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Economic Damages of Primates on Farmlands around Ibodi Monkey Forest, Osun State, Nigeria

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Abstract

There have been the reports of incidence of primate's invasion within the vicinity of Ibodi Monkey Forest, in Osun State, Nigeria. This article examined the expected losses incurred, owing to damages caused by primates on farmlands as well as the techniques of control. For the study, primary data were gathered and used. Open-ended questionnaires were used to gather data, and they were given to all the affected farmers in the research area. In order to identify and sample the impacted farms, the non-probability snowballing method was applied. The outcome showed that each farmer in the settlements of Eriperi, Iyemogun, Isaobi, and Ileki-Ijesha lost an estimated average amount of cocoa valued at N67,656.35±420.90, â,N68,248.14±500.97,â,N66,094.73±482.22, â,N67,817.90±554.17,

respectively. Also, an estimated average of â,₦3,979.18, N3,981.33, N3,974, and N3,905.85 worth of maize were lost on farmlands by each farmer at Eriperi, Iyemogun, Isaobi and Ileki-Ijeshasettlements respectively. Additionally, in the aforementioned communities, an estimated average of N4,780.53, N3,993.50, N5,834.48, and N5,321.99 worth of cassava plants were lost to primates. Additionally, the majority of respondents (37.8%, 18.2%, 20.1% and 23.9% in Eriperi, Iyemogun, Isaobi, and Ileki-Ijesha, respectively) used firearms to manage primates on their farmlands. The data also demonstrates that traps, scarecrows, chasing and firearms were the four (4) fundamental primate-invasion control methods utilized by farmers in the study locations to reduce damage. On the basis of the study's findings, recommendations were made.

Keywords
Wildlife; Conservation; Damage control; Conflicts, Losses
Word Count: 228

Introduction

Problem of animal control is a contentious topic around the world, and there is much discussion about eliminating problem species, especially in the more industrialised nations where potential ecological consequences have been realised. All species, including birds, insects, carnivores, omnivores, pisces, and herbivores, are essential to the functioning of a stable and balanced environment. They interact with one another in such an untouched or natural ecosystem, keeping each other in balance. It is difficult to overstate the importance of animals in the ecological system, particularly with regard to preserving ecological balance in the function and structure of an ecosystem.

The functioning of the systems and maintenance of life within it are carried out by all the elements making up the ecosystem, according to a study of the transfer or transmission of energy through the ecosystems in the food chain and food webs (Ojo, 2006, unpublished data). However, certain creatures are viewed as pests because they harm habitat elements that are economically valuable

to man, which may substantially hamper his attempts to generate food (Evans, 2019). According to Hamilton, Johnson, Case, Riley, and Stroup, (2019), a pest species is any organism, animal, or plant that endangers or damages man, his animals, crops, or bothers him in any way. Depending on the species involved, wildlife damage problems vary from location to location, causing varying types and levels of damage to cultivated crops in the field, which reduces the amount and quality of food that is available for consumption as well as the income and standard of living of farmers (Johnson, 2019).

Primate Studies in Agricultural Management

This is the science known as primatology. Most people think that scientific observations of nature have to be strictly regulated or severely restricted. The observers must remain impartial towards their subjects in either case. This makes it possible for the participants to be free from human influence and for the data to be impartial. In primatology, there are three methodological approaches: semi-free ranging, which replicates wild social structure and primate environment in a captive setting; field study, which is more realistic; and laboratory study, which is more regulated. Scientists do field research in natural settings, observing primates in their native habitat. Research is conducted in controlled laboratory environments. Scientists can conduct controlled experiments on the animals' ability to learn and their behavioural patterns in lab conditions. Scientists can see how primates might behave in the wild in semi-free ranging research since they have easier access to the animals and can manipulate their surroundings. According to Western methodology, all forms of primate research are intended to be impartial. In this area, the focus is on the objective, yet there are instances where people conduct more subjective study.

Primates and humans have clashed all over the world; they frequently destroy cattle and crops, and some have even been known to hurt or kill people (Newman, 2018; Groves, 2019). Additionally,

they might consume the same natural foods that humans and cattle do, making them competitors with people for these resources. The Mona monkey was listed as the most prevalent crop-raider by Newman (2018). They move in packs and destroy vast swaths of crops all at once. Primates are social, highly intellectual creatures. According to Groves (2019), some people will feed while others watch out for farmers, and they switch off between the two tasks. They can thereby destroy larger regions of crops than animals that graze by themselves.

Simply being aware that farmers are losing crops to wildlife, raiding may not be sufficient information to assess the impact on nearby communities or individuals. For the purpose of managing agriculture-wildlife conflict effectively, information on the different types of crops that were harmed as well as the estimated quantities and crop loss are crucial.

Competition for shared natural resources leads to conflict between humans and nonhuman primates, which have an impact on both the welfare of the nonhuman primates and human food security. Conflict between humans and primates can take many forms, such as crop damage, primates destroying human property, and the local populace killing back at the primates (Hariohay & Røskaft, 2019).

The most common type of conflict between humans and primates in Africa is crop damage. Crop destruction by primates causes large financial losses. It's general knowledge that critters that exhibit this behaviour are called crop-raiders. Primates causing damage close to protected areas are a major issue that could endanger conservation efforts. Crop damage impacts rural farmers' ability to subsist, especially in developing nations, making them more susceptible to food and financial instability and, ultimately, poverty. Building and assessing deterrents requires an understanding of the components of damaging events that determine crop loss, as this is the most common source of conflict between humans and primates (Tweheyo, Hill, & Obua, 2021).

Developing nations, especially those in sub-Saharan Africa, are more vulnerable than developed nations because to their reliance on natural resources. A well-known phenomenon in Nigeria and the West Africa is fighting between humans and primates (FAO, 2009). Coexistence, positive interactions, and tolerating attitudes towards monkeys are all essential elements of strategies that maximize the efficiency of conservation. Primate populations are major pests in tropical regions, especially in Africa, where the majority of the population is subsistence farmers. A few primates are quite good at robbing crops; the most successful and destructive crop foragers are baboons (Jonathan Kingdom, 2015).

Statement of the Problem

Reducing human-primate conflict is an urgent conservation priority and is a key to coexistence between humans and primates in West Africa. There are many human-primate conflicts in Nigeria that need solutions, but there is not enough empirical study of this issue. The majority of research on conflict and coexistence between humans and primates in the nation has been done in protected areas (Seoraj-Pillai & Pillay, 2017). The conflict between humans and primates in settings altered by humans has been the subject of very few researches. Research on conflict and coexistence between humans and primates in communal areas is crucial due to the above mentioned causes, as well as the significant effects of anthropogenic pressures and primates. In villages close to the Southwest, Nigerian forest edge, the current study aimed to gather data on the kinds of crops lost, the monkeys most responsible for crop damage, the amount of crop loss, and the local farmers' preventive actions to prevent crop loss to primates (Mekonen, 2020).

In addition to estimating the losses incurred due to damages caused by primates on farmlands in the same research region, this research looked into the different types of crops destroyed by

primates, cost of losses incurred, and methods of primate invasion control in the areas around the Ibodi Monkey Forest.

Objective of the Study

The main objective of this research was to investigate the different types of crops primarily targeted by the primates, evaluate the cost of monetary losses incurred, and methods of primate invasion control in the areas around the Ibodi Monkey Forest.

Research Questions

What are the main different types of crops primarily targeted by the primates?
What is value in monetary terms the losses incurred?
Which methods of primate invasion control in the study areas?

Methodology

Study Area

Study was carried out in settlements and towns bordering Ibodi Monkey Forest, Nigeria. Ibodi Monkey Forest (IBMF) is one of the primary forests of Southwest of Nigeria, located in Atakumosa Local Government area of Osun State, Nigeria. The forest is easily accessible from Southwestern and Northwestern, Nigeria. The nearest cities and towns adjoining Ibodi Monkey Forest include Oshu-Ijesha, Ilesha, Iyemogun, Iwaraja-Ijesha, and Ogunmodede which have their own commercial and cultural attractions for tourism.

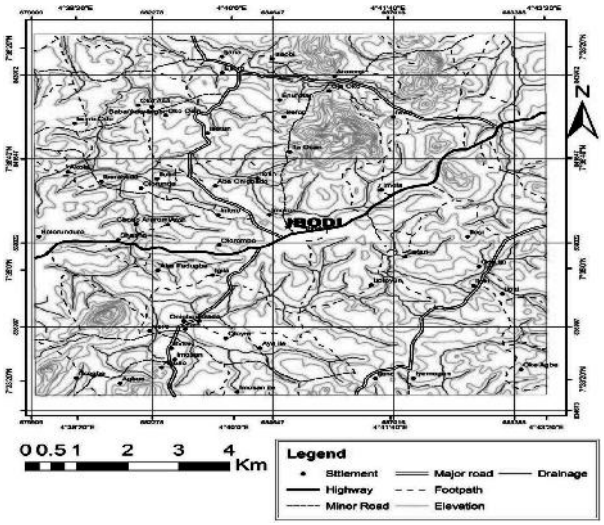

Figure 1: Map showing Ibodi Monkey Forest in Osun State, Nigeria
Source: Field survey, 2021.

Ibodi Monkey Forest comprises of a handful lot of settlements bordering of the forest. However, only four (4) settlements were used for this study based on the location and distribution of primate within the forest. They are: Eriperi, Iyemogun, Isaobi and Ileki-Ijesha. Thus the four settlements mentioned above were used for the study. This study was conducted between January-November, 2021.

Data Collection

For this study, primary data were gathered and used. Open-ended questionnaires were used to gather data, and they were given to all the affected farmers in the research area. In total, 113 questionnaires totaling 113 were distributed. In order to identify and sample the impacted farms, the non-probability snowballing method was applied. When the desired sample attribute is uncommon, the snowball sampling technique is a non-probability sampling technique utilised. Locating respondents in these circumstances could be very challenging or very expensive. Snowball relied on referrals from initial subjects

to create additional subjects; thus, the interviewer selected one or more respondent(s) within the association who referred the interviewer to another respondent, and the chain continued in this manner until the sample was exhausted or attained. All impacted farmers were interviewed until no fresh referrals were made because the research regions are tiny settlements. Descriptive statistics such as frequency tables, percentages and bar chart were used for analysis.

Results and Discussions

The most common primate identified during this study was the Mona monkey (*Cercopithecus mona*). These primates are known for their tendencies to become pestiferous, especially when there are nearby crop farms. About a group of twelve (12), fifteen (15), thirty-seven (37), and twenty-one (21) individual monkeys were found at Eriperi, Iyemogun, Isaobi and Ileki-Ijesha, respectively. They were observed to mostly feed on Cocoa fruits, cassava tubers, maize and other crops. Their mode of farm invasion was mostly observed during the early hours of the day and late in the evenings when the temperature was observed to be around 22°C-29°C

Plate1: One of the Mona monkeys identified during the study
Source: Field survey, 2021

Socio-Economic Structure

Table 1: Demographic Distribution of Respondents

Settlements	Male (%)	Female (%)
Eriperi	10.0	9.6
Iyemogun	31.6	4.5
Isaobi	7.8	16.2
Ileki-Ijesha	20.1	3.4
Total	**61.39%**	**38.61**

Source: Field survey, 2021.

According to the survey (Table 1), most farmers were men (62.00%) and had no formal education (48.70%). This outcome was consistent with earlier research by Ojo et al. (2009), which found that in villages near IBMF, 75.00% of farmers were male and 72.00% had no formal education. According to earlier studies, farmers with formal education are more likely to be aware of dangerous environmental practices or pest control techniques and to exercise caution around them (Jacobson et al., 2006). Additionally, 69.00% of farmers have families with seven or more members, and 73.45% of farmers are married. According to earlier research (Ayodele & Ojo, 2012), households with more members are likely to experience greater financial strain and struggle to raise their standard of living.

Financial Implication of Wildlife-Crop Damages in the Study Area

Table 2: Table showing financial implication of wildlife-crop damages in the study area.

Settlements	Cocoa (₦)	Cassava (₦)
Eriperi	₦67,656.35±420.90	₦4,780.53
Iyemogun	₦68,248.14±500.97	₦3,993.50
Isaobi	₦66,094.73±482.22	₦5,834.48
Ileki-Ijesha	₦67,817.90±554.17	₦5,321.99

Source: Field survey, 2021.

Table 2 shows the average value of crops lost to Primates in the study area. The result revealed that an estimated average of â,₦67,656.35±420.90, â,₦68,248.14±500.97, â,₦66,094.73±482.22, â,₦67,817.90±554.17worth of cocoa were lost by each farmer in Eriperi, Iyemogun, Isaobi and Ileki-Ijesha settlements respectively.

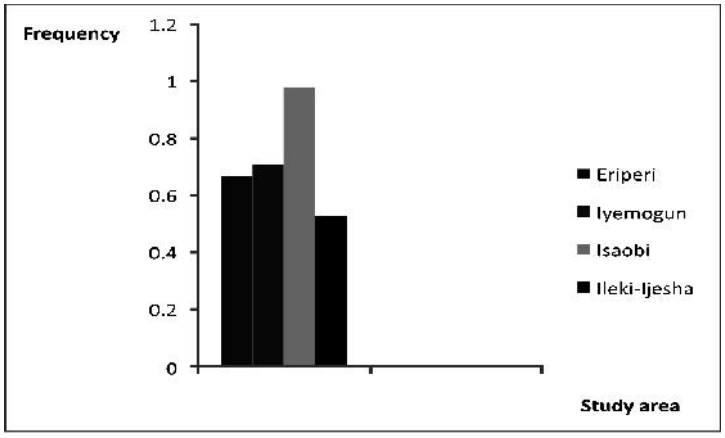

Figure 2: Resultsshowing estimated sum (mean) of crop loss to invasion.
Source: Field survey, 2021.

Results also showed that an estimated sum of â,N43 771.20, â,₦59 720.17, â,₦59 619.06 and â,₦54 682.21 worth of cocoa were lost to primate invasion on a total of 35 farmlands in Eriperi, Iyemogun, Isaobi and Ileki-Ijesha respectively (Figure 2).

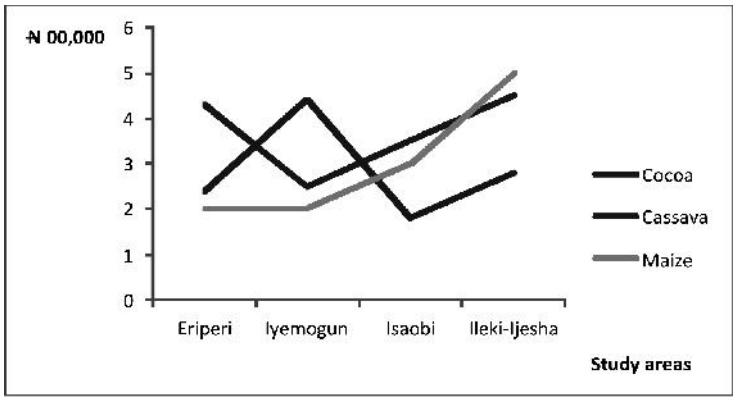

Figure 3: Results showing major crops loss to invasion.
Source: Field survey, 2021.

In addition, an estimated average of â,₦3,979.18±5.79, â,₦3,981.33±3.67, â,₦3,974.60±6.85, â,₦3,905.85±6.32 worth of maize were lost on farmlands by each farmer at Eriperi, Iyemogun, Isaobi and Ileki-Ijesha settlements respectively. The result revealed an estimated sum of â,₦473,594.40, â,₦409,488.90, â,₦396,568.40 and â,₦440,816.40 worth of crops or plants were lost to primate preying on farmlands in Eriperi, Iyemogun, Isaobi and Ileki-Ijesha respectively (Figure 3).

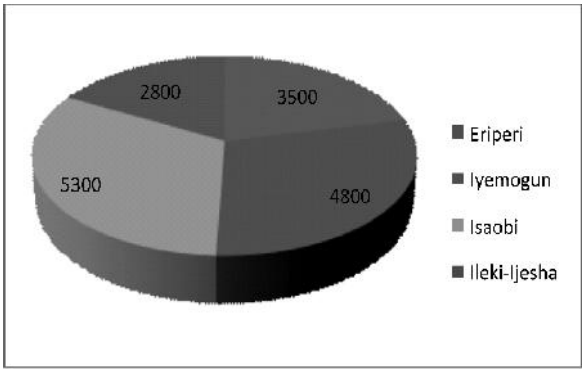

Figure 4: Results showing estimated sum (₦) of crop loss to invasion.
Source: Field survey, 2021.

Furthermore, while an estimated sum of â,₦11949.04, â,₦7983.09, â,₦11669.21 and â,₦7982.00 worth of cassavatubers were lost to primate invasion on a total of 10 farmlands in the respective settlements mentioned; an estimated average of â,₦4780.13±1.53, â,₦3993.09±4.50, â,₦5834.50±4.48, â,₦5321.33±3.99 worth of cassava plants or tubers were lost to primate in Eriperi, Iyemogun, Isaobi and Ileki-Ijesha respectively as shown in (Figure 4).

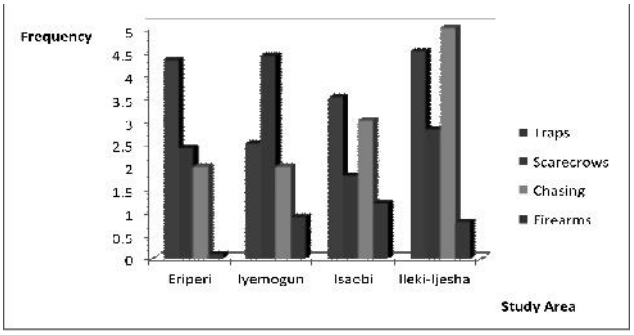

Figure 5: Results showing the methods of primate-invasion control within the study areas.
Source: Field survey, 2021.

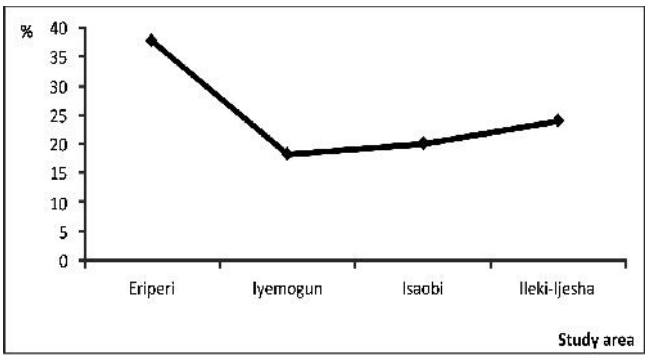

Figure 6: Results showing distribution of the use of firearms within the study areas.
Source: Field survey, 2021.

Discussion

This study shows that not many cassava farmlands or plants were affected by primates, when compared with other food crops that were affected in the study areas. This can be as a result of comments made by farmers in the study site that unlike cocoa, primate rarely eats cassava tuber or plants, which may be as a result of high percentage of cyanide in cassava. Farmers' comments in the study area further revealed that angered, provoked or wounded primates often intentionally destroyed farm crops, uprooting tubers and Cocoa trees on farmlands.

In general, a total of â,N217 792.64, â, N1 720 467.70 and â,N39 583.34 worth of cocoa and cassava farmlands were altogether respectively destroyed in settlements prone to primates attack within the Ibodi Monkey Forest ranges. Sarvas et al., (2012) concluded that destruction of crop by wild animal species hardened farmers' attitude against wildlife conservation. Loss of thousands and millions of Naira of food crops in settlements of a nation where 70.80% of the population are living on less than one dollar a day and 92.40% on less than two dollars a day (UNICEF, 2006, http://www.unicef.org/wcaro/

Countries_1320.html.) can further impoverished people living in such areas. Ayodele and Ojo (2012) argued that killing of wild animal is not an activity in which people engage in for the purpose of deriving leisure from it, rather, it is an activity associated in one form or the other with the upliftment of living standard of people.

Results also shows (Figure 5), that three basic techniques were in use in controlling damages by primates in the study areas. The techniques include the use of traps, scarecrows, chasing and the use of fire arms. While some of the respondents claimed that they only fire gun shot into the air to scare the animals away; some others disclose that there are occasions when many of the primate had been killed either intentionally or otherwise. This finding however, corroborates that of Ojo et al., (2009) where unfavourable attitude of farmers to wild animal species was traced to the information gathered on the estimated number of farmers that lost crops to wild animal species and the rate of occurrence.

Although, the use of fire arms appeared insignificant during the study, (see Figure 5), results further revealed that most of the respondents: 37.8%, 18.2%, 20.1% and 23.9% at Eriperi, Iyemogun, Isaobi and Ileki-Ijesha respectively, who engaged the use of fire arms in the control of Primates on their farmlands, did so during the dry season, mostly due to high visibility during the said season (see Figure 6). Distribution on the use of traps was closely followed by use of scarecrows, chasing, and firearms with a representation of 33.33%, 35.71%, 35.71% and 38.50% of respondents in the respective settlements. However, both the use of fire arms and traps are known to be unfriendly to wildlife conservation as it can either lead to outright killing of wild animal or rendering them wounded. It can be deduced from this result that control of primates is necessary to forestall annual losses reported by the respondents, however, selective method of primate-invasion control on farmlands is equally important, because if not quickly checked, some unintentionally targeted species of fauna may be threatened and unsustainably affected within the environments.

Conclusion

This study revealed that farmers in the neighbouring settlements of IBMF losses several amount of money to damages caused by primates on their farmlands. Majority of the farmers however resulted into use of fire arms and traps in controlling primate damages on their farmlands.

The most common type of primate found constituting the menace to farmers is the Mona monkey known scientifically as *Cercopithecus mona*. This was seen at almost all the study sites, and there were numerous evidences of the damages inflicted on the farmlands. Also, conflict between humans and primates in study site was mainly crop damage. According to the study, crop destruction by primates was seen to have caused large financial losses, as a result of their crop-raiding capabilities. Primates-causing damage was a major issue that could endanger crop production in the areas. Crop damage was seen to have negatively impacted the rural farmers' ability to subsist, especially in *Iyemogun*, where they mostly practice arable farming, making them more susceptible to food and financial instability and, if unchecked ultimately, poverty.

Recommendations

Based on the findings, informed conclusion inferred from this study, the followings are the recommendations:

1. Farmers should be encouraged by concerned authorities by compensating them for losses incur on their respective farmlands, due to wild animal damages, as a means of encouraging favorable attitude of farmers toward wild animal conservation.
2. There is need to educate the farmers on the importance of using wildlife damage control that support wildlife conservation such as cultivating on land unit that are clearly out of wild animal ranges to minimize damages.

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