Deterrent Methods for Mitigating Crop Raiding By Primates in the Communities around Kainji Lake National Park, Nigeria

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KEYWORDS

Primates,
Crop damage,
Deterrent methods,
Mitigating losses

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ABSTRACT

The study identified the deterrent methods employed to prevent crop damage and economic losses in the Support zones of Kainji Lake National park, Nigeria. There is a general perception that primates living at the edge of reserve boundaries are often agricultural pests. Direct method and structured questionnaire were used to obtain information on preventive methods used and it effectiveness in mitigating crop damage by primates. Purposive sampling technique was used for ten (10) communities with serious presence of human-primate conflict. Simple random sampling technique was adopted in selecting respondents from each community. Descriptive statistics and Chi-square test analyses were adopted to investigate the opinions of respondents for significant differences. The results revealed that the various deterrent methods mostly used include, trapping, killing, scare crow, shouting, fencing and stoning which were adopted by 17.8%, 15.5%, 8.9%, 14.5%, 10.2% and 3.3% of the respondents respectively. Majority of the respondents (57.8%) indicated guarding method as the most effective method of preventing crop damage. With respect to the methods and strategies adopted for crop protection, opinions of respondents were also unequally divided, depending on which method or strategy fitted any particular situation ($P < 0.05$). Guarding method is the most effective method of preventing primates from crop damage in view of their diurnal foraging behaviour. Since most deterrent methods used by local farmers did not take into consideration affordability and use, more methods which must be absolutely effective, affordable and can be operated by the local dwellers be developed.

INTRODUCTION

Human-primate conflict resolution is important in reducing the vulnerability of people that come into conflict with wildlife, by reducing the magnitude of wildlife damage sustained (Dickman, 2010). If problems are allowed to persist, losses will only get worse and difficulties in management magnified (Engeman *et al*., 2010). Furthermore, providing solutions helps encourage positive attitudes towards wildlife so that peaceful human wildlife coexistence can be maintained (Strum, 2010). There are a number of deterrent methods that are currently implemented by agriculturalists that suffer from damage by wildlife. These include: guarding, chasing, beating drums, throwing stones, slingshots, spears, bear bangers, ultrasound, dogs, scarecrows, chilli bombs, translocation, culling, a range of fencing including electric, fladry, buffer crops, and many more (Kaplan, 2013).

However, most of these methods are employed with limited effectiveness and could be significantly improved. Most control strategies will require some form of investment in either manual labour or capital (Wang *et al.*, 2016). Therefore, an important consideration is whether the management strategy is appropriate and affordable to the community concerned. It is extremely important to gather knowledge of the context of crop raiding at any study site, both from an ecological and social stand point, before implementing mitigation strategies. It is unlikely that a single management strategy will prevent all crop damage by all problem animals (Wang *et al*., 2016), and therefore a combination of techniques should be used.

There is a general perception that primates living at the edge of reserve boundaries are often agricultural pests and can pose considerable costs to cultivators living in their vicinity(Naughton-Treves, 1998). Such perception is based on a large body of literature

from studies conducted in Africa and Asia which reported that members of the genera Macaca, Papio and Cecrcopithecus are among the most frequently cited primate pest species and that they can impose considerable losses to farmers by destroying crops (Paterson and Wallis, 2015). This leads to development of negative attitude towards primate conservation as they are seen as nuisance and pest (Kivai, 2008), and consequently killed.

However, information on primates crop damage and control measures adopted in locations surrounding the Kainji Lake National Park are scanty. Therefore, the development of adequate strategies to minimise primates conflict impacts on local livelihoods, which can reverse the negative attitude by the people towards primates is constrained by scarce information.

MATERIALS AND METHOD

Study Area

Kainji Lake National Park (KLNP) which has a savannah climate is located in the North-West central part of Nigeria between Niger and Kwara States with coordinates Latitudes 9º 40'- 10º 20' N, and Longitude 3º 40' – 5º10'Eand a total area of 5,340.82 (sqkm). The area has two distinctive sectors known as the Borgu and Zugurma Sectors (Marguba, 2002). (KLNP) was established as Premier Park in Nigeria on 29th July 1979 by the amalgamation of the two existing Game Reserves, Borgu and Zugurma sectors under decree 46 of 1976 replaced by decree 36 of 1991. Zugurma Sector covers an area of 1370.89km^2 and it is situated in Mashegu Local Government Area of Niger State while Borgu sector is located in Borgu Local Government Area of Niger State in Kaiama and Barutten Local Government Areas of Kwara state. It covers an area of 3970.02sqkm. Both sectors (Zugurma and Borgu) are separated by the Kainji Lake, a lake impounded on the river Niger for hydroelectric power generation (Eleazor, 2002) as shown in Figure 1.

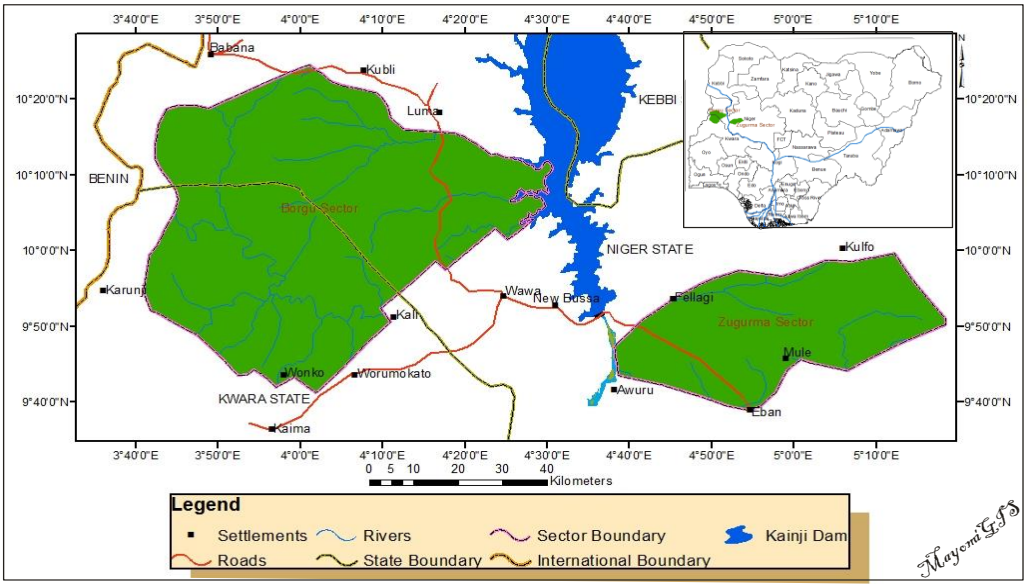

Figure 1: Map of Kainji Lake National Park
Source: Digitized from Google Earth Pro (May, 2018): GIS Laboratory, Dept. of Geography, University

Sampling technique and data collection

Purposive sampling technique was used in data collection. This involved the selection of communities with serious presence of human-primate conflict in the study area. A total of ten (10) communities having serious human-primate conflict were identified and selected. The communities included Mazakuaka, Felegi, Patiko, Woko, Worumakoto, Kemanji, Luma, Kulho, Ibbi and Dekara. Simple random sampling technique was then applied to select respondents from each community. The respondents included farmers, civil servants, traders, students, pastoralists and hunters. The number of respondents selected in each community shown in (Table 1)was determined using the probability proportional formula as adopted by Amaja *et al.*, (2016).

Table 1: Number of Respondents randomly selected from each community

Community	Population	Number of respondents sampled
Mazakuka	150	15
Feleji	200	20
Patiko	149	15
Woko	150	15
Worumakoto	200	20
Kemanji	499	50
Luma	500	50
Kulho	350	35
Ibbi	530	53
Dekara	300	30
Total	**3028**	**303**

Source: KLNP office (2019)

Data Analysis

Data collected were analyzed using SPSS version 20 software and MS Excel. Accordingly, descriptive statistics (frequency, percentages and cross tabulation) was used in analyzing the types of deterrent method and it effectiveness by farmers. Chi-square test analysis was also adopted to reveal the opinions of respondents for significant differences.

RESULTS

Table 2 presents different deterrent and preventive measures adopted to deter primates from invading or damaging crops in the areas around the park. As a measure, 70.6% of the respondents protected their crops in one form or the other while 29.4% did not. About 60% of the farmers used guarding as the primary method of crop protection, while 40.4% did not. On the other hand, trapping, killing, scare crow, shouting, fencing and stoning were adopted by 17.8%, 15.5%, 8.9%, 14.5%, 10.2% and 3.3% of the respondents respectively as means of ensuing crop protection. However, about 30% of the respondents indicated that nothing was adopted to protect their crops. With respect to the methods and strategies adopted for crop protection, opinions of respondents were also unequally divided, depending on which method or strategy fitted any particular situation ($P < 0.05$).

Table 2: deterrent methods adopted for crop protection against primate damage

Variables	Frequency	Percentage	P
Protection			
Yes	214	70.6	0.00
No	89	29.4	
Total	303	100	
Use guarding as the primary method			
Yes	180	59.6	0.00
No	122	40.4	
Total	302	100	
Other strategies adopted for crop protection			
Nothing	90	29.7	0.00
Trapping	54	17.8	
Killing	47	15.5	
Scarecrow	27	8.9	
Shouting	44	14.5	
Fencing	31	10.2	
Stoning	10	3.3	
Total	**303**	**100**	

$\alpha = 0.05$

Source: Field survey (2019)

Table 3 presents effectiveness of deterrent Methods adopted for crop protection against primate. About 10.2% of the respondents are of the opinion that the methods are very-effective, 57.8% believed that the methods are effective while 32% noted that the methods were not-effective, going by their assessment of the situations. In terms of the effectiveness of the methods and whether lethal prevention methods should be adopted, respondents were unequally divided with responses skewing towards non-adoption of lethal methods ($P < 0.05$).

Table 3: Effectiveness of deterrent Methods adopted for crop protection against primate

Variables	Frequency	Percentage	P
Effectiveness			
Very effective	31	10.2	0.00
Effective	175	57.8	
Not effective	97	32.0	
Total	303	100	

$\alpha = 0.05$

Source: Field survey (2019)

DISCUSSION

There were several strategies and deterrent methods of control and prevention adopted to deter primates from damaging crops in the areas around the park. More than 70% of the respondents adopted one form or the other methods to protect or prevent crop raiding. The use of guarding method seemed to be the primary method of choice to many farmers and was adopted by 60% of the respondents. Other methods such as trapping, killing, use of scarecrow, shouting, fencing and stoning were used by not more than 10% of the respondents in the study area. These findings agree with the report of Mosissa *et al.* (2017) who observed that the most commonly used methods to protect crop from primate raiding was guarding. Since primates are diurnal, guarding proves to be an effective strategy for the protection of crops from damage and it can be done by watching or by using dogs. However, chasing primate from one field may simply move them to the next field .Mosissa *et al.* (2017) reported that Scarecrow is one of the traditional indigenous methods in which farmers used different models that resemble humans but, since primate are intelligent the method is not effective. Fencing was not found to be effective as primate can easily cross over fences. Akosim *et al.* (2010) reported that fencing and smoking were not effective for protection against crop raiding by Baboon. It is implied from the findings of this study that there is yet no absolutely effective method of protecting the farms from being raided by the primates. An important consideration in developing any effective method is its affordability. It is therefore necessary that effective technique be developed through the improvement of the existing traditional deterrent methods. This observation agrees with the report of Sillero-Zubiri and Switzer (2001) that effective methods must take into consideration affordability and the ability of the local farmers to use it.

CONCLUSION AND RECOMMENDATIONS

The findings on deterrent method adopted and their effectiveness revealed that guarding among all the methods of crop protection against raiding by primates proves to be more effective than any other methods. However, it still does not offer absolute protection against the raiding of crops by primate species in view of their diurnal foraging behaviour. Since most deterrent methods used by local farmers did not take into consideration affordability and use, it is recommended that more methods which must be absolutely effective, affordable and that can be operated by the local dwellers be developed. For example, locally available materials, fences, solar lights, digging trenches, alarms and repellents chilli powder.

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