

Primates crop raiding situation on farmlands adjacent to South-West of Mole National Park, Ghana

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ABSTRACT

Human activities have led to the overlapping of resource requirements among themselves and animal species and this often results in conflict. This research was conducted to determine the type of animal species involved in crop raiding, crops raided, the reasons for crop raiding events with its associated effects on the livelihoods of surrounding communities and the mitigation measures against it. 10 victims from eight communities were interviewed through a semi-structured guide. Though many animals were involved, the most troublesome and destructive were the following monkey species: Olive baboons (*Papio anubis*); Patas monkeys (*Erythrocebus patas*); and Green monkeys (*Cercocercus sabaues*). These monkeys raiding events were found to be based on the palatability of crops and the most adopted methods used in deterring them were shouting and trapping. Monkeys were found to raid crops at the various farms in the communities for diverse reasons and recommendations for peaceful coexistence of humans have been made.

Keywords: crop raiding; primates; human-wildlife conflicts; human-wildlife coexistence; Mole National Park

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Introduction

The conflict between humans and wildlife today undoubtedly ranks amongst the main threats to conservation of wildlife in Africa, in addition to hunting and habitat destruction. The adaptable nature of certain wildlife species (especially those that share common traits with humans), along with their ability to learn very rapidly and change their behaviour render them a very successful candidate to create conflict between humans that live closely with them (Else, 1991).

In a developing country like Ghana, where there is a high degree of dependence on

agriculture for subsistence within communities, if wild animals consume crops meant for human consumption then conflict arises. On the other hand, if human beings expand their cultivated land into or close to wildlife habitat, crop raiding becomes one of the most common conflicts antagonizing human-wildlife relationships. The conflict accelerates as the human population keeps growing at a high rate with the invention of modern tools and equipment to encroach into land containing wildlife habitats (Hill, 2000; Allotey & Wiafe, 2015).

This kind of conflict has been recognized by the early artist and has been featured in some paintings e.g., a Diana monkey (*Cercopithecus diana*) among three monkeys stealing food by Franz Synder (1579 -1657) in Louvre-Paris, France (Grubb, 1998). San or Bushman rock art in Africa also sometimes presents people who flee from animal attack or some predators. Historians of pre-colonial and early 19th century described many cases in the world where large mammals especially elephants have raided human farms and agricultural areas, which consequently ended up in food shortages and subsequently displacement of settlements (Barnes, 1996).

Primates are group of wild animals ranking high among the species that cause damage to farmers' produce. This has probably been so because they have close lineages to humans and some of the primate species find crops palatable and their population normally grows in numbers to become pest (Forthman-Quick & Demment, 1988). The losses incurred by farmers compel individuals and communities living close to primate range protected areas to develop antagonistic and intolerant relationship towards primates. Though many species of animals (e.g., insects, rodents, birds and livestock) raid cultivated crops, primates, in particular, can be significant pests because of their opportunism, adaptability, intelligence and manipulative abilities (Naughton-Treves, 1998; Sillero-Zubiri & Switzer, 2001; Warren *et al.*, 2007). For instance, in western Uganda, a study of the behaviour of non-human primates on farms identifies number of individuals raiding and duration of raids as primary parameters determining crop loss (Wallace & Hill, 2012).

Attention has recently been given to human-elephant conflict around the Mole

National Park (MNP) (Akenten, 2015; Dakwa, 2016) however, the conflict between human and non-human primates has not been investigated in the area. Extensive studies have been conducted on human-primates interactions elsewhere in the Eastern African region such as Tanzania (Gillingham & Lee, 2003), Uganda (Hill, 2000; 2004; Naughton-Treves *et al.*, 1998; Saj *et al.*, 2001), Zanzibar (Siex & Struhsaker, 1999) and Kenya (de Jong *et al.*, 2008). However, there are no systematic records or centralized databases on human-primates conflict and for that matter, little information exists to verify exactly what is occurring around MNP in Northern Ghana. In recent times, there has been a public outcry on the destruction caused by non-human primates to the food of people living and farming on the piece of land situated between the south-western border of MNP and northern border of Kanikani Forest Reserve.

This study, therefore, provides baseline information on human-primates conflicts and strategies adopted for coexistence. It specifically investigated the type of non-human primate species involved in crop raiding, type of crops being raided, the causes of crop raid, its effects on the livelihoods of surrounding reserves and the mitigation measure against crop raiding by non-human primates.

Materials and methods

Study area

The study took place on the piece of land that situates between the south-western part of the Mole National park and Kanikani forest reserve in Ghana (Figure 1). It is located in a fairly undisturbed portion of the Guinea Savannah zone in Northern Ghana and includes parts of West Gonja and Sawla-Tuna-Kalaba, and lies between latitudes 9°11' and 10°10'N, and

longitudes 1°22' and 2°13'W. The climatic conditions of the area have two seasons: a dry season from November to April, and a rainy season from May to October. Annual rainfall is around 1100 mm per annum. The mean annual temperature is 27.8°C, with extremes of 35°C to 40°C (Wilson, 1993).

Data collection procedure

The study was conducted in eight communities located at the south-western boundary of the Mole national park, in 2016. A minimum of 10 victims of farm raiding was selected from each of the communities on a 60 km stretch along the south-western boundary of Mole National Park. The selected communities were as follows: Kananto, Kabampe, Grupe, Seiyire, Nosoyire, Jintripe, Nyanye and Sawla (Figure 1). The sampled participants were selected based on the fact that the farmer had suffered crop raiding, not beyond one month from the period of the interview. Most of the victims engaged mainly in farming activities which is their sole source of livelihood. Maize, groundnut, millet sorghum, rice, yam, beans, mango and other crops were normally cultivated in the eight communities with an attachment of local poultry farming for subsistence. Participants who wanted to disclose their identity informed us and pseudo-names were used for those who wanted to remain anonymous. Each interviewee was subsequently informed that sensitive information and personal characteristics would not be included in the report of the study (Christensen, 1992). Participants were interviewed on types of crops, animals involved, effects and mitigation measures against crop raiding. Semi-structured interview guides were depended on for the interview. The framework for interviews was adapted from Gillingham and Lee (2003) and the Oxford Brookes University Code of

Practice on Ethical Standards was followed. Statistical Package for Social Scientists (SPSS v. 16) was used for analysis of the data.

The frequency of raids by primates was based on the number of times respondents had constantly observed the occurrence. The frequency of raids was classified as mostly, moderately and least visited if the animal raided the farm every other day to every day, once in a week and once in a month respectively. The intensity of destruction was based on the activity of the various animals on their farms as most, moderate and least destructive depending on the quantity destroyed.

Results and Discussions

Demography of the respondents

In all, there were 89 participating farmers in the research and they all responded to all the questions. The participants included 69% males and 31% females, ranging between the ages of 20 years and above. The natives were 82% and 18% were non-natives. With educational background, 19% of the respondents had no formal education, 25%, 30% and 26% had basic, secondary and tertiary education respectively. In terms of religion, 45% were Christians, 23% were Muslims, 22% were Traditionalist and 10% did not belong to any religion. Most of the respondents, 51%, were solely farmers; 27%, 19% and 3% were teachers, traders and students respectively who farmed in addition to their profession/vocation. The majority of the respondents (40%) had their farms located at a distance greater than 4 km from either the National Park or the Forest Reserve; 15% had their farms at a distance between 3-4 km, and 9% had their farms at a distance between 2-3 km, 32% had their farms at a distance between 1-2 km and 5% had their farms at a distance less than 1 km from the protected areas.

Animal species most involved in crop raiding

It was recorded that several animal species were involved in crop raiding events. The common ones were: birds, monkeys, rodents, ungulates, elephants, insects, reptiles and amphibians. Common bird species identified was the weaver bird (*Ploceus cucllatus*), monkeys were (*Erythrocebus patas*, *Chlorocebus sabaeus*, *Papio anubis*), ungulates (*Cephalophus rufilatus*), reptiles was *Agama agama* and amphibians were *Bufo bufu*. The birds raided in large numbers and the damage caused by monkeys was very intensive and the victims complained about the extent of the damage. Table 1 shows the percentages of respondents who indicated the frequency of animals that visited the farm and the level of their destruction. It could be deduced that among all the taxa listed, monkeys were the second most frequently farm visited animals complained of after birds by almost 60% of the respondents; yet they were the most destructive animals complained by most of the respondents. Not surprising, the three monkey species involved in the raids in this particular study have been reported to be the most destructive species reported by other researchers elsewhere (Hill, 2000; Saj *et al.*, 2001; De Jong *et al.*, 2008). A study in Budongo Forest Reserve in Uganda concluded that baboons could cause direct cost by damaging field crops such as maize and cassava extensively; they also cause indirect costs such as labour to protect crops and crop stands replacement (Hill, 2000). In some parts of Kenya, patas monkeys have been reported to have raided crops due to human expansion to their historical range (De Jong *et al.*, 2008) and green monkeys (vervets) have also been reported to be involved in the conflict with farmers at forest edge of Entebbe in Uganda (Saj *et al.*, 2001).

One of the respondents stated that, though it is not common to meet patas monkeys while human beings were on-farm they could be very destructive to farm crops. However, Hill (2000) continued that the baboons were fearless, and they were able to raid crops while human beings would be working on the farm. Almost all the respondents were amazed at the large group size of the green monkeys: it was noted that the green monkey moves in large numbers during raiding events.

Type of crops cultivated and loss to primates crop raiding

Crop cultivation was usually done on a 1-5 acre of land per household (Table 4). Majority of the victims harvested between 1-50 bags (one bag is equivalent to 125 kg) of maize per farm for the season with the cost of cultivation usually amounting between GH¢ 16-800 (US\$4-200) per acre. All cultivated crops (maize, groundnut, millet, beans and mango) and poultry birds were susceptible to raiding by monkeys. In almost every stage of the crop's life (from seedling to harvest), there was a possibility of attack of which every cultivated crop was vulnerable (Table 4). This was similar to the description of crop raiding by Sillero-Zubiri and Switzer (2001) in the Budongo forest in Uganda that, maize, right from sowing to maturity stage suffers raiding (damage). Thus, affecting the expected yield as well as incurring loss to the affected farmers. Not only were crops vulnerable but local poultry birds and their products (eggs) were highly at risk to raiding events by monkeys. At Boabeng-Fiema Monkey Sanctuary in Ghana, Wiafe and Arku (2012) reported that monkeys raided fresh eggs by consuming them but eschewed cooked ones. Majority of the respondents, 94% stated that the loss incurred as a result of monkeys raiding

events on the local poultry cost them between GH¢4-2,000 (US\$1-500) whilst that amount could have been a profit to them if the products from the poultry were sold (Table 2).

The underlying causes of crop raiding by primates

Major features of farms that were perceived to attract monkeys to raid crops included farm size, displacement of primate's habitat and nature of crop. Most respondents (71%) attributed it to the attractiveness of crops, 14% attributed it to the replacement of monkey's habitat with farms and 16% said it might be the size of the farm.

Furthermore, 43% of the respondents were of the view that the natural food for non-human primates have become scarce; 20% indicated that crops being raided by primates were more palatable than wild food; 19% also indicated that both the taste of crop and the scarcity of primate food accounted for raiding events whilst 8% attributed the raiding to the fact that primates require diverse food items and crops were more palatable than wild food. Also, 6% stated that all the characteristics of crops attracted monkeys to raid and 4% attributed the crop raiding only to the requirement of diverse food items by primates. Change in weather conditions (seasonal changes) affected the growth and harvesting periods of crops yet such changes do not deter monkeys from being attracted to farms. Most of the respondents (41%) said change in harvesting period attracted monkeys to their farms, 30% indicated that change in the fruiting period did attract monkeys to their farms and 29% said the attraction to their farms by monkeys was based on change in the flowering period.

Other factors that were found to be the causes of monkeys' visitation to farms to raid

crops were tree cutting, charcoal production, live trapping and hunting of monkeys. It was deduced that 65 % of the respondents said tree cutting accounted for monkeys' raid of their crops, 18% attributed it to live trapping of monkeys, 9% attributed it to hunting and 8% mentioned charcoal production. Even though tree cutting and hunting may seem strange to have ordinarily attracted monkeys to raid crops, these factors repel the monkeys from their natural habitat and in an effort of escaping, they chanced on the farms to raid. On the other hand, those factors deprived the monkeys of the resources required in the natural habitat and compelled them to depend on resources meant for humans. The main driving force fuelling crop raiding was basically human-induced resulting in scarcity of wild primate food. The increasing human population at the selected communities had fuelled the expansion of farms into wild areas whereby trees that could have served as a habitat for monkeys had been removed to compel the monkeys to move to farm lands and eventually raid crops.

The effect of crop raiding on livelihoods of crop raiding victims

Crop raiding by the non-human primates affect the growth performance of crops 24% of the respondents said that it reduced fruiting, 17% resulted in less fruiting and stunted growth; 17% it resulted in poor seed production and decreased fruiting of crops; 13% were of the view that crop raiding resulted in stunted growth, low fruiting and poor seed production, 10% attributed stunted growth and poor seed production to the raid and 11% of them said the raiding only affected the production of poor seed, while 8% attributed stunted growth to the raids (Table 3).

On crop yield, 44% of the respondents showed that monkeys' crop raiding events resulted in reduction in quality whilst 38% of the respondents reported a decrease in yield and 18% said the raiding reduced market price. Crop raiding though occurs throughout the year, it mostly occurs during the wet season with significant effect on crops' growth thereby impacting negatively on crop yield per season (Table 3).

Measures adopted by victims to mitigate crop raiding by monkeys

The high incidences of crop raiding have led to the adoption of diverse methods by victims to minimise the activity (raiding). Such methods, to the victims, were cheaper and they included shouting, beating (throwing objects at the animals), trapping and use of scarecrow. The study showed that shouting and trapping were used by 27% of the respondents to protect their crops; 20% used scarecrow and beating to deter monkeys from raiding; 15% used shouting and scarecrow whilst 10% used only scarecrow, and 10% used only trapping. Also, 6% of the respondents combined several methods such as shouting, scarecrow, trapping and beating while 5% used shouting only and 5% beating only, and 2% use the combination of shouting and beating (Figure 2). The respondents observed that some of the methods were effective when used to protect their crops from being raided by monkeys. The following methods were declared effective by the respondents: 25% said shouting and trapping, 24% said scarecrow and trapping, 15% said shouting and using scarecrow, 9% said shouting only, 8% said scarecrow only, 2% said trapping only, 2% said beating only, 2% said trapping and beating, 7% said killing the monkeys only, 3% said none of the methods was effective whilst another

3% of the respondents said all the methods were very effective. Some of the methods used in mitigating monkeys crop raiding have proven to be effective, 63% of the respondents indicated they would like to continue using the same method but 37% of the respondent stated that they wouldn't like to continue with their methods. Majority of the respondents (90%) said that despite the destructive behaviour of the monkeys they would like to still have them and 10% said some form of eradication should be made to solve the raiding problem. The victims had in mind that even as they have adopted their methods especially beating the animals, these animals should also be protected.

Majority of the victims (90%) would like to coexist with monkeys despite their destructive nature but the minority would not want to. In justifying the reasons for the respondents admitting to coexist with the monkeys, 31% said they were God's creation and that they must live, and 20% said they were such interesting animals and one can learn a lot from them; 23% said the monkeys were their pets and were not killed for meat and 26% said they were friendly. This was not different from the views expressed by the people of Boabeng-Fiema Monkey Sanctuary where the people would like to coexist with the monkeys regardless of the intensity of destruction to their crops (Wiafe & Arku, 2012).

Owing to the negative impact of monkeys' crop raiding events, minority of the victims (10%) would not want to coexist with them. The reasons for some respondents who would not like to coexist with monkeys were as follows: 19% of the respondent said they just do not want to coexist with monkeys, 53% said the monkeys are dangerous and they destroy the quality of their crops, 10% also said the monkeys cause losses before harvesting

period; 9% of the respondents said that the monkeys cause more harm than good, destroy a lot of crops and they make farming difficult, 9% were of the view that the monkeys raiding activity caused low productivity, reduce market value, and destroyed most crops leaving them with a little to depend on for a living.

Conclusion and Recommendation

It was concluded that monkeys' involvement in the crop raiding events might be because they were attracted by the crops in their victim's farms. This is probably due to the taste of the compared to the food in the wild food. Tree cutting, hunting and live trapping were found to be the main human impact influencing monkeys' raid crops. These factors might have deprived the monkeys of their natural habitat and resources. Decreased fruiting was one effect of crop raiding as well as low-quality yield. Shouting and trapping of monkeys were the most effective methods used by victims to ward off monkeys from crop raiding. The position of the farms i.e., their proximity to the forest reserve and the national park is suspected to be the main cause of the crop raiding events. Some of the raiding events can be attributed to mere chance. As monkeys forage between the two protected areas, they may come across farmlands and take advantage of them.

The following are recommended to ensure peaceful coexistence of monkeys and humans:

- (i) More trees that are purposely meant for primate food should be planted in the reserves to enrich the resources to provide for the needs of monkeys to help stop or minimize raiding crop farms.
- (ii) People inhabiting close to reserved areas and should be educated on the benefits of coexisting with monkeys.

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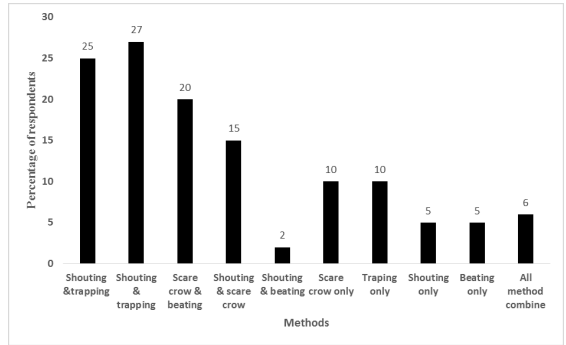
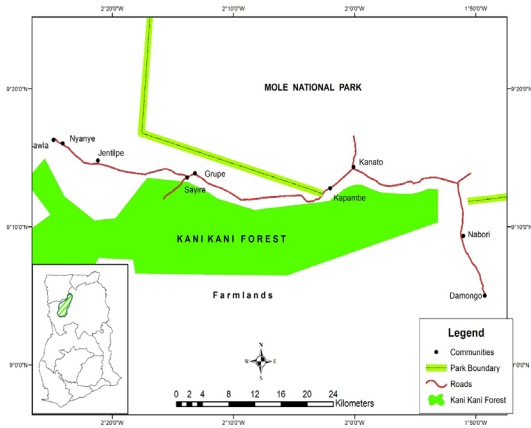


Fig. 2: Crop raiding mitigation measures and number of respondents used.

Fig. 1: Map of the study area showing the study communities.

TABLE 1
Animals that raided crop farms and the level of destruction of crops around the Mole National Park, Ghana

<i>Animal</i>	<i>Frequency of raid</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Intensity of destruction</i>	<i>Frequency</i>	<i>percentage</i>
Bird	Mostly visit	72	80.9	Most destructive	11	12.4
	Moderately	7	7.9	Moderate destructive	14	15.7
	Least visit	10	11.2	Less destructive	64	71.9
Monkey	Mostly visit	53	59.6	Most destructive	59	66.3
	Moderately	27	30.3	Moderate destructive	21	23.6
	Least visit	9	10.1	Less destructive	9	10.1
Rodent	Mostly visit	37	41.6	Most destructive	28	31.5
	Moderately	26	29.2	Moderate destructive	32	36.0
	Least visit	26	29.2	Less destructive	29	32.6
Ungulates	Mostly visit	8	9.0	Most destructive	24	27.0
	Moderately	17	19.1	Moderate destructive	15	16.9
	Least visit	64	71.9	Less destructive	50	56.2
Elephant	Mostly visit	11	12.4	Most destructive	13	14.6
	Moderately	6	6.7	Moderate destructive	14	15.7
	Least visit	72	80.9	Less destructive	62	69.7
Insects	Mostly visit	20	22.5	Most destructive	18	20.2
	Moderately	28	31.5	Moderate destructive	27	30.3
	Least visit	41	46.1	Less destructive	44	49.4
Amphibians	Mostly visit	8	9.0	Most destructive	8	9.0
	Moderately	20	22.5	Moderate destructive	20	22.5
	Least visit	61	68.5	Less destructive	61	68.5
Lizard	Mostly visit	10	11.2	Most destructive	11	12.4
	Moderately	26	29.2	Moderate destructive	17	19.1
	Least visit	53	59.6	Less destructive	61	68.5

