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Conflict of Interest Between People and Baboons: Crop Raiding in Uganda

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Much has been written about insect damage to standing crops, but an area that has received little attention within agricultural development, conservation, and primatological literature is that of primates and the potential damage they can cause to farmers' fields. This is likely to become an increasingly important issue for people interested in primates, as conservation projects adopt a more integrated approach to take account of local people's perspectives and needs. The aim of this paper is to examine the impact of crop raiding by primates, particularly baboons, on farmers living around the southern edge of the Budongo Forest Reserve, Uganda. I use data gathered during monthly farm surveys and informal discussion groups, along with time budget data, to demonstrate that 1) baboons can cause extensive damage to field crops, such as maize and cassava; 2) proximity of the farm to the forest edge and the presence or absence of neighboring farms affect the likelihood of any farm sustaining crop damage from baboons; and 3) in addition to the direct costs associated with crop losses attributed to baboon foraging activity, there are indirect costs of baboon crop raiding such as increased labor demands to protect crops from them and, occasionally, to replant crop stands badly damaged by baboons. These results have important implications for future primate conservation policy and practice.

KEY WORDS: human-wildlife conflict; crop raiding; baboons; farmers.

INTRODUCTION

Until relatively recently, there has been little attention given to vertebrate species that damage crops, particularly crops of small-scale farmers

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in tropical and subtropical regions. Yet, there is good evidence that crop raiding is not a new phenomenon. Perhaps not surprisingly, certain species of primates are very successful crop raiders. With their extensive repertoire of cooperative behaviors, opportunistic life-style, and nonspecialized and omnivorous dietary tendencies, primates such as baboons (Forthman-Quick, 1986), vervets (Boulton *et al.,* 1996), and macaques (Pirta *et al.,* 1997) are highly adaptable and take readily to living alongside humans in rural or sometimes urban and semi-urban settings. Their highly adaptable nature, along with their ability to learn very rapidly and change their behavior accordingly, makes them very successful and potentially troublesome when living close to humans (Else, 1991).

Previous work with farmers living around the southern edge of the Budongo Forest Reserve, Uganda, confirms that many of them consider wildlife, and baboons in particular, to be a major threat to their livelihood. Six species of primate were reported to raid field crops: chimpanzees (*Pan troglodytes*), olive baboons (*Papio hamadryas anubis*), vervets, red-tailed guenons, blue monkeys (*Chlorocebus aethiops, Cercopithecus ascanius,* and *C. mitis*), and black-and-white colobus (*Colobus guereza*). However, in this region, only baboons are considered to be a major pest species. Chimpanzees only rarely visit farms, taking one or two fruits at a time, causing little destruction, and do not represent a serious threat to the farmer. Vervets are generally only a problem in some of the more open areas away from the forest edge, whereas forest guenons and colobus monkeys are very rarely seen raiding farms (Hill, 1997).

Of all the species complained about locally, including nonprimates, baboons are the most frequently mentioned pest species and farmers consider them to be responsible for the greater portion of crop damage locally (Hill, 1997). Not surprisingly, baboons are the animal most feared by farmers (Hill, 1997). But do they really pose as serious a problem as local farmers suggest?

The aims of this paper are to (1) determine whether baboons are as much of a threat as they are perceived to be, (2) evaluate the extent to which they exact a cost on local subsistence farmers, and (3) discuss the implications of this case study in the broader context of human-wildlife conflict issues and conservation ideology.

METHODS

I collected data during a 12-month study (September 1993–August 1994, inclusive) of the impact of crop raiding by wildlife on subsistence farmers living around the edge of the Budongo Forest Reserve in Masindi

District, Uganda. The study concentrated on farmers who cultivated land in three villages (Nyakafunjo, Nyabyeya II, and Kyempunu) and another area, Kawanda, which was being farmed under the Taungya agroforestry system at the time of the study. People from local villages are able to farm here providing they plant only annual crops and agree to plant and tend tree seedings provided by The National Forestry College, situated locally at Nyabyeya. There is a high degree of dependence on agriculture for subsistence within this community, with approximately 70% of people reporting agriculture as their sole, or main, source of livelihood (Hill, 1997). Fifty-four percent of the participants in this farm study of crop raiding are entirely dependent on agriculture for their subsistence ($N = 37$).

A variety of crops are grown locally, including carbohydrate staples such as maize (*Zea mays*), cassava (*Manihot esculenta*), sweet potatoes (*Ipomoea batatas*), taro (*Colocasia esculenta*), and finger millet (*Eleusine coracana*); legumes, such as beans (*Phaseolus vulgaris*) and groundnuts (*Arachis hypogaea*); and some vegetables and fruits.

There are two growing seasons during the agricultural year. The first season extends from March to July, and the second, shorter, season from July through October. Although people cultivate a range of staple crops during both seasons, the main maize crop is planted in March/April and harvested during June and July. Cassava is grown throughout the year and has no particular harvest period; it is harvested when it is needed, either for household consumption or for sale at local markets.

With the help of two field assistants, I visited a sample of 37 farms at monthly intervals to carry out farm surveys. There were 10 sample farms in each of the villages and 7 in the area known as Kawanda. During the initial visit, I mapped a farm and calculated its size. Farm size ranges from 0.15 to 14.58 ha; the median value is 0.7 ha. I estimated the distance from the edge of the farm to the forest boundary and plantation boundaries. We compiled a list of crops already present, including information about planting time where possible, and the number of stands planted of each of the main staple crops.

Subsequently, monthly visits were made to each farm. We asked people to report any instance of crop damage and whether they had observed the animal(s) responsible at the time. Field assistants and/or I viewed all instances of crop damage to make an independent assessment of the likely species responsible for the damage. This was done using visual assessment of bite size and spoor. We noted the type of crop, whether it was a single species stand or an intercropped stand, which is common in the region, and the plant part/stage of development attacked. When possible, we quantitatively estimated the degree of damage. It was not always possible to estimate the degree of damage sustained because (1) the damage was too

old for the recorder to be confident that the species responsible could be identified, (2) the damage had occurred too long ago for the recorder to estimate the degree of damage, and (3) on two occasions the damage was so severe that the farmer had already replowed and replanted the field with a different crop. On such occasions, we noted the incident, but did not estimate the degree of damage, and I exclude the data from the analyses. I did not estimate the amount of damage for 20 of the 70 recorded instances of crop damage, either because of not being able to identify the animal responsible or because the damage had occurred too long ago to make an adequate assessment of the degree of crop lost. Because of the relatively infrequent visits made to individual farms, the estimates of degree of damage and frequency of crop damage by wildlife are likely to be conservative estimates of what actually did occur during the study period.

To assess the degree of damage, we sampled five quadrats, 2×10 m, from each affected crop stand. We placed quadrats randomly within the crop stand. We calculated the proportion of crop damaged having counted the number of damaged or missing plants or plant parts. The mean of the five quadrat values for each damaged stand is a measure of the proportion of crop damage sustained in any one sample. I estimated mean percentage crop losses for each farm, taking into account the number of stands planted of each crop and the proportion of stands that sustained crop damage. When the same crop stand sustained losses in >1 month, I accounted for it in the calculation of mean percentage loss.

We collected time budget data using standard sampling techniques (Altmann 1974). Observers walked a circular route through each village and Kawanda at hourly intervals from 0800 to 1800 h for 3 days each month. We collected scan samples at 20-min intervals along the route and recorded details of age, class, sex, location, and activity for all people during each scan. Each scan continued until five individuals had been observed or a period of 5 min had lapsed.

I analyzed all data using SPSS for Windows (version 8), and considered results to be statistically significant when $p \leq 0.05$.

RESULTS

Baboons as Crop Raiders

We recorded 70 instances of crop damage by wildlife to the 37 farms being monitored during the study period. This is likely to be a conservative estimate of overall crop-raiding frequency.

Baboons crop raid more often than any other species and are responsi-

Table I. The frequency of raiding events, and mean percentage crop losses per damage event, caused by baboons to five staple crops on 37 farms over a 12-month period[a]

Crop	Frequency of raiding	Mean percentage crop losses per damage event	Raiding events by baboons (no.)	Mean percentage crop losses per damage event by baboons
Maize	25	43.8	23	43.8
Cassava	27	45.5	17	50.4
Sweet potatoes	4	58.9	1	66.7 [$n = 1$]
Beans	6	50.2	6	50.2
Groundnuts	4	42.2	2	58.4
Total	66	45.7	49	48.0

[a]The values for mean percentage crop losses do not take into account the number of stands of any crop type planted, thus they are only indicators of the relative intensity of damage incurred rather than estimates of the actual percentage crops lost across the sample.

ble for 70% of all crop damage events. Of all the crops grown by the farmers, maize and cassava sustain the most frequent damage. Baboons raid stands of cassava and maize significantly more frequently than all other animals combined do (χ^2 + 6.17, df + 1, $1p < 0.05$), and they cause proportionately larger amounts of damage (Table I). Thus, I concentrate on damage sustained by maize and cassava stands because they are the most frequently cultivated species and are of major importance in local food culture (Hill, unpublished).

Are All Farmers Equally Vulnerable to Baboon Crop Raiding Activities?

Figure 1(a,b) illustrate that not all farmers are equally at risk from crop damage by baboons. Of the 37 farms, only 15 (40%) experienced any crop damage by baboons throughout the year. In addition, baboons do not visit all affected farms equally frequently: the mean number of visits per farm is 1.4 in 12 months, with a range of 1–11 visits per farm (Fig. 1a). Across the whole sample, approximately 10% of the maize standing crop and 9% of the cassava standing crop were lost to baboons. However, the average percentage losses on farms that actually experienced crop losses are 19% (range: 7.7–53.0%) and 25% (range: 4.5–61.0%) for maize and cassava, respectively. On considering the estimated percentage crop damage sustained across different farms, it is clear that although farms that experience frequent raiding also tend to support proportionately greater losses, frequency of raiding events *per se* is unlikely to account for all variability between farms. For example, although farm 16 experienced raiding events most frequently, a greater pro-

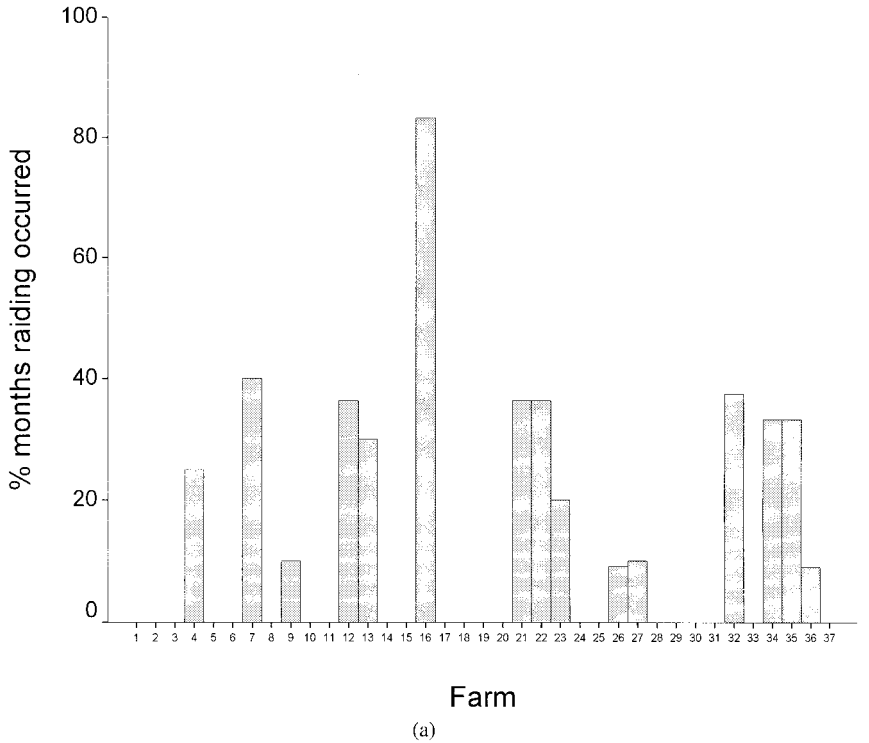
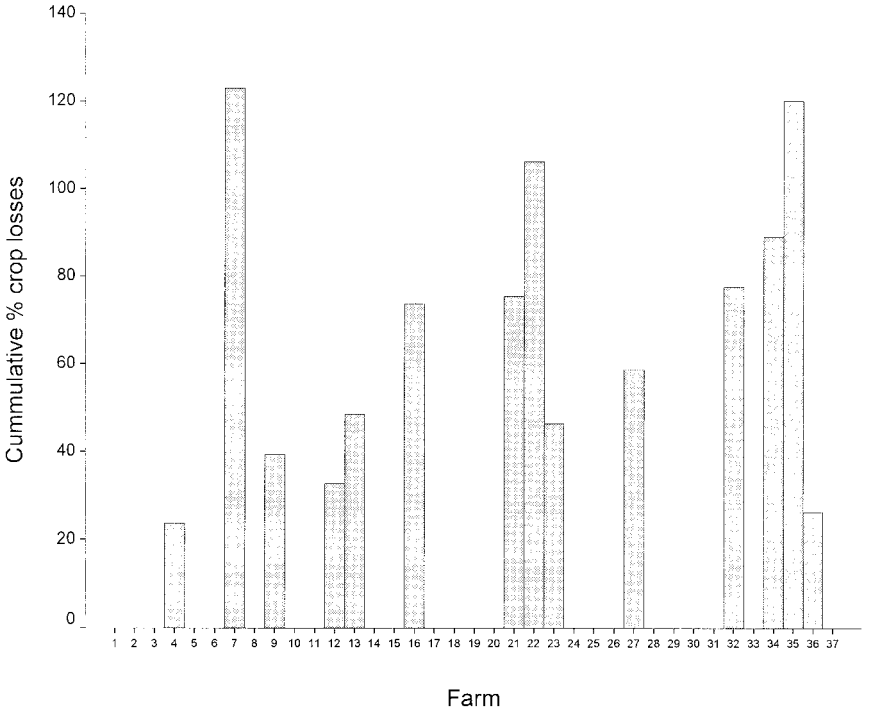


Fig. 1. (a) Percentage of months farms were observed when crop raiding by baboons occurred. Percentage of months was used rather than absolute frequency of months because several of the farmers included in the study were not contacted successfully every month. Two farmers dropped out partway through, one because he gave up farming because of heavy crop losses to wildlife; the other farmer moved to a new area, again giving heavy crop losses as the reason for relocating outside the study area. (b) Cumulative percentage crop damage for five staple crops—maize, cassava, sweet potatoes, groundnuts and beans—recorded on each study farm throughout the study, taking into account the numbers of stands grown of each crop.

portion of crops planted were lost from farms 7, 22, 34, and 35 versus that lost from farm 16 (Fig. 1b). These figures are a measure of the total proportion of crop damage experienced on individual farms rather than absolute amounts of crop loss. Why should particular farms be especially vulnerable to frequent or extensive baboon crop-raiding activities?

Factors likely to affect vulnerability to crop raiding by wildlife include the distance from farm to forest edge, the number of other farms lying between any field and tree habitats (both forest and plantation), and choice of crops being grown (Hill, 1997). In this sample, there is no damage recorded from farms lying more than 450 m beyond the forest edge. Statisti-



(b)

Fig. 1. (Continued).

cal analysis confirms that the presence or absence of baboon raiding activity on any farm is influenced by the location of the farm in relation to the forest boundary, i.e., those farms lying at or very close to the forest boundary are much more likely to receive at least one raid from baboons (Mann–Whitney U test: $N = 37$, $z = -3.3$, $p < 0.001$). Similar results are obtained when the same analyses are carried out using number of neighboring farms between the study farm and forest boundary. There is a significant relationship between the number of neighboring farms between the study farm and forest boundary and occurrence of baboon crop-raiding activity (Mann–Whitney U test: $N = 33$, $z = -3.95$, $p < 0.0001$).

CAN FARMERS PREDICT WHEN CROPS ARE MOST AT RISK FROM BABOONS?

An important consideration is how crop damage was distributed across the agricultural year. Does damage occur seasonally or year-round, and do

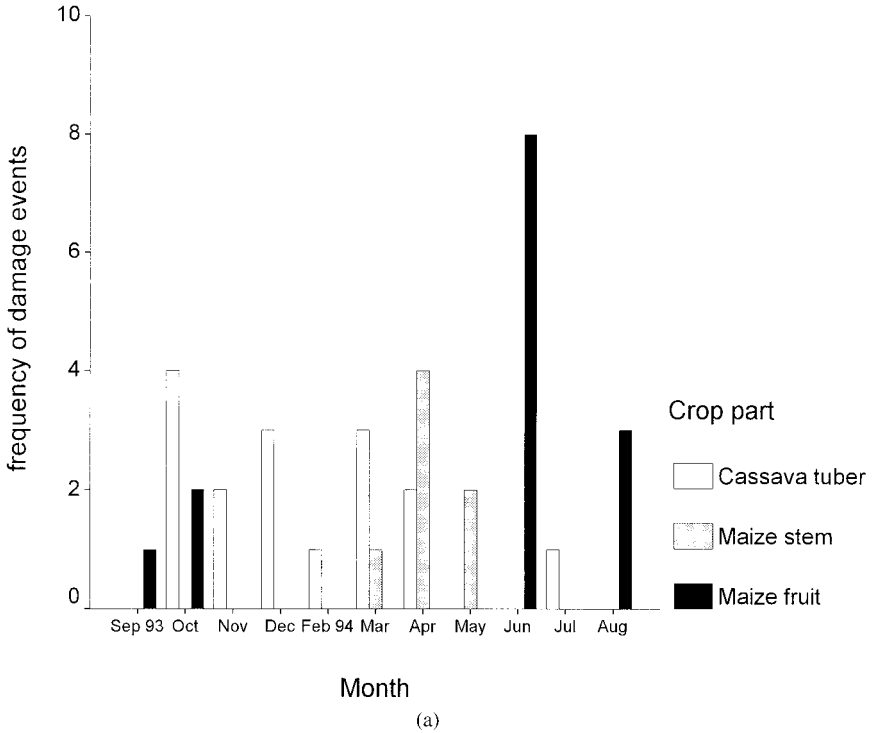
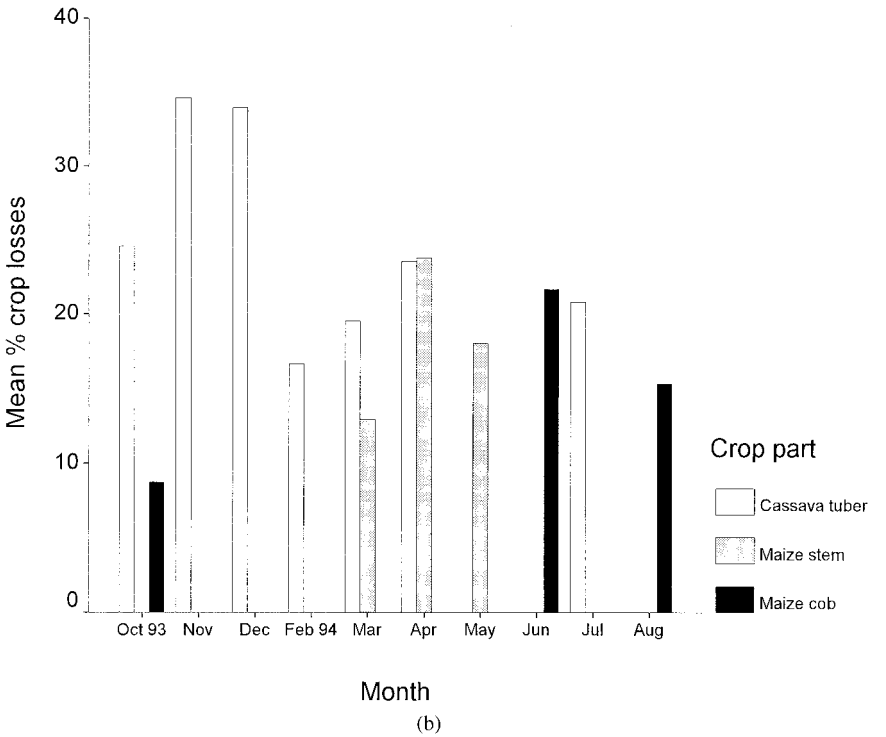


Fig. 2. (a) Frequency of crop-raiding events across the year, illustrating how maize and cassava plant part use by baboons varies with time of year. (b) Mean percentage crop damage recorded for each crop part, taking into account the numbers of stands of each crop grown.

patterns of crop raiding between village sites vary? Figure 2(a,b) summarize the pattern of crop damage by baboons. A Friedman two-way analysis of variance indicates there is no significant difference in the pattern of crop-raiding across the four study sites for either maize or cassava; therefore, I lumped the frequency data from all sites. Baboons appear to concentrate their crop-raiding activities on maize throughout the year when the crop is present in the fields. The main maize crop was planted in March to April and harvested between June and July, whereas a smaller, second crop was cultivated during the period July to October. Baboons switch to feeding on cassava tubers more frequently during the brief period when there is no maize crop available to them: October/November to early March. They continue to feed on cassava tubers during April and May while also feeding on maize stems. They uproot or snap off the stems to feed on pith and sap, thereby removing the plants from further agricultural production. Accord-



(b)

Fig. 2. (Continued).

ingly, even when baboons raid cassava stands relatively infrequently, they cause considerable crop damage in November/December. The frequency of baboon damage to maize stands peaks during June (Fig. 2a), when baboons direct their raiding activities primarily towards the young ripening maize cobs, just before the main maize harvest. They remove whole cobs from the plant but may not remove all cobs from any one of them. Figure 2b depicts the mean percentage loss of different crop parts across the year, illustrating the degree of damage occurring to different crops throughout the year.

Not all crop plant parts prove equally vulnerable to damage from baboons. Figure 2a illustrates that baboon feeding activity is concentrated on cassava tubers and maize cobs (both immature and mature), although they feed on maize and cassava stems occasionally, as do other animals. This confirms that baboons damage maize throughout much of its growing cycle, as claimed by local farmers.

The frequency of raiding activity is not necessarily a good indicator of the level of crop damage sustained in any area, and estimates of at least percentage amounts of crop losses, if not estimates of actual crop losses, combined with information relating to the frequency of raiding events, are likely to provide a more complete picture of what is happening at any particular site and at any particular time.

Crop Protection Strategies

The main method used locally to protect fields from wildlife, and especially baboons, is by patrolling the fields and chasing out intruding animals, including groups of baboons. Children (6–12 years old) carry out nearly a third (30%) of all guarding and just over a third (34.4%) is done by women. The remaining third is carried out by men. Farmers sometimes use dogs, spears, bows and arrows, and bells to help scare away raiding primates, and people work cooperatively, helping to chase away intruders from their neighbors' fields as well as their own.

Time budget data illustrates that people invest varying amounts of time guarding field crops according to the season (Fig. 3). Guarding behavior was predicted to fluctuate with baboon raiding activity. Although peak investment in time spent guarding is observed during October/November and June/July, coinciding with the peak raiding frequencies of baboons (Fig. 2b), there is no significant association between patterns of guarding and frequency of raids by baboons. However, there is a significant positive correlation between monthly investment in guarding and monthly frequencies of crop-raiding events by all diurnal species recorded during this study [$r_s = +0.515$, $p < 0.05$, $N = 12$].

DISCUSSION

Baboons have the potential to cause large amounts of damage locally. They raid farms more frequently than other species of wildlife do, cause proportionately greater amounts of damage than all other animals combined, and visit farms throughout most of the year. In addition, they prefer maize and cassava to other crops. Maize and cassava are the two most frequently cultivated field crops within this community (Hill, 1997), and they form the basis of most households' meals (Hill, unpublished). Thus, they are of great importance to household food security. Baboons concentrate their feeding activities on these food crops especially during later stages in the crops' development, thus farmers are unable to offset some

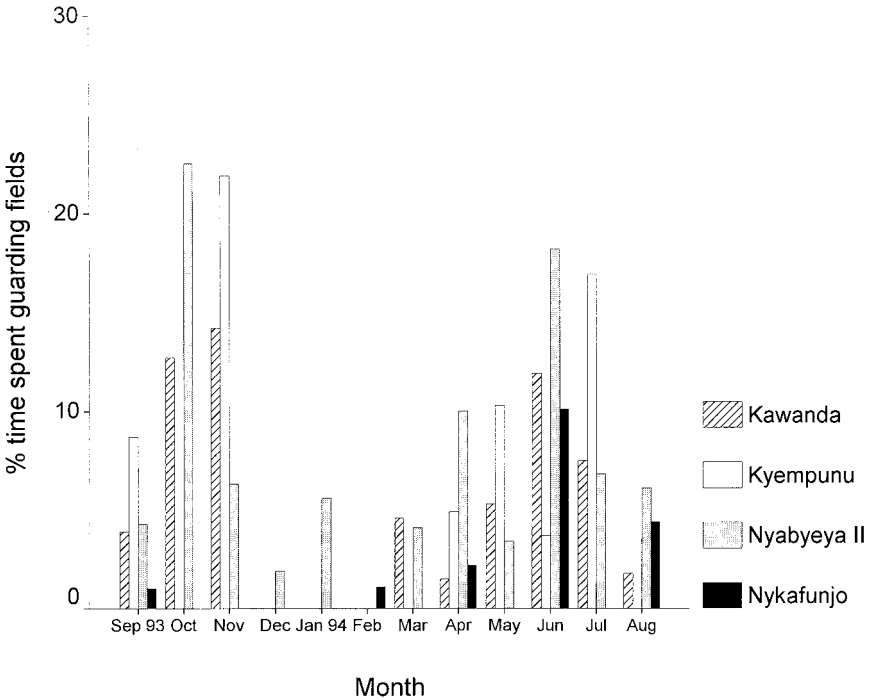


Fig. 3. Percentage time spent guarding fields against wildlife across the year in Nyakafunjo, Nyabyeya II, Kyempunu, and Kawanda.

of the costs of crop damage by replanting because damage occurs too late in the growing season. Given the degree of damage caused by baboons, as compared with other crop-raiding species, and the frequency with which they feed on field crops, farmers' perception of baboons being the worst crop-raiding species locally is understandable.

Additional information collected during interviews with local farmers ($N = 245$) suggests that they consider baboons to be major pests not only because they are perceived to be more destructive than most other species but also because they visit farms frequently, in large and sometimes very large groups, and can be very persistent. For example, an elderly man commented, "Baboons come in large numbers and are not scared of people. They keep on coming, even when you kill them." His neighbor was keen to stress this point further, and added, "Baboons are not scared of people. When you chase them, they run and hide and then come back. When you chase other animals, they run away for good." In addition, baboons are perceived as intelligent animals, and well organized in the way they raid

fields, as reflected in some of the comments made to me by local farmers. "They destroy much and cause a lot of damage and they are many. They are organized like the army." Another farmer said, "Baboons are a problem because of their skills, which are like those of humans—they check for the owner from the tops of trees, and when chased they just hide, and then return and take the crops." Locally, many people regard baboons as being vindictive, damaging crops for the sake of it rather than for food alone, and respondents often made comments such as, "After feeding, baboons destroy the rest of the crop. When there are no fruits, monkeys leave the crop; thus monkeys are better than baboons." Another comment was, "They [baboons] just break and sit on any food they don't eat."

A study of crop raiding by wildlife around Kibale National Park, Uganda, reported many similar findings. At Kibale, red-tailed guenons (*Cercopithecus ascanius*) and L'hoesti's guenon (*C. l'hoesti*) were more frequent visitors to farms at the forest edge than baboons were. Nevertheless, baboons caused more damage to field crops than either guenon species did, and baboons were actually responsible for the greatest amount of crop damage of any species, including elephants. Baboons were also recorded preferentially feeding on maize stands around Kibale, as in the present study. Likewise, they visited fields around Kibale throughout most months during the year, and fields close to or at the forest boundary were most at risk from crop damage by wildlife (Naughton-Treves, 1996).

Studies looking at the behavior of crop-raiding baboons have reported that troop ranging behavior, frequency, and duration of raids varied according to season and the degree of vigilance practiced by farmers (Marples, 1976; Forthman-Quick, 1986). Although not all farms in this study were equally vulnerable to crop raiding by baboons, those that were affected tended to experience serious losses. Generally, the farms most at risk to frequent losses were ones lying immediately at the forest edge. However, location was not the only factor to render farms especially vulnerable to crop raiding. The number of neighboring farms lying between any farm and the forest edge was also an important consideration, as illustrated by the example of farm 21, where a relatively large proportion of crop losses were incurred (Fig. 1b). Although farm 21 lay 150 m from the forest boundary, there was nobody farming the land between it and the forest; thus, there were no extra people available to guard crops at the boundary. Moreover, because the land was not cleared for agriculture, it provided raiding wildlife, including baboons, with extra cover, facilitating their entry to fields and supplying good vantage points from which to observe any person approaching. I saw baboons raiding fields on several occasions. Not all group members entered the fields, and those remaining on the edge of the field were highly vigilant and gave alarm barks on sighting approaching people or dogs.

A number of studies have reported that baboons and other primates are more fearful of adult men than of women and children, and of people carrying weapons versus ones who are unarmed (Strum, 1994; King and Lee, 1987). Although it was recognized locally that adults, and particularly men, were most feared by baboons (Hill, 1997), two-thirds of all crop guarding was carried out by women and children. Successful guarding required that people be in the fields for long periods of the day throughout the seasons when there were vulnerable crops in the ground—i.e., most of the year. Obviously, this was not always possible given that people had other tasks to complete, including attending school, household chores, taking crops to the grinding mill, trading in the local markets, and employment by local industries, e.g., a sugar plantation, Nyabyeya Forestry College and Department of Forestry).

The absence of neighbors to help with guarding can be problematic. Farm 16, which experienced more crop-raiding events than other farms, was located on the edge of a strip of riverine forest in the village of Nyabyeya II. The owner also had a second farm in the region known as Kawanda. Consequently, the three adult members of the family split their time between the two farms. Perhaps the most important factor was that at the time of this study, there was no other farming in the immediate vicinity, thus crop-guarding activities were carried out by family members only, without additional help from neighbors. A study of Nigerian farmers and crop pests reported that farmers considered isolated fields to be exceptionally vulnerable to damage by wildlife, so farms were grouped together to spread the risk of crop losses amongst many farmers, who shared the costs of guarding fields and any consequent crop losses (Atteh, 1984).

Evidence from several studies suggests that crop-raiding conflict issues reinforce the attitude among farmers that conservation programs and conservation areas actually contribute to their subsistence problems rather than benefit them (Infield, 1988). Furthermore, a commonly voiced view among farmers in Nyabyeya Parish is that wildlife authorities, and conservationists particularly, are either unaware of the costs of crop raiding or they are indifferent to farmers' needs (Hill, unpublished). Such views are not restricted to African farmers. Conover and Decker (1991) reported similar findings from their study carried out in the United States. They argue that such a perspective is likely to alienate local people, thus reducing their support for and compliance with conservation policy and practice (Conover and Decker, 1991).

In a study looking at the costs and benefits of living adjacent to Forest Reserves in Uganda, Howard (1995) estimated from farmers' own estimates of crop losses to all wildlife that the costs of crop losses suffered by farmers in Nyabyeya Parish, including the costs of crop protection per household,

ranged between $96 and $519 per year, and the greatest costs were those associated with time spent guarding crops. Average local salaries were approximately $25–30 per month. Crop protection can incur actual monetary costs to households, particularly where adult male members of the household are employed away from the farm either part-time or full-time. Guards are usually employed to protect field crops against wild pigs, which are primarily nocturnal in their raiding habits, but some farmers locally employ laborers to guard vulnerable fields against baboon raiding (Hill, unpublished).

Traditionally, farmers throughout many parts of Africa have hunted and trapped wildlife attracted to their fields, holding seasonal game drives to reduce local populations of pest species and laying snares and traps within their fields. Such strategies have had the advantage of providing people with meat for the household as well as reducing the amount and impact of crop losses (Vansina, 1990), although primates have not necessarily been a primary target for these kinds of protective measures, particularly among communities that regard primates as non-food items. In recent years, these practices have declined in frequency in many places as a consequence of changing wildlife protection laws.

Horrocks and Baulu (1994), Strum (1994), Pirta *et al.* (1997) and Naughton-Treves (1998) recommended ways to minimize the costs of crop-raiding by wildlife. However, there has been little investigation to determine how successful different strategies might be. An important consideration is that any management strategy be appropriate to the particular site concerned. For example, keeping animals out of fields by fencing them off (Mascarenhas, 1971) or by guarding (King and Lee, 1987; Strum, 1994) are considered to be the most successful strategies for limiting crop damage by primates. However, guarding is labor intensive, and at sites like Nyabyeya Parish, where it is difficult for farmers to predict when baboons are likely to raid their fields, farmers located at the forest edge do not regard guarding alone as an adequate measure to protect their livelihood. Oyaro and Strum (1984) and Forthman-Quick and Demment (1988) demonstrated that baboons that adopt crop raiding as part of their foraging strategy are able to reduce their overall investment in foraging time because of the high nutritional value of their preferred field crops. Consequently, in order to provide effective protection for standing crops, farmers must harry primates extensively, making crop raiding both energetically much more expensive and riskier for them (Strum, 1994). Under present circumstances, farming households are not necessarily able to do this and may well already be facing labor bottlenecks without investing extra time and labor guarding fields. In such a situation, farmers are likely to be more willing to adopt methods that scare baboons away from their fields more effectively without incurring

extra labor or substantial monetary costs. Further research at this site should concentrate on investigating how guarding fields at the forest boundary can be made more effective without substantially increasing the costs to the individual farmers, perhaps through increased use of dogs, carrying out trials of different kinds of locally available fencing, and/or the use of substances that might act as repellents to baboons and other wildlife.

Although the results obtained during this case study are in accordance with previous findings, they illustrate how crop losses can vary greatly from farm to farm within the same time period. People are aware of and express concern about the fact that any benefit that might accrue from living alongside wildlife, e.g. profits from local community-run tourist wildlife viewing facilities, will go to local institutions for the benefit of all people, yet it is only certain individuals that bear the actual costs of living alongside the animals, i.e. farmers who actually experience crop damage by wildlife. This is an important issue, and is not unique to this site (Western, 1994). Where such conflict issues exist, it is important that the individual farmer's plight be recognized and given due consideration when evaluating costs and benefits of particular conservation programs. Schemes by which the costs of crop-raiding by wildlife might be ameliorated are likely to vary according to local social structures and systems of organization as well as local peoples' perceptions of the issue.

CONCLUSIONS

Baboon crop-raiding activity can pose a significant threat to field crops and thus farmers' livelihoods. Animals such as baboons are particularly costly for farmers, not just because they have the capacity to cause large amounts of damage to a wide range of highly valued crops, but also because it is difficult to predict times when they are unlikely to visit fields. In areas where there is a bimodal rainfall pattern, and thus edible crops present in fields throughout much of the year, farmers must be vigilant against baboons year-round in order to protect their crops. Not all farms are equally vulnerable to such crop damage, but where there is such a risk, the effects can be extremely costly to the farmer, both in actual crop losses and the economic (and energetic) costs of protecting crops. Crop raiding by wildlife is an issue that is likely to become an even more pressing concern for conservationists and conservation programs in the future, as farmers and wildlife continue to compete for resources. Although there is a very real need for more research on practical ways to reduce the impact of wildlife on farmers, it is also important that within any intervention initiative there be adequate consideration of and support for ensuring that the individuals who bear

the costs of any conservation policy are also those who subsequently benefit from them.

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