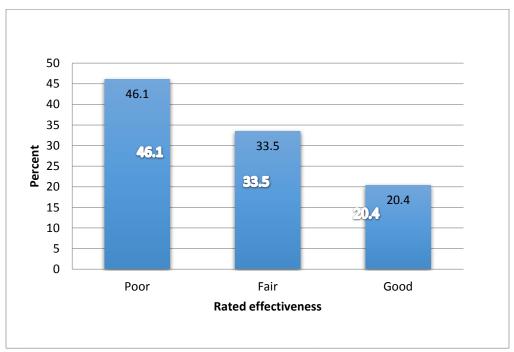**Figure 2: Control measures adopted by the respondents**

Figure 3: Effectiveness of control measures based on field observation in the study area

DISCUSSION

The findings from the study revealed that majority of the respondents were male and were married. This indicates that farming activities are mostly dominated by men. This result can be justified by the assertion of Twyman *et al*. (2015) that women may be seen as farm helpers, but not farmers; or they may be viewed as only growing food in the kitchen garden or homestead. . Majority of the respondents were in the age group of 31-40 years. This means that the respondents in the age group of 31-40 living along the park boundary were still within their active and productive age. This result is in accordance with the findings of Yekini, (2011) where he observed mean age of 43.2 years for farmers in Nigeria. Majority of the respondents had no formal education. This shows the level of illiteracy among the people living in rural areas. This result is in line with the findings of Oladeji, (2011) that farmers have one form of education or the other. The household size showed that almost half of the household had 4-6 persons. The household size has implication for labour provision on the farm which increases farm productivity but it has the negative impact of causing overcrowding in the home. Most of the respondents were engaged in farming as their major occupation. Badmus *et al*., (2009) noted that agriculture as a sector is dominated by small holdings farming families, with most of them residing in rural areas. It was observed that majority of the respondents farms were located close to or within 10km to the park boundaries. This corroborate the findings of Brockington (2004) which stated that crop raiding affects farms closer to forest boundaries than farms which are farther as such farms are easily accessible by wildlife and are therefore at the most risk from crop raiding.

The response on invasion of wild animal on farmlands neighbouring villages in the study area shows that 74.8% of the respondent farmlands were raided by wild animals. This is an indication that some factors are responsible such as animal density, distance of farmlands to the park boundaries and wild animal species involved and so on. This is supported by the findings of Hill (2004) who stated that farmers' perceptions of the most notorious crop pests are often influenced by factors other than crop damage. Most (94.8%) of the farmer in the study area have the land ownership close to or within 4acres. This shows that most of the respondents were affected by crop raiding since many were engaged in farming and larger farmlands may experience more economic loss than the lesser farmlands. This corroborate the findings of Messmer (2000) which stated that the relative impact of wildlife damage on farmland production and household income varies greatly according to the amount of land owned and peoples' economic dependence on rural activities. Different species of wild animals were found problematic in the study area. Patas monkey were identified as the most notorious crop raider while bush buck were the least crop raider. This may be because of their intelligence, opportunism, adaptability and manipulative abilities that makes them formidable crop raiders. This corroborate with the findings Sillero and Switzer (2001) which stated that across the globe, primates wherever they occur, are the most frequently identified crop raiding animals. The findings on crop species commonly raided by wildlife species revealed that yam is mostly raided.

The assessment of economic damage caused by wild animals on farmlands showed an average of ₦1141251±111078, ₦1995640±104967, ₦902500±38456 worth of Yam, Maize, Cassava were respectively loss to wild animal by farmers while Pepper and tomato were the least crop loss with an average of ₦6500±3250 and

₦40,000 respectively in the study area. The findings came to the same conclusion with Sitati *et al.,* (2005) that certain crops such as yam, cassava and sweet potatoes are mainly raided by wild pigs. Also, the claimed preference of forest primates for raiding maize may be related to its higher level of protein, making it a more worthwhile risk (Pérez and Pacheco, 2006), or because it is one of the predominant crop grown along the park boundary.The mitigating techniques adopted are the use of scarecrow, guarding, gun, gong, bottle, and cassette tape. These methods are used either individually or in combination. This is in line with Osborn (2002) which stated that combination of crop protective methods would better protect the crop from wild animals. Most (33%) of the respondents adopted the use of scarecrow. This could be attributed to the size of farmlands, availability of labour and the species of animals involved in crop raiding. This corroborates with Fungo (2011) who stated that selection of the method to use depends on size of the fields, crop grown, and availability of labour to guard and vulnerability of the crop to available raiders. The result from the effectiveness of the preventive measures shows that 46.1% of the respondents control measure effectiveness was observed to be poor. The respondents complained that losses could really seriously not be mitigated. This result shows that there are no specific method of control that is most effective, rather, extent of damage seems to be as a result of factors like proximity to forest edge, search for more palatable food, animal species involved and high density of animal rather than the type of control method employed by the farmer. Sitati and Walpole (2005) suggested that these methods need further research to ensure their effectiveness against without any additional costs to households and impacts to wildlife.

CONCLUSION
Patas monkey (*Erythrocebus patas*) were the most destructive crop raider and were believed to inflict substantial losses to inhabitants living in communities close to or within 0 to 4 km to park boundary. Food crop that are mostly raided within the areas surrounding the National Park include; Yam, maize and cassava and this is due to its preference by many of the pests. Control measures currently used by the farmers are mostly ineffective as even the farms which recorded low percentages of damage were due to their considerable distance to the park boundary. It is recommended that cultivation of crops within 0 to 4 km to park boundary should be discouraged to reduce the effect of crop raiding to barest minimum. Furthermore, the government and all conservation associated stakeholders should foster efforts together to ensure that compensation schemes are been put in place to address the losses incurred by the affected farmers before they start taking laws into their own hands.

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