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# Human-monkey conflict and community wildlife management: The case of Boabeng-fiema monkey sanctuary and Fringed communities in Ghana

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## Abstract

This paper focuses on the nexus of monkey conservation and the livelihood of fringed communities at Boabeng-Fiema Monkey Sanctuary in Ghana. Communities around wildlife sanctuary often complain of monkeys raiding their crops, destroying properties, livestock depredation as well as threat to life and personal safety. The aim of the study was to find out the causes of human-monkey conflict, livelihood effect of the conflict on the fringe communities as well as effective mitigation measures to curb this menace. A total of 270 local residents who were household heads from the six fringed communities at different distances from the edge of the sanctuary were randomly selected and 2 wildlife officers were purposively selected for the study. Structured questionnaire coupled with in-depth interview, focus group discussion and direct observation were used in the data collection. Crop raiding, destruction of properties, livestock depredation and threat to life and personal safety were the main causes of human-monkey conflict. Compensation, education and arresting offenders were rated as effective enhancement and mitigation measures of human-monkey conflict. Direct benefit from the proceeds from the sanctuary could be devised as a measure to mitigate the loss of farm produce, even though such benefits may not compensate the concerns of fringed communities.

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**Introduction**

Wildlife habitats are fast becoming human-dominated, which means that more wild species are compelled to exploit new human resources to survive (Strum, 2010). Human-wildlife conflict does not occur only in Africa. They occur on all continents, in developed as well as developing countries, yet the problems vary according to the particular environment and people's way of life. Conflict between humans and crocodiles, for example, has been reported in 33 countries spanning the tropics and subtropics, and the problem probably exists in many more (FAO, 2009). A case that has attracted a lot attention is the conflict in Zanzibar. On this island, farmers consider red colobus as serious crop raiders.

Urgent measures need to be put in place as red colobus is one of the most endangered primate species in Africa and in Zanzibar (Siex & Struhsaker, 1999). In particular, cultivation in forest areas which at the same time act as wildlife habitats in Africa is increasingly leading to conflict. Leopards still kill sheep within 100 km of Cape Town, South Africa, and lions kill cattle around the outskirts of Nairobi, Kenya (FAO, 2009). Conflict can be exacerbated by local people's lack of access to natural resources, substantiating the concept of conflict co-management as a means to achieve sustainable wildlife conservation (Weladji &Tchamba, 2003). 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).

Humans and monkeys have interacted over millennia in Africa as both wild and pets in their homes (Wilson & Reeder, 2005). As wildlife conflict has escalated, the lives of monkeys have not been spared. One-third of all primate species are now endangered as a result of human conflict related causes such as overexploitation, hunting and habitat destruction (Moinde *et al*., 2006. Previous studies have shown that hunting for bush meat is capable of decimating primate populations in different habitats (Butynski, 1985; Moinde *et al*., 2004). The distribution pattern of non- human primates in Africa is intrinsically linked to that of human. They share almost similar resources breeding localized competition between the two. This usually results in monkeys raiding people's crops from time to time making it difficult for local people to meet their basic livelihood needs. Restricting people in the attainment of their livelihoods does not inspire collaboration nor instill a feeling of ownership (Amoah and Wiafe, 2012).

A long term solution to human-monkey conflict can only be realized when an in-depth scientific research regarding human-monkey conflict is conducted since it affects the livelihood of fringed communities. Several past studies on human-wildlife conflict have concentrated on the major national parks such as Kakum Conservational Area (Addo-Boadu, 2010), Mole National Park (Acquah, 2013) and Digya National Park(Ayivor *et. al.,* 2013), which even focused on mega-fauna such as elephants. The few conducted in BFMS focused on crop raiding as the causes of human-monkey conflict in isolation (Wiafe and Arku, 2012). No systematic study has been conducted to find out the causes of human-monkey conflict, the livelihood effects and the appropriate solutions to the continuing problems as such the need to bridge this knowledge gap.

The objectives for this study are:

a. Identify the causes of human-monkey conflict by the activities of Lowe's monkeys (*Cercopithecus lowei)* (Groves, 2005) and white-thighed colobus (*Colobus vellerorus* (Saj *et. al.,* 2006) the two primate species inhabiting the Boabeng-Fiema Monkey Sanctuary (BFMS) in Ghana.
b. Identify the negative effects on the livelihoods of fringed communities
c. Suggest an effective mitigation measures to curb this menace were identified.

Findings from this study would provide country-specific knowledge on community wildlife sanctuary and people relationships. This knowledge could serve as a baseline for evaluating the causes and the mitigating strategies to be adopted to streamline these conflicts. This knowledge could also be juxtaposed with that of other areas to provide a framework for effectively mitigating human-monkey conflicts, especially those pertaining to crop raiding.

**Materials and methods**

*Study area*

The Boabeng-Fiema Monkey Sanctuary is located in the Nkoranza District in the Brong Ahafo Region of Ghana, between Latitudes 7°43'N and Longitudes1°42'W within the forest savanna transitional zone. It is about 22km from Nkoranza. The topography is flat with a gentle slope into a ground water spring adjacent to the village of Boabeng. The mean annual rainfall is 1250mm between March and October with peaks in June and September. The villages around the sanctuary have traditionally had a taboo against killing the white-thighed colobus (*Colobus verallosus*) and Lowe's monkey (*Cercopithecus lowei*) which the sanctuary harbors (Fargey, 1991).

The sanctuary covers an area of 494.2 hectares which is surrounded by maize, yam, groundnuts, cassava, and oil palm farms. Ground water potential is highly variable depending on the underlying rock formation and rainfall. The average maximum temperature is 30.9°C and minimum of 21.2°C. The hottest months are February, March and April. The prevailing climatic conditions in the district are favourable for agricultural activities (Ghana Statistical Service, 2010). The people of Boabeng and Fiema villages have considered the monkeys as sacred since the past 150 years. . The myth is that several years ago, a chief of the area was mysteriously protected by some of the monkeys during a tribal war.

During the tribal war, the enemies were unable to shoot the chief because he was surrounded by the monkeys; thence the local chief priest decreed that no one should kill or eat the monkeys. Since then the villagers have always regarded the monkeys as a totem or sacred (Appiah-Opoku, 2007).

*Data collection and Analysis*

The data collected for the study was carried out from February to April, 2018. The study employed a mixed-method approach and involved six communities around BFMS. In total, 272 individuals were randomly selected and were involved in semi-structured interview. The sampling frame was the village mapping for the 2010 Population and Housing Census (PHC) conducted by Ghana Statistical Service in 2010. From the mapping the selected households were easily identified. The equivalent sample size in the study communities was estimated according to the recommendation by Gomez and Jones (2010), using PHC 2010 (see table 1).

$$n = \frac{N}{1 + N(\alpha)^2}$$

Where,

N = Total Population (excluding institutions)

α = Confidence Level (The researcher took 95 percent confidence level).

n = Sample Size

All household heads in the selected households were engaged in semi-structured interviews. The questionnaire was developed from literature and the information gathered from key informants, focus groups and field observations was used to refine the questionnaires for the survey. The questionnaires were made up of mainly closed-ended questions that were pre-tested in two communities and further refined before the actual survey. It focused mainly on three modules. The first module sought data on socio-demographic characteristics of the respondents.

The second module laid emphasis on the causes of human-monkey conflict and the negative effects on the livelihoods of fringed communities. The final module focused on effective mitigation measures to curb the menace. The semi-structured interviews, which were recorded, lasted between 30 to 60 minutes. Key informants interview were used to gather primary information from park officials on issues relating to human-monkey conflict.

The focus group meetings were a follow up to the key informant interviews. The issues raised by the key informants were discussed at a group level. Gender and age were taking into consideration before forming the groups. The participants were recruited from the fringed communities and each group composed of 4-8 participants to allow for effective discussion. The participants were purposively selected based on their knowledge on the study

objectives. Two focus group meetings were held using a semi-structured interview which lasted for about 45-90 minutes. Checklists was prepared to guide topics for open-ended discussion with group of farmers. A three point Likert scale was developed to find out the effect of human-monkey conflict on fringe communities livelihood. It ranged from "Less severe", "More severe and "Most severe".

**Table 1.** Sample Size for the Study.

| Study communities | Distance from the sanctuary (Km) | Coordinate (W) | Coordinate (N) | Number of household | Proportionate sample |
|---|---|---|---|---|---|
| Boabeng | 0.01 | 1°41´ | 7°42´ | 248 | 38 |
| Fiema | 0.02 | 1°41´ | 7°43´ | 517 | 56 |
| Bonte | 1.06 | 1°40´ | 7°44´ | 609 | 60 |
| Bomini | 1.69 | 1°39´ | 7°43´ | 420 | 51 |
| Kokrompe | 3.54 | 1°42´ | 7°45´ | 225 | 36 |
| Tankor | 3.86 | 1°44´ | 7°40´ | 164 | 29 |
| Sub total | | | | | 270 |
| Participants for WD staff | | | | | 2 |
| Total | | | | | 272 |

Before the data was analyzed, there was data coding and editing to eliminate all errors. The data was collated and analyzed using Statistical Package for Social Scientists (SPSS version 16) and MS Excel. Non Parametric Test such as Chi-Square Test was used to show statistical significance between the variables. The analyzed data were represented through tabular and graphical form.

## Results and discussion

*Socio-Demographic Characteristics of Respondents*

Males dominated respondents sampled for the study, constituting 74.3% and females were the least representing 25.7%. The age distribution of respondents sampled for the study is revealing that the age group of 45-53 formed the majority and the least were within 18-26 age range.

Considering the educational level of respondents, 39.7 % had no formal education, 26.8% and 17.6% have had primary and Junior Higher School education respectively, whereas, 9.6% and 6.2% have had Senior High School and Tertiary education respectively.

About 49.3% of the respondents were crop farmers, 16.9% being livestock farmers, 13.6% engaging in trading, 11.8% being government workers and 8.5% constituting hunters. Males dominated respondents sampled for the study, constituting 74.3% and females were the least representing 25.7%.

This could be due to the fact that males are mostly the household heads in the African settings and males are willing to give out more and key information than females. Again, because of the culture, females are more reserved and need to seek permission from the males before giving out information or undertaking any activity.

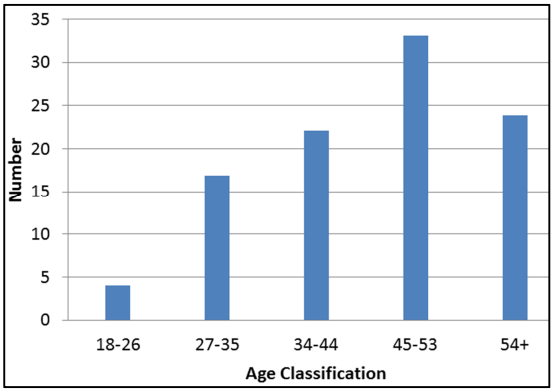


**Fig. 1.** Age classification of Respondents.

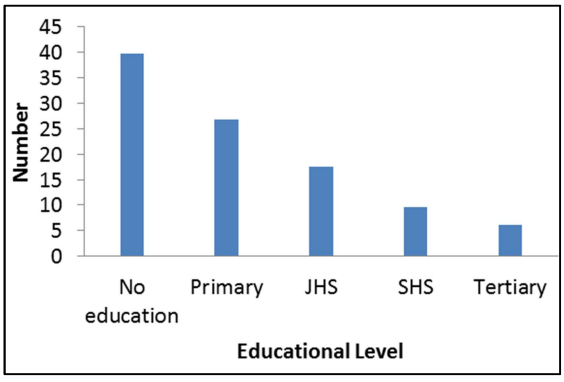


**Fig. 2.** Educational background of Respondents.

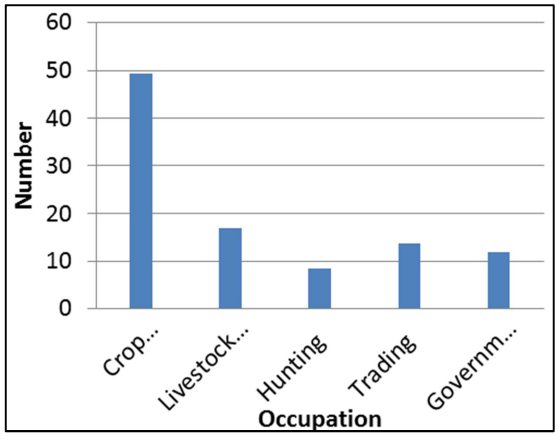


**Fig. 3.** Occupation of Respondents.

The age distribution of respondents sampled for the study is revealing that the age group of 45-53 formed the majority and the least were within 18-26 age range. This is so because at age 45-53, even though their energy levels are not all that high and most of them without formal education have resorted to farming regardless of the tedious nature of it coupled with the harsh environmental conditions which could affect their health. Those within age 18-26 have high energy levels to aid them in farming activities but most of them are still in school and those who have managed to complete have resorted to white collar jobs with the perception that farming is for the aged. The 2010 population census revealed that apart from Upper East Region and Northern Region, Brong Ahafo Region was ranked the next region with low levels with 26.4% of population living in the region have not being to school before (Ghana Statistical Service, 2010).

The study also confirms an earlier assertion by Eshun and Tonto (2014) and Thomas (2013) that the educational level of residents around eco-destinations in Ghana tends to be low.

The majority (66.2%) of the respondents engaged in farming both crop and animal. This suggests that agriculture is the main source of food and income for fringed communities and also consolidate the fact that agriculture is the backbone of the country's economy. The farmers were group of interest to the study as they are usually the people that seem to be at conflict with conservation due to threat on their livelihood (Kideghesho, Røskaft and Kaltenborn, 2007; Akenten, 2015). Crop raiding by monkeys has been a long standing problem for farmers in communities around BFMS. (Wiafe and Arku. 2012) reported that farmers were intolerant to the risk of losing crops to monkeys.

Fig. 2 shows that majority (57.4%) of the respondents bemoaned that crop raiding was the main cause of human-monkey conflict around BFMS. Most respondents expressed disappointment and frustration due to high rate of crop raiding exposing residents to food insecurity since most of the residents are peasant farmers.

Destruction of properties representing (24.3%) was ranked second to crop raiding and shown in Fig. 3. Since most of the homes in the study area are roofed by reeds, the monkeys pull out these reeds as they play on top of the building. Fig. 4 shows the attack and killing of domestic animals by the monkeys which represented (13.2%). This followed crop raiding and destruction of properties.

Livestock plays a vital role in the economy of local people (FAO, 1992). It is an important source of protein, income, savings and social standing. Therefore, monkey attacks on livestock are a major problem for rural communities. Though the monkeys are regarded as sacred, the local communities around BFMS had a little bit of suspicion on threat to personal safety stemming from the fact that they snatched food from indigenes as well as tourists visiting the sanctuary.

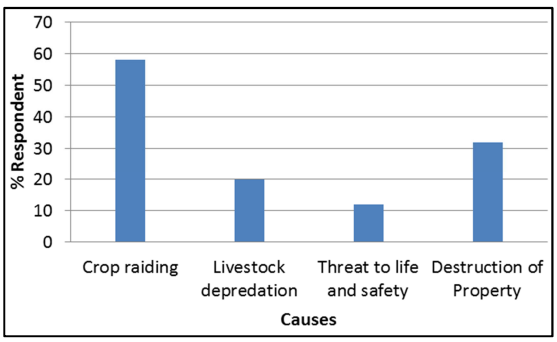


**Fig. 4.** Causes of human-monkey conflict according to results of questionnaire survey in Boabeng-Fiema Monkey Sanctuary.

On the trend of age and causes of human-monkey conflict, 33.1% from the age group 45-53 years were affected by the various causes of human-monkey conflict and the least of the respondents 4.1% from the ages 18-26 were affected. This may be due to the fact that respondents from this age group are mostly students. Majority of respondents (54) came from the age group of 45-53. This probably may be due to the fact that respondents from this age are mostly illiterates and have taken up crop farming as their main source of livelihood. Since the youth are not actively involved farming and not affected by crop raiding, they tend to have positive attitude towards the primates than the old age. This finding is in line with a study conducted in Norway. Young people (53.3%) generally were more positive towards wildlife, than older people. This was the case in Norway (Røskaft *et al.,* 2007; Kleiven *et al.,* 2004). Male respondents were greatly affected by the various causes of human-monkey conflict representing 74.3% and female respondents were least affected representing 25.7%. This could be due to the fact that most males were engaged mainly in crop farming whiles females are engaged in other livelihood activities such as gari processing and petty trading. This has made most men having negative attitude towards the primates. These findings are in line with the situation in Switzerland where the preference for more lovable species by women is high (Schlegel & Rupf, 2010). The difference in views of respondents on the possible causes of human-monkey conflict based on gender was not significant ($x^2$ =6.23, DoF =3, P = 0.101). Respondents without education were greatly affected by the various causes of human-monkey conflict representing 39.7%and respondents with tertiary level of education were least affected representing 6.3%. As most respondents do not have any formal education, they have resorted to crop farming as their primary source of income and main source of livelihood. Respondents with tertiary education (6) were least affected by crop raiding since most of them have resorted to white collar jobs. Though educational level was low, the cultural connotation attached to these primates make them have positive attitude towards them. This is anti-thesis to researches conducted in Norway (Røskaft *et al.,* 2007), Avakatov, Arx & Breitenmoser (2011) and Macedonia (Lescureux *et al.,* 2011). The views of respondents with various educational backgrounds identified did not differ, indicating that level of education has no influence on the causes of human-monkey conflict ($x^2$ =11.51, DoF =12, P = 0.486).

**Table 3.** Age of respondents and causes of human –monkey conflict cross tabulation.

| Age of respondents * causes of human-monkey conflict around BFMS Cross tabulation | | | | | | |
|---|---|---|---|---|---|---|
| | | causes of human-monkey conflict around BFMS | | | | Total |
| | | Crop raiding | Livestock depredation | Threat to life and personal safety | destruction of property | |
| Age of respondents | 18-26 | 7 | 1 | 0 | 3 | 11 |
| | 27-35 | 21 | 4 | 2 | 19 | 46 |
| | 36-44 | 34 | 13 | 4 | 9 | 60 |
| | 45-53 | 54 | 13 | 3 | 20 | 90 |
| | 54+ | 40 | 5 | 5 | 15 | 65 |
| Total | | 156 | 36 | 14 | 66 | 272 |

**Table 4.** Livelihood effects of human-monkey conflict on communities around BFMS.

| | Percentage of response | | | | | |
|---|---|---|---|---|---|---|
| Livelihood effect | 1 | 2 | 3 | 2+3 | Mean | Std. Dev. |
| Limited land | 21.0 | 56.2 | 22.8 | 79.0 | 1.98 | 0.66 |
| Food insecurity | 14.0 | 19.5 | 66.5 | 86.0 | 1.47 | 0.73 |
| Lack of access to forest products | 57.4 | 31.2 | 11.4 | 42.6 | 2.46 | 0.69 |

Likert scale of livelihood effect 1= Less severe 2= More severe 3= Most severe N=272.

From the table 4, food insecurity was ranked first as the major livelihood effect fringed communities are facing having 86.0% from the addition of most and more severe. This was due to the fact that most of the residents in the communities around BFMS are farmers.

Lack of access to forest products was ranked last having 42.6% from the summation of most and more severe. The findings of the study reveal that crop raiding has contributed significantly to the food insecurity problem which further determines the livelihoods of the local people. It also consolidates the fact that crop loss to animals has contributed greatly towards low income generation within communities. Similar observation was made by Nyindo in 2007 as cited by Mulu (2010) in Tanzania. Primate species raided 14 crops. This implied that if the conflict continues unchecked especially with mitigation measures targeting these species, food and economic losses will continue to hit the local people.

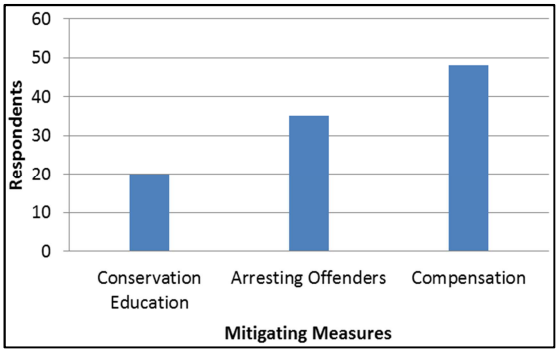


**Fig. 5.** Suggested management strategies by respondents to effectively mitigate human-monkey conflict in Boabeng Fiema Monkey Sanctuary.

Sillero-Zubiri and Switzer (2001) made similar observations as primate species like the baboons will take a whole range and diversity of foods including many crop species and often utilize several different parts of these plants rendering them vulnerable throughout their life cycle.

Fig. 6 revealed that education, arresting offenders and compensation were found to be very effective to mitigate human-monkey conflict in the community in Boabeng-Fiema Monkey Sanctuary. Among these, compensation was the leading strategy representing 48.9%. Aside this, arresting offenders and education followed with 28.3% and 22.8% respectively. The communities around BFMS reiterated that adequate compensation should be paid to affected people especially the already impoverished farmers who have farming as their only source of livelihood. These offenders were those considered to be very active poachers of animals that the communities regard as sacred. Education was ranked last amongst the ways to mitigate HMC since the people believed that they had coexisted with monkeys since time immemorial and they were willing to coexist provided substantial benefits accrued to the community as such no need for intensive education.

**Conclusions and recommendations**

The study has confirmed the existence of human-monkey conflict around BFMS and the effort to mitigate this long standing friction has proved futile. Human-monkey conflict occurs whenever human and monkeys occupy the same landscape and share the limited resources. Human-monkey conflict affects the livelihoods of rural farming communities. This is especially the case for crop damage, which reduces the ability of a farmer to feed their family (Wiafe & Arku, 2012). Frequent crop raiding events with its implication on food security result into conflict. The study also revealed that as human population continues to grow likewise the monkeys as they are considered sacred. This had led to encroachment and breeds conflict as human and non-human primates occupy the same landscape. According to the local people, the officials had no sympathy with the communities who were facing many problems with the monkeys as they raided crops and destroyed valuable properties. They sought for compensation of which they were declined. In turn, local residents can with time develop negative attitudes towards reserves and wildlife. Both human and monkeys suffer when conflict arise. The onus therefore lies on various stakeholders to commit them fully to resolve such conflicts. Conflict resolution is two party affairs. Both humans and monkeys are in conflict. To curb this menace, stakeholders must ensure harmonious coexistence and sharing of resources equitably. This can be achieved through finding a balance between conservation priorities and the needs of local people who have lived with the monkeys for years.

It is recommended that BFMS should include educational and training activities their operations. This should be periodically to educate the local communities on innovative techniques to protect ones farm and properties.

The education should also cater for capacity building in conflict management and resolution. Park officials should take advantage of the cordial relationship the local communities have with the monkeys and actively engage them in their planning and implementation of conservational strategies. Based on the findings that monkeys destroy local communities' crops and properties and nothing is being paid to them, it is recommended that a compensation scheme must be introduced. Such compensation will offset some of the cost caused by the monkeys and prevent the local people from hunting them down.

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**Appendix**

Livestock depredation Destruction of properties Crop Raiding.