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Victims Perspectives of Lowe's Monkeys' (*Cercopithecus campbelli lowei*) crop raiding events in Ghana: A case of Boabeng-Fiema Monkey Sanctuary

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Abstract

The conflict arising as a result of human and non-human interaction on a single landscape was investigated in Ghana at the Boabeng-Fiema monkey sanctuary. Semi-structured interview guides were used to investigate the farmers' perceptions of the crop-raiding issue and the respondents were selected from randomly selected houses. Irrespective of belief or knowledge system, majority of the respondents complained of crop or food damage by Lowe's monkey, with no reliable effective deterrent measures. The monkeys caused a lot of damage to human food growing in the field, in storage as well as prepared food ready to be consumed. The monkeys also used force to seize the food items from the humans especially the children, women and very old adults. About 61% of the respondents attributed the increase in crop raiding to increase in primates numbers, 29% attributed it to habitat decrease while 4% attributed it to inefficiency in the use of crop protection methods. Neither the dry nor wet seasons were found to be a barrier to monkeys' damage to human food as 97% of the respondents had observed that the disturbance of the monkeys to human food occurred throughout the year. Since the monkeys play a significant role in the culture of the people, non-destructive methods to reduce the food/crop raiding incidences have been depended though these methods have proved ineffective. A more effective friendly method to reduce the conflict must be investigated and implemented to ensure continues coexistence between human and non-human primates.

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Introduction

Wild animals are compelled to exploit human resources including crops in order to survive because humans are dominating ecosystems and habitats (Strun, 2009). Crop-raiding animals may cause a substantial damage to agricultural crops, and this has always been a major issue of contention throughout the world. Due to the expansion of cultivated land into previous wildlife habitat, crop raiding is becoming one of the most common conflicts antagonizing human-wildlife relationships (Sillero-Zubiri and Switzer, 2001). In areas where the species involved in crop-raiding can be hunted as food, the issue of crop raiding is not treated as a problem. However, it is a major cause of human-wildlife conflict in other areas where they are not hunted. This is especially true of areas adjacent or close to protected areas, like national parks and sanctuaries, which can harbor large populations of wildlife. Animal crop-raiding activities can pose a significant threat to food crops and thus farmers' livelihoods. Conflicts between human and wildlife can vary within and between communities (Hill, 2000) and also within and between animal species. For example, Marchal and Hill (2009) reported that primates were perceived to be damaging crops differently from other vertebrates in Sumatara, Indonesia and baboons were found to be the major crop pest among the six primates reported to raid crops in Budongo forest reserve in Uganda (Hill, 2000).

The major causes of human-wildlife conflicts could be attributed to many factors ranging from wildlife population increase to habitat decrease as a result of human population increase. Sillero-Zubiri and Switzer (2001) stated that although there is a general concern over declining wildlife populations, particularly in tropical ecosystems, some species may actually be increasing in numbers. For example, increasing reports of crop raiding by elephants in Africa may reflect the recovery of population numbers since the Convention on International Trade in Endangered Species' (CITES) ban on ivory trade and the subsequent decline in poaching. Despite the fact that some animals are being recovered, more people also means more cultivated land, and hence a greater interface between people and wildlife. For example, the world population is predicted to grow by over 50% in the next fifty years from six billion in 2000 to over nine billion in 2050. Most of this increase is expected to take place in the least developed countries of Africa, Asia and Latin America. This population increment is expected to invade wildlife habitats thereby increasing the conflict.

The conflict usually emerges when wildlife and human requirements overlap with consequential costs to humans and/or the wild animals (Osei-Owusu and Bakker, 2008). Many authors have attributed the raiding of human resources to the fact that at most basic levels, raiders target human foods because they have nutritional advantages over natural forage (Naughton-Treves 1998; Naughton-Treves et al. 1998; Tarara et al. 1985; Warren et al. 2007). Forthman-Quick and Demment (1988) demonstrated that baboons raid crops as part of their foraging strategies to be able to reduce their overall foraging time investment because of the high nutritional value of their preferred crops. The overall result is that, human foods are easier to process and digest and raiders get more energy for less effort when they eat human food. On the other-hand, natural forage is found to contain higher proportion (forage contains higher proportion of protein than which food?) of protein which therefore, may explain why crop raiders do abandon wild food and adapt exclusively to cultivated food (Altmann and Alberts, 1987; Altmann and Muruthi 1988; Altmann *et al.* 1993; Biquand *et al.* 1994; Bourg *et al.* 1994; Bronikowski and Altmann 1996; Forthman 1986a, b; Hill, 2000; Kemnitz et al. 2002).

A long term solution to primate crop raiding can only be devised based on the outcome of proper investigations into the behavioral dynamics and pattern of raids by the primates. Studies have already

established that the frequency of crop raiding by animals such as elephants is affected by the ecological conditions within their forest refuge (Wyatt and Eltingram, 1974; Barnes, 1982; Ruggiero, 1992), but that of farming landscape outside the protected areas has not been completely unraveled (Oppong *et al.,* 2008).

In this study, we document the current nature and extent of raiding activities of Lowe's monkeys (*Cercopithecus campbelli lowei)*, one of the two primate species inhabiting the Boabeng-Fiema Monkey Sanctuary (BFMS) in Ghana and how the adjacent communities react to these activities. The views of the people would serve as guidelines for outlining strategies for successful management schemes that may eventually lead to the improvement of livelihoods of the people and the welfare of the monkeys.

Materials and methods

Study area

The BFMS is located at 350m above sea level between Latitudes 7º 43'N and Longitudes1º42'W within the forest savanna transitional zone of Ghana, 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 black and white colobus (*Colobus polykomos*) and Lowe's monkey (*Cercopithecus cambelli lowei*) which the sanctuary harbors (Fargey, 1992). The sanctuary covers an area of 494.2 hectares which is surrounded by maize, yam, groundnuts, cassava, and oil palm farms.

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). This traditional norm and belief was strictly adhered to until early 1970s when Christians thought otherwise. According to one Christian sect, the Savior Church maintains that humans are not bound by traditional beliefs and taboos and God has given man dominion over all creatures (including the monkeys). Subsequently, church members started killing the monkeys for food (Appiah-Opoku, 2007; Fargey, 1992). As the traditional authorities were concerned about by killing of the animals for food, they appealed to the Department of Game and Wildlife, now Wildlife Division of the Forestry Commission, which incorporated the area into the National Protected Area System to add the conventional method of wildlife protection to the traditional method (Appiah-Opoku, 2007).

Data collection

Semi-structured interview guides were used to gather information from the farmers regarding their perceptions of the crop-raiding issue. The framework for interviews was adapted from Gillingham and Lee (2003) and the Oxford Brookes University Code of Practice on Ethical Standards was followed. Twenty-five (25) and 26 houses in Boabeng and Fiema, respectively, were randomly selected for the study and two persons in each house took part in the study. The manager of the Sanctuary was also interviewed, so in all 103 respondents took part in the study. Each interviewee was subsequently informed that sensitive information and personal characteristics would not be included in the report of the study (Christensen, 1992). The study took place between 1st and 31st July 2011. Field observations were conducted to document the mode of raiding.

Results and discussions

Demography of the respondents

The reported ages of respondents ranged from 15 to 100 years which were specifically grouped into youth

(8.6%), young adult (38.6%) and adults with the highest percentage of (52.9%). Of these respondents, the majority (88.6%) were natives and (11.4%) non-natives. About 52.9% of the respondents were Christians, 4.3% Moslems, 41.4% Traditionalists and 1.4% belonged to other religions. Most (60%) of the respondents were found to have stayed in the area for more than 10 years, 30% less than 10years and 10% had stayed there for less than five years. The majority (44.3%) of the respondents engaged in farming and other activities like masonry, carpentry, and dressmaking, and 40% were solely farmers while teachers and traders were 4.3% and11.4%, respectively. About two-thirds (74.3%) of farmers grew food crops and the rest of the farmers (25.7%), grew cash crop with food crops. This suggests that the majority of the respondents use farming activities as supplementary source of food and income while a considerable number also depends solely on farming activities.

Table 1. Purpose of food grown by the people.

FARM PRODUCE	DESTINATION		
	COSUMPTION %	COMMERCIAL %	BOTH %
Cassava	20	50	30
Yam	76	15	9
Maize (dry & fresh)	68	16	16
Wild palm nut fruit	33	22	45
Banana	46	36	18
Mango	30	34	36
Plantain	50	27	23
Groundnut	44	32	34

The Impacts of monkeys on humans

It was deduced that, irrespective of the religious backgrounds of the respondents, they faced problems of crop damage which may have greater impact on food security. The types of food grown by the farmers included maize, yam cassava etc. for subsistence and/or commercial purposes as shown in Table1. Whereas 79% maintained that primates damaged their crops, 3.8%, 1.9%, 3.8% and 9.5% indicated that they were damaged by rodents, ungulates, insects, and birds, respectively (Table 2). About 96% of the respondents attributed the crop damage by primates to Lowe's Monkey, while 4% attributed it to Black and White Colobus.

Table 2. Cross tabulation of religious background and complains of problem animals by the respondents.

	Problem animals					Total
Religion	Primates	Rodents	Ungulates	Insects	Birds	
Christian	42	3	1	4	5	55
Moslem	6	0	1	0	0	7
Traditional	35	1	0	0	5	41
Total	83	4	2	4	10	103

On the trend of crop damage by monkeys, 54.4% of Christians, 38.8% traditionalists and 6.8% Moslems, respectively, stated that the situation has increased. The views of respondents with the three major religious backgrounds identified did not differ, indicating that the religious belief has no influence on the crop damage complains (X^2=0.19, DoF=2, p=0.90).

On the reasons for the increased in crop raiding incidence, 64.1% related it to increased in primates numbers, 23.3% and 5.8% related it to decreased in primate habitat and increased in human habitat respectively whilst 3.9% attributed it to inefficiency in the use of crop protection methods. The difference in views of the respondents on the possible causes of increased in crop damage by primates was significant (X^2=12.36, DoF=6, p=0.04). Only 2.0% and 1.0% of the respondents said the dry and wet seasons respectively contributed to the crop raiding occurrences while 97% had observed that the crop damage incidence by the monkeys occur always (X^2=1.03E, DoF=2, p=0.00). In contrast, Marchal and Hill (2009) reported that in Sumatara, Indonesia, the crop damage by primates were high during the peak of fruiting of certain tree species, that is May to August. Hill (2000) also reported that baboons in Budongo forest reserve in Uganda caused high damage in June. Table 3 shows the list of some

food items intended for human consumption that were raided by Lowe's monkeys.

Table 3. Human food confirmed to be consumed by Lowe's monkey.

HOUSEHOLD FOODS	State of consumption	Percentage (yes)	Percentage (No)
Banana	Ripe fruit	98	2
Pineapple	Ripe fruits	56	24
Mango	Ripe fruits	37	42
Fufu	Ready to serve	84	10
Boiled yam	Ready to serve	88	11
Boiled cassava	Ready to serve	79	19
Kenkey	Ready to serve	80	20
Eggs	Fresh	79	19
Eggs	Boiled	0	100
Bread	On stalls for sale	94	6
Biscuits	On stalls for sale	89	11
Plantain	Ready to serve	88	22
Pepper	Fresh	0	100
Soup	Ready to serve	0	100

Mode of raiding

The Lowe's monkeys raid crops or food during the day time. They moved in troupes ranging from three to five groups in search of ripe fruits on the farms. When a bout was found the animals grab it with their fingers and loaded the cheek pouches with it, whilst they consume some in a fast manner, depending on the security situation prevailing at the site. In case the farmer or any human being was on the farm, the monkey had to stand at a distance, gauge the targeted food, grabbed it actively and ran away with it. But if a human being was not identified then they took their time to consume the food item on the spot. On domestic foods, the monkeys would search the premises of the human houses, for example, kitchens for prepared food items or stored food. If nobody was in the house, they consumed it on the spot but if people were found in the house then the animals would use aggressive force to grab the food and ran away with it. According to a regular victim 'when the Lowe's monkey sees that someone has any food in his hand it would do everything possible to get some'. It was observed further that the male dominant among a group would use aggressive forces to grasp food from young children, females or very old people. However, the Lowe's monkeys were found to fear grasping food from men and young adults. These styles of raiding crops made it very difficult to estimate the cost of damage to crops and also made it difficult to predict times when they were likely to raid.

It was gathered that the monkeys avoid any food associated with pepper, for example 'fufu', which is a pounded boiled cassava or yam. The fufu is normally served with soup (mixed with pepper). When a monkey came in contact with the 'fufu' with soup, it picked only the fufu and consumed it without drinking the soup because of the pepper component of the soup. Raiding Lowe's monkeys were also observed to avoid consuming meat and boiled egg but preferred fresh egg (Table 3).

Table 4. Methods for crop protection and their effectiveness.

Methods for crop protection	Effectiveness of the methods			Total
	It works all the time	It does not work all the time	It does not work at all	
Shouting	49	41	4	94
Scare crow	0	2	0	2
Shooting or Trapping	2	2	2	6
Beating or hitting the animals	0	0	1	1
Total	51	45	7	103

Crop raiding mitigation measures

The respondents used various means to discourage the monkeys from consuming their food and crops and these include shouting, using scare crows, shooting/trapping and beating or hitting the animals. The survey revealed that, the most patronized method was shouting where 91.3% of the respondents said that was the method they depended

for scaring the monkeys from raiding their food or crops. Among the respondents who maintained that shouting was the most appropriate method to drive the animals away from raiding, 47.6% said it worked all the time, 39.8% said it worked sometimes, whilst 3.9% responded that though they depended on that method it has never worked at all. The details of other crop protection methods and their effectiveness are shown in Table 4. Shouting was suspected to be the most effective method of reducing crop raiding incidences because of the beliefs associated with the monkeys.

Despite damages to their food and crops, the people of Boabeng and Fiema would always like to keep the monkeys alive hence majority dependence on non-lethal method (shouting) to scare the monkeys from crop and food damage. It is also likely that the majority chose the non-lethal method in order to reduce the damage to their properties, for example houses. Thus, the use of other methods like shooting or hitting the animals might accidentally end up destroying their houses or domestic animals.

Importance of the presence of the monkeys

Some of the benefits derived indirectly from the monkeys include tourists visiting the community, improvement of income from sales of agriculture goods as a result of increasing tourists to the place, and NGOs are also being attracted to the area. The respondents also indicated that the presence of the monkeys have also helped them to protect the environment. Thus, 73.5% said they have helped in protection of the forest patches, while 22.0% indicated that they have helped to improve sanitation situations - as an NGO provided each house with a toilet facility, and 5.5% thought the presence of the monkeys led to the conservation of the forest making the area to have its micro-climate which largely contributed to the area having relatively higher rainfall than the neighboring environment. All the respondents (100%) admitted that the monkeys helped them to keep to their culture and traditional norms.

Conclusions and recommendations

Human-wildlife conflict occurs whenever the landscape is shared by humans and wild animals. In the case of BFMS, the human lives at the boundaries of the protected forest of the monkeys. The monkeys have evolved to live with the humans by entering into their houses in order to feed on human food that seems to be more palatable to them than the natural foods. The dimension of raiding at BFMS differs from most of the reported raiding events in other primate range countries where crop damage were limited to crops on farms. The raiding events at BFMS were not only limited to crops on farms but the monkeys moved to houses and streets to consume human food. They did not only consume food that they come in contact with per chance but actively search and consume it per choice.

The most troublesome animals in the sanctuary were the Lowe's monkey whose diet requirements are flexible and that qualifies them to eat almost everything that human consumes at the Sanctuary. The possible reasons assigned to the incidence of raiding of food could be attributed to the fact that animals are attracted to human's food more than the wild food. The human food is suspected to be more nutritious and easily digestible than the wild counterparts. Moreover, preferred items might tend to have high digestibility, lower levels of digestion inhibitors and more assessable protein.

Furthermore, people encroachment on the woodland which is meant to be the habitat for the monkeys might have contributed to the high invasion of Lowe's monkey in human homes. As human population increases without any harm to the monkeys, the population of the monkey also increases with time. The powerless monkeys are being over-powered by humans as they invaded the habitant of the monkeys for construction of houses and cultivation of farms.

The people of Boabeng and Fiema villages have used the indigenous knowledge and believe system to protect the monkeys that inhabit the sanctuary. This has contributed to the population increment of the monkeys whilst the human population and associated development has contributed to the shrinking on the monkeys' natural habitat. In addition, the monkeys have been habituated to humans and this has compelled them to evolve to adapt to consume human food. The monkeys raiding patterns differs from that of other animals and primates at other places.

It is recommended that further studies be conducted to identify a more effective and efficient method of raiding mitigation measures. Moreover, palatable plants species must be planted at the buffer zone area of the sanctuary for the monkeys to feed on. This could largely decrease the monkeys feeding on human's food.

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