

**Possible strategies/practices in reducing wild animal
(Primate) crop raids in unprotected areas in Hoima
District.**



Conducted in two Sub-Counties in Hoima District,

By

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A report to the PCLG-Uganda

March 15, 2012

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1.0 CHAPTER ONE: INTRODUCTION.

1.1 Introduction

Until recently, there has been little attention given to vertebrate species that damage crops, particularly crops of small-scale farmers in tropical and sub-tropical 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, (Hill, 1997).

There is a high degree of dependence on agriculture for subsistence within communities of Hoima, as it may be the case elsewhere in Africa. For approximately up to 80% of people, agriculture is the sole source of livelihood. Crop-raiding animals may cause 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.

On the other hand, one of the main challenges facing wildlife conservation in the twenty-first century is the increasing interaction between people and wildlife and the resulting conflicts that emerge. Some parts of Hoima are densely populated because of the immigrants in the study area and also because of the rapid increase in indigenous population.

Because of increasing demand for land and the declining productivity of the already cultivated land, human communities are looking to virgin lands especially forests, which they believe to be more fertile than their own land, for increasing agricultural productivity.

In particular, cultivation in forest areas which at the same time act as wild habitats in Africa is increasingly leading to conflict. This quandary is epitomized by primates, especially baboons, chimpanzees and other herbivores raiding valuable crops, which cause serious hardship to the already impoverished farmers (Sillero and Switzer. 2001). 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).

1.2 Research Problem

Lack of appropriate and effective interventions by the smallholder farmers, the Government and the private sector (NGOs & CBOs), has led to persistence of crop raids, which has resulted into a human-wildlife conflict. This, if not appropriately addressed, will result into adverse effects on the socio-economic advancement and biodiversity conservation and preservation processes. The problems associated with wildlife found out of protected areas in Hoima include:

- loss of human life
- injury to human beings
- destruction of crops
- destruction of farm infrastructure
- creation of an environment of fear

- Spread of diseases to livestock.

Although wildlife is a source of foreign exchange to the country, it is perceived by some disadvantaged communities as a cause of poverty and a source of hunger and disease for livestock. Human-wildlife conflict is, in most aspects, a land use conflict which spills across and beyond the jurisdiction of the Uganda Wildlife Authority.

In their quest to protect their crops against wildlife raiding, farmers utilize strategies that are often cruel and ineffective. People lay traps e.g. snares, metal traps, poisoning the animals with pesticides like furadan, hunting them with dogs and killing them and worst of it all, cutting down the forests which act as homes for these animals not knowing that they are increasing the problem both in terms of crop raiding and also compromising conservation and preservation efforts (Hill, 1997). In some countries, governments have even resorted to the wholesale capture and trade of primates as a putative control measure (Else, 1991). While arbitrary killing or trapping of suspect crop-raiders may provide a short-term solution to the perceived problem, it fails to address the long-term needs of either farmers or wildlife. For example captured animals are frequently taken at random and their removal often has little effect on the level of crop damage.

The main threat to the survival of primates in Uganda is habitat destruction, but there is also an increasing problem of conflict with local people due to crop-raiding, (Sillero and Switzer, 2001).

Human- Animal Conflict situation in Hoima:

In Hoima District, Kiziranfumbi, Kabwoya, Bugambe and Kitoba sub-counties have the most deforested environment, and are part of the Northern animal corridor and provide habitats for primates such as chimpanzee, baboons, Vervet monkeys, mangabeys as well as other species such as porcupines and wild pigs.

As a result of the socio-economic activities in these areas, forest cover has been reduced leaving the animals with smaller habitats and less food. So the wild animals have resorted to feeding on crops in people's gardens, resulting into a conflict. Human beings want survival while wild animals need the same. This has brought about confusion and resentment from both sides rendering conservation and preservation a challenge, hence need for interventions that reduce crop raiding to enhance ecological, economical and social sustainability so as to foster co-existence.

Despite the interventions by government and some nongovernmental organizations, such as Jane Good all Institute (JGI), Chimpanzee Sanctuary and Wild life Conservation Trust (CSWCT) World Wide Fund for Nature (WWF) in the area little has been achieved. These bodies have consolidated efforts to protect the wild animals plus encouraging conservation and re-establishment of forests, but to some farmers, it is still a mystery, because wild animals continue to destroy their crops. This has had social economic implications and resentment culminating in the use of, sometimes cruel methods to prevent wild animal raids on gardens.

Therefore, this study aimed at identifying the interventions put in place by the farmers, their effectiveness and suggest other possible interventions basing on aspect of suitability of land uses in these areas. The

aspect of planning according to land use suitability might be lacking, and this is partially accountable for the wild animal crop raids, hence the human-animal conflict.

The study was conducted in two Sub counties, Kabwoya and Kiziranfumbi in Hoima District. Within the two Sub counties, three parishes from each were selected depending on the intensity of the problem.

1.2 Main Objective and aims.

To evaluate the efficiency of practices/strategies used to control crop raiding in order to contribute to the reduction of community and wild life management conflicts.

Specific objectives

1. To determine the severity and frequency of crop raids in the unprotected areas of two selected Sub-counties in Hoima district.
2. To document the practices used by the different stakeholders to reduce wild animal crop raiding.
3. To assess the effectiveness and risks of the using these practices to counteract wild animal crop raids

1.3 Significance of the Study

This study aimed at assessing the severity and frequency of primate crop-raiding in two Sub counties Hoima District. This study sought to establish information on crop species destroyed mostly, which specific primate species are thought to damage crops, the perceived extent to which each primate species damages crops, other human attacks and (iv) the preventive measures taken in the two Sub counties.

Gap and risk analysis was done leading to suggestions of better options to reduce wild animal crop raids in un-protected areas so as to contribute to both environmental and agricultural sustainability.

This documentary evidence aims at bringing about the sustainability dimensions in conservation and socio-economic stability of the farmers. This information could be beneficial to affected farmers, conservationists and policy makers. To fulfill the intentions of this study, results and information will be disseminated to the mentioned stakeholders for use and a paper published.

2.0 CHAPTER TWO: LITERATURE REVIEW

Crop raiding by primates can be seasonal as it is influenced by availability of both crops and wild food resources. Raiding intensity may vary as a function of local crop assemblages, planting patterns, growth stage or ripening periods, with certain crops and developmental stages being consumed preferentially (Salafsky 1993; Treves et al. 1998; Hockings 2007).

Availability and fluctuations in preferred forest foods may affect crop-raiding incidence, as certain species have been observed to feed on crops as a temporary alternative in times of fruit scarcity (Campbell and Linkie 2008). Although evidence suggests that forest fruit availability may affect crop-raiding levels, crop consumption may also be a preferential means of accessing a high energy food to optimize forage strategies (Treves *et al.* 1998; Hockings 2007). By predicting temporal and spatial variations in the human-wildlife conflict, farmers might be able to direct their resources more effectively. For example, mitigation strategies could target a few choice crops during specific periods when primate raiding levels are elevated. Human-wildlife incidents may also show inter-annual variation in both distribution and severity; long-term data collection consistently is sometimes required, therefore, to fully understand the prevalence and extent of the problem.

Population and species differences in the intensity of crop-raiding are likely to reflect the relative costs and benefits of feeding on cultivated versus non-cultivated foods.

In general, primates, especially great apes can achieve more sophisticated cognitive abilities than many other mammals, including advanced abilities for social learning, solving problems innovatively and behaving flexibly. Such cognitive capacities must be considered when assessing how primates perceive and adapt to human-induced habitat changes, what counter-measures are likely to be effective, and for how long. Given the protected status of the great apes, a problem individual should only be repelled or removed or tolerated. Experience from other human-wildlife conflict programmes and suggested measures to reduce HWC, these measures are either direct by reducing the severity or frequency of interaction with primates, or indirect by raising tolerance for great ape threats (Treves 2008) Generally, these measures are distinguished between those appropriate for communities neighboring protected areas and those where the great apes are found outside protected areas on private or state land. In most studies to develop strategies of mitigating wild animal crop raiding; emphasis has been on large mammals and interventions suitable for communities neighboring protected areas. This study therefore aimed at identifying the possible interventions to suit small mammals (primates) found in un-protected areas on private land.

In accordance to with the IUCN/SSC Africa Elephant Specialist Group (Hoare 2001), human-great Ape conflict mitigation measures are listed as counter-measures, which are sub-divided into methods, which are merely actions, different actions within each category of counter-measure.

a) Traditional counter-measures

This includes, guarding crops against damage by wildlife. This is a common practice across the agriculture wild-life interface (Salafsky 1993; Hill 2005; Byamukama and Asuma 2006); however, quantitative data specific to great apes are lacking. As crop-raiding incidences are sometimes opportunistic and occur in poorly defended fields, crop loss is often inversely correlated with farmers' vigilance (Osborn and Hill 2005). The guarding measures preferred by different groups of people vary in

effectiveness and practicality (Chalise and Johnson 2005). There are considerable social implications to guarding crops, such as increased risk of injury and significant time commitment. The effectiveness of methods such as patrolling fields and shouting, banging objects and throwing stones, sticks or spears, is difficult to quantify; although Naughton-Treves (2001) suggests that in Uganda intensive guarding is at least partially effective because primates avoid farms that are heavily guarded. Although the use of domestic animals to guard crops might reduce some of the social costs, they could introduce health hazards or safety risks to great apes (Smith *et. al* 2000).

b) Traditional fencing has proven ineffective for excluding primates from fields. In some regions, fencing is combined with wire snares set between pickets to capture raiding rodents and these snares constitute danger to primates. In Uganda, one quarter of chimpanzees in two habituated communities (Budongo and Kibaale) have snare related injuries as observed by Wrangham and Mugume (2000); Plumtre *et al.* (2003) and Reynolds (2005). Although Chimpanzees can escape by dislodging a wire from the release mechanism, the wire often remains tight around the trapped limb, resulting in severe short-or long –term handicap, limb loss or even in some cases, the death of the individual. Clearing around fences may also discourage shy individual primates from raiding, thus minimizing the damages to crops and offsetting economical losses. Regular small scale cutting back of vegetation along fields, paths and trails frequented by humans and great apes can also reduce the incidence of primate attacks on humans if these are linked to issues of travel restrictions and surprise encounters. However, data on this is lacking.

c) Physical barriers:

Modification of the landscape around primate habitats might significantly improve the human-Primate conflict situation by creating new buffers and barriers to influence primate behavior and discourage them from coming into contact with people (Reynolds 2005). Fencing and barriers are widely used to keep animals out of agricultural areas (Osbond and Hill 2005; Yuwono *et al.* 2007). However, studies of orangutans suggest that even electric fences can become ineffective due to the primates ability to learn to overcome the problem, the ape realizes that the shocks from electric fences are not harmful; their effectiveness decreases (Agoramoorthy 2002)

3.0 CHAPTER THREE: METHODOLOGY

3.1 Study Area

The study was carried out in two Sub-Counties in Hoima District. Hoima District is found in the mid-western of Uganda it shares borders with Masindi and Buliisa Districts in the North, Kiboga District in the East, Kibaale District in the South. Hoima District stretches to the national boundary of the Democratic Republic of Congo in the West.

3.1.1 Major activities

Agriculture is the dominant sector of the economy, employing 77% of the population followed by the sales and services sector employing 11.9% of the population. The agricultural sector employed relatively higher proportions of women (85%) than men (69%). The proportions for men were relatively higher than those for women for the construction, mining/manufacturing and services sectors.

3.1.2 Climate

Hoima District has a bimodal rainfall pattern with totals ranging from about 800 mm in the Lake Albert flat rising rapidly eastwards above the escarpment to between 1250 - 1500 mm per annum before tapering off to 1000mm in the eastern border areas of the District. This presents a very important potential for agricultural development. Major agricultural enterprises include upland rice, coffee, maize, cassava, bananas, beans, vegetables, millet, groundnuts, cocoa, irish potatoes, tea and tobacco, and soya-beans. Temperatures are moderate averaging 18 - 30°C with the hottest spot of the district lying in the Rift Valley to the West. Although this is a dry belt area it has potential for livestock keeping.

3.1.3 Vegetation The vegetation of the district can be broadly classified into forest, savannah, grassland and swamps. Human activities have had a great influence on the natural vegetation in the district, such as deforestation, wetland degradation, river pollution and many others.

3.1.4 Soils

Hoima's soils are ferralitic and generally acidic. However they have adequate organic matter especially on the lower slopes and in the valleys. The soils are typically loam and deep on the valley slopes but tend to be shallower on the upper slopes. (Hoima District Plan-, 2009/10 – 2011/12 DDP). (Hoima District Plan-, 2009/10 – 2011/12 DDP).

3.2 Methods.

Data was collected during a 3 months study (January –March 2012). During the initial visit, the researcher mapped different farms and calculated the average size of gardens/ fields cultivated by farmers in these communities.

3.2.1 Questionnaire Survey

Questionnaire surveys at the parish (extensive) and household level (intensive) formed the basis of the study in which farmers' perceptions of the crop damage and the raiding animal were considered with a

view to estimating crop losses. Actual crop losses were observed on farms through quadrat sampling, as a means of cross-checking data collected by other means.

With the help of two field assistants, a total of 5 farms were visited at weekly intervals to carry out farm surveys.

3.2.2 Use of Quadrats

Four- 5 kilo meter transects were laid in each Parish, and gardens with evident crop destruction along the transect were selected to determine the severity of the problem by use of quadrats. To assess the degree of damage, 3 quadrats of 2 by 2 m, from each affected crop stand were laid. Quadrats were placed randomly within the crop stand. The proportion of damaged crops was derived from calculating the number of damaged or missing plants or plant parts, divided by the total crop population planted in the garden. The mean of the three quadrat values for each damaged stand is a measure of the proportion of crop damage sustained in any one sample. The mean percentage crop losses for each farm, taking into account the number of stands planted was estimated, of each crop and the proportion of stands that sustained crop damage. When the same crop stand sustained losses in 1 week, it was accounted for in the calculation of mean percentage loss.

3.2.3 Focus Group Discussions (FGDs)

Two FGDs were conducted to ascertain the practices used by small scale farmers to cope up with the problem. These were conducted with community members and key informants respectively with a help of an interview guide frame that captured the key aspects about the subject matter, which included; assessing the effectiveness and risks involved in the interventions employed by different the stakeholders to reduce wild animal crop raids, Farming communities were engaged to evaluate the effectiveness of each of the different methods applied by farmers to prevent wild animals from destroying and damaging their crops. Assessment was based on whether the intervention aims at killing the animal, or merely scaring them off, or habitat destruction. Also estimates of death rates per month were established.

3.3 Sampling Method

Purposive sampling of two parishes from the two Sub counties, where the problem is intense was done. Household population was obtained from the 2011 voters' registers and crosschecked with sub county records. Questionnaires were administered in 10% of the house holds in each parish. These households were randomly selected by following a pattern of skipping two households, and the third house hold interviewed.

160 questionnaires were administered to gather data on key aspects, which included, a) Severity of crop raiding, b) practices used by the different stakeholders to reduce wild animal crop raiding, c) Contribution from other stakeholders (government (UWA) and non government organizations) in reducing wild animal crop raids. In there the details included (i) crop species mostly affected, (ii) which primates in particular are responsible for causing damage to farmers' crops, (iii) the perceived extent to which each primate species damages crops, (iv) are crop raids seasonal or all year round, and (iv) the preventive practices by different communities within the two Sub counties in Hoima District.

Lists of crops already present in gardens were compiled, including information about planting time where possible, and the number of stands planted of each of the main staple crops. Subsequently, weekly visits were made to each farm. Community people were asked to report any instance of crop damage and whether they had observed the animal(s) responsible at the time. Field assistants and/or the researcher 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. The type of crop was noted, 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, the team quantitatively estimated the degree of damage. It was not always possible to obtain the actual degree of damage sustained because (1) some of the damages were too old for the recorder to be confident that the species responsible could be identified, (2) some damages had occurred too long ago for the recorder to estimate the degree of damage, and (3) on some occasions the damages were so severe that the farmer had already re-ploughed or weeded the field destroying severely damaged crops. On such occasions, the incident was just noted, but did not estimate the degree of damage, and such data was not considered during analysis. 16 out of 176 data records (filled questionnaires) were not considered during data analysis, either because of not being able to identify the animal responsible or because the damage had occurred too long ago to make an accurate 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.

4.0 CHAPTER FOUR: Data analysis and interpretation

The data collected by administering questionnaires was analyzed using SPSS for Windows (version 8), and considered results to be statistically significant when $p = 0.05$.

The findings were presented as the percentage of frequency of respondents giving each response in the case of multi-response questions.

Weighted ranks were calculated from the ranks farmers assigned to different practices to indicate efficient measure is compared with other with respect to the animal they control. To calculate the weighted rank, each individual rank given by the interviewees was assigned a score: rank 1 = 1, rank 2 = 2, rank 3 = 3, and rank 4 = 4, and the formula below was used to calculate weighted rank for each species.

$$\text{Overall ranking} = \frac{\sum (\text{score} \times n)}{N}$$

N=Total number of respondents ranking the intervention,

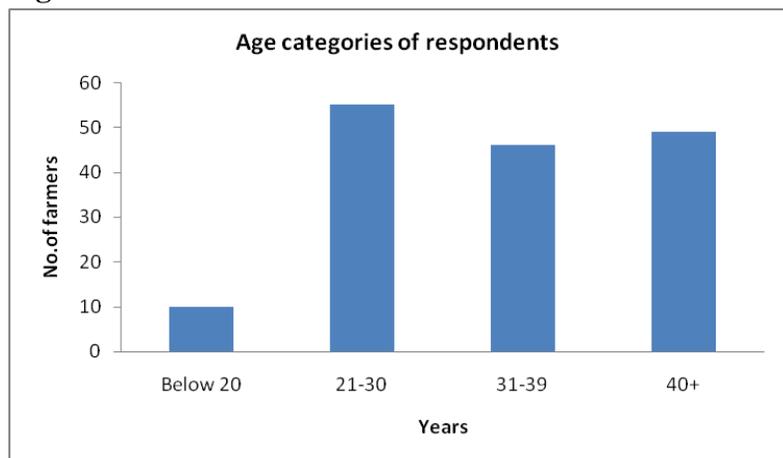
n= number of respondents ranking the intervention.

The Kendall Coefficient of Concordance was used to assess degree of concordance in farmer rankings across the two sub counties (Siegel and Castellan 1988).

5.0 RESULTS

Data was collected from a total of 160 respondents, 80 (50%) from Kabwoya and 50% of the respondents from Kiziranfumbi Sub-county respectively. Of the respondents, 68% were females and 32% were males. Taking into consideration the marital statuses of the respondents, 56% were married, 23% single, 15% divorced and 6% widowed.

Fig. 1



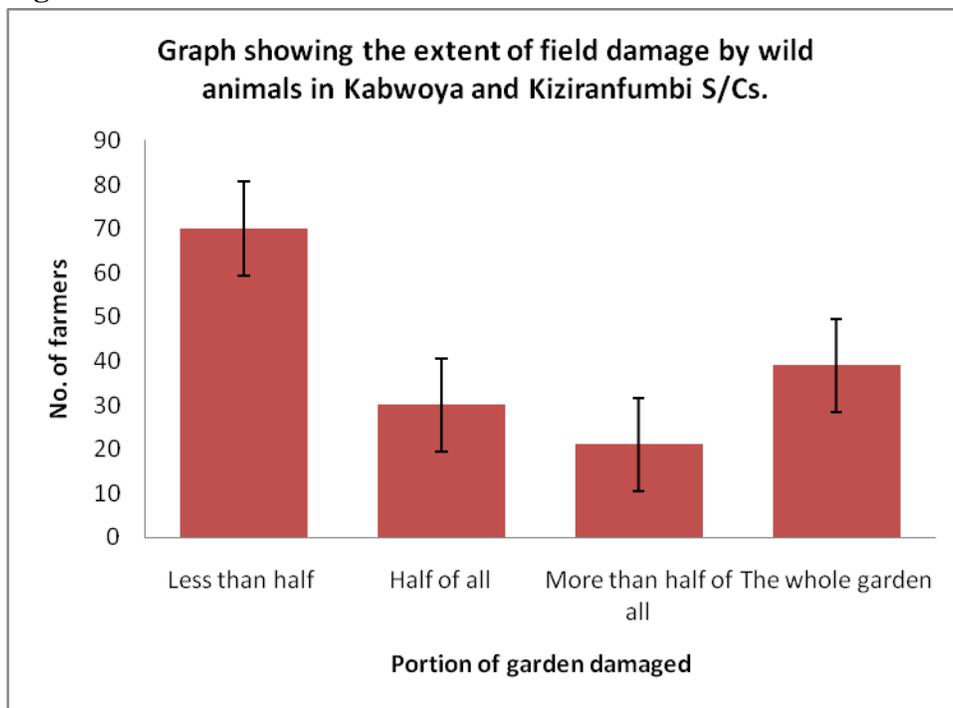
From the graph above, it implies that the farmers interviewed were of mature age, thus having an experience in practicing agriculture and all its underlying challenges, crop raiding inclusive.

Only 32% had education levels ranging from secondary to certificate, 49.5% studied up to primary level and 18.5% did not attain any level of education. Subsistence agriculture dominates within these communities; up to 78% of people reported agriculture as their sole, or main, source of livelihood. Variety

of crops are grown locally, including carbohydrate staples such as maize (*Zea mays*), cassava (*Manihot esculenta*), sweet potatoes (*Ipomoea batatas*), 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. For some crops such as Millet and sorghum, the growing season ranges from August to December, as harvesting proceeds to January. However, the average percentage losses on farms that actually experienced crop losses are 23% (range: 7.7–53.0%) and 25% (range: 4.5–61.0%) for cassava and sweet potatoes 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 is unlikely to account for all variability between farms.

Some crops were reported to incur damages by vermin right from germination, through fruiting up to maturity. Up to 65% of the staple crops, serious destruction occurs starting with fruiting stage up to when mature, ready for harvesting. Only in 35% of the crops were reported by the farmers for sustaining damage throughout their life span. Such crops included fruit species, cassava, sweet potatoes and vegetables especially cabbages whose tender leaves are palatable as well as stems roots and stems.

Fig. 2



The scale of field/farm destruction differed from farmer to farmer. 62.5% of the respondents reported farm destruction ranging from less than half to half of all while 37.5% reported losses of more than half all up to the whole garden being destroyed completely. Being small scale farmers, farm sizes range from 0.25 to 3.5 acres of cultivated land for growing staple crops. The extent of crop destruction was proportional to the over all acreage cultivated.

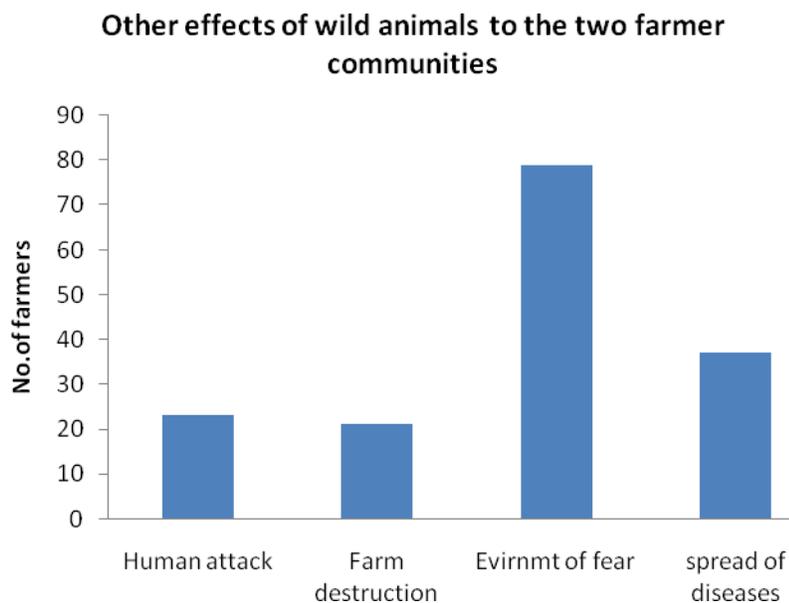
5.1 Crop parts damaged by wild animals;

Not all crop plant parts were proven equally vulnerable to damage by crop raiders. Farmers' experience sharing showed 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 as also stated by Hoare,(2001) in his findings. This confirms that baboons damage maize throughout much of its growing cycle, as claimed by local farmers.

Field observations showed that crop damages ranged from leaves, flowers, fruits, roots and stems up to the whole plant. Parts of plant fed on were associated to animal species involved in crop raiding. However baboons were predominantly mentioned for unspecialized character of feeding on any part of the plant and just destroying even what is not palatable. Vervet Monkeys were reported for feeding on roots, fruits and seeds, but in rare cases, when they fail to get a fruit or maize cob, they destroy the plant stem and leaves, or uproot crops such as legumes and just leave them lying in the garden.

Other than damages caused to crops, farmers reported other dangers associated with wild animals' existing in the same environment with human beings.

Fig. 3



Majority of the farmers (50%) reported that wild animals are responsible for creating an environment of fear, 23% reported spreading of diseases to livestock, 16% reported injury and loss of human life and 11% reported destruction of farm infrastructure and planted forest trees.

5.2 Who is most affected by the crop raiding wild animals??

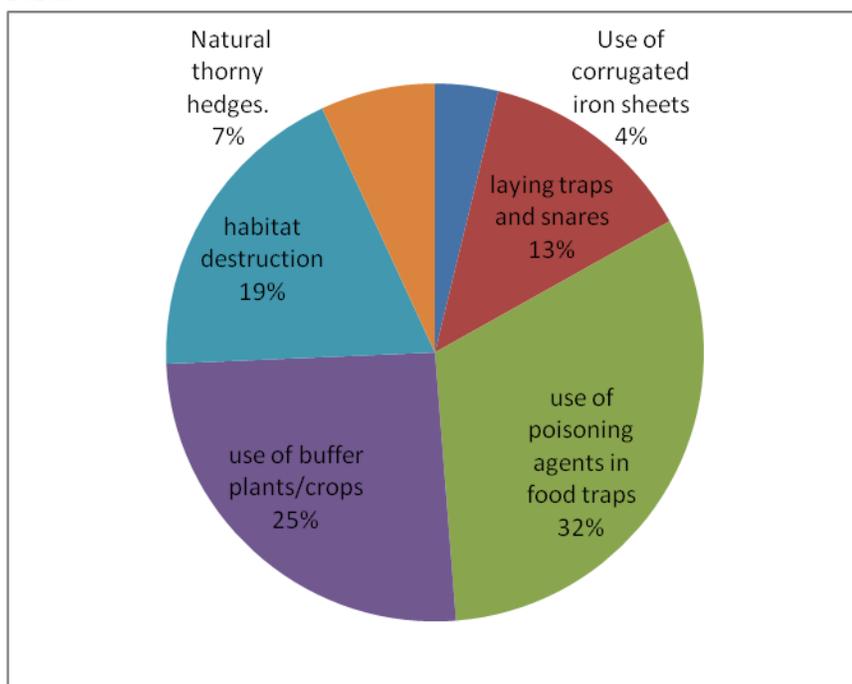
During the Focus Group Discussion with the key stakeholders from different villages and disciplines, farmers expressed it that when crop raids are rampant, the whole village is tensed up. Some people resort

to preparing meals at farm places. For those who do not guard their fields regularly, they suffer severe crop losses since a big population of wild animals might swarm one garden and wipe it up completely.

5.3 Crop Protection Strategies;

The main method used locally to protect fields from wildlife, and especially baboons, is by patrolling the fields and chasing out the raiding animals, including groups of baboons, vervet monkeys, in rare cases chimpanzees which are guarded by men only. This is so because community people stated that chimpanzees and Baboons are so aggressive and are not easily scared, thus tend to over look women and the children. Children (7–12 years old) carry out nearly a quarter(20%) of all guarding since they are mostly at school, and just over a half (52%) is done by women . The remaining percentage (28%) is carried out by men.

Fig 4: Pie-Chart showing other methods being used by the farmers to prevent wild animal crop raids



42% of the respondents reported that in some cases, other methods used cause deaths of the victims (wild animals). Such methods include snares and food poisoning with agents such as furadan, in rare cases, spearing. The remaining portion of respondents, 58% of them said that the methods used are not harmful. On average, farmers estimated between 2 and 6 animals dying monthly. Between 6 and 10 animal are wounded, whereby they sustain injuries; up to 80% get injuries on their limbs, 20% get injured on the general body parts.

Ranks were assigned to animal species according to their extent of involvement in crop raiding as follows Baboons were ranked number one crop raiders, followed by Vervet monkeys, Chimpanzees third, and lastly, Wild pigs although they are not primates.

5.4 What groups of especially primates are involved in crop raiding?

During FGDs, farmers reported that the raiding groups are always led by males, which do most of the spy work, then make sounds which the females and young ones interpret and either flee or follow. Also during individual interviews, 77% of the respondents said that raiding is done by mixed groups (Males, females and young ones), 13% were not sure about the sex of the animals and 10% proposed that they are always males with a few females.

Fig. 5



Three animal gender and age groups (Adult Male, Adult female and a slightly young baboon).

5.5 Effectiveness of the methods used in preventing wild animal from crop raiding;

Farmers accorded ranks to the different methods used as follows; Guarding and chasing away of animals was ranked no. one, and the ones below followed suit.

Laying traps and snares, use of poisoning agents in food traps, use of buffer plants/crops, habitat destruction and planting natural thorny hedges and lastly use of corrugated iron sheets.

5.6 Costs incurred;

72% of the farmers reported that they incur direct costs in vermin control. They further explained that the money involved is used majorly to pay hired guards, pay for labour to plant live hedges, buy snares and traps, and also cutting transects for tracking and chasing the animals. On average, a farmer spends between \$10-35\$ per month on vermin control, especially the elderly farmers who depend on hired labour since they cannot do the work themselves. The remaining 28% reported that they do not incur direct costs; since they depend on family labour to guard and scare away the vermin.

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.

6.0 DISCUSSION.

Although people in Kabwoya and Kiziranfumbi S/Cs 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. All the mentioned crops above are susceptible to crop raiders, especially baboons which were reported to be unselective to the extent that they uproot tree seedlings. Across the whole sample, approximately 10% of the maize standing crop and 9% of the cassava standing crop were lost to vermins. Because of the difference in behavior and feeding habits of the wild animals, crop raiders are seasonal. Farmers reported more crops raiding to take place during dry periods particularly in the morning hours. 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 is always planted in March to April and harvested between June and July, whereas a smaller second crop which is planted 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.

Crop raiding instances differ but are widely spread, and everyone is affected accordingly. The attitude of a person affected by wild animal-Human conflict may differ if they speak to a researcher or wild life manager alone rather than in the presence of other members of their community. It was observed that issues could easily become exaggerated or politicized, particularly in meetings where complaints had an audience and while speaking to outsiders perceived to have a political or other influence, as also discovered by Treves in his report of 2005. During FGDs, perceptions were quite exaggerated or reality distorted for economic, social, or political reasons. However, it was essential therefore, to gain the trust of an affected community and maintain cultural sensitivity when discussing issues connected with HGAC in order to acquire a comprehensive and fair understanding of how primate issues are perceived in a particular locality.

Crop protection strategies;

Farmers sometimes use dogs, spears, bows and arrows, and bells to help scare away raiding primates, and people work cooperatively, helping to chase away wild animals from their gardens as well as from their neighbor's fields. A number of studies have reported that baboons and Chimpanzees are more fearful of adult men than of women and children, and of people carrying weapons versus ones who are unarmed, the same was affirmed by Strum, (1994) and King and Lee, (1987). Although it was recognized locally that adults, and particularly men, were most feared by baboons, 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 for local chores, and businesses to include taking agricultural produce to markets. The absence of neighbors to help with guarding can be problematic. However, there is a significant positive correlation between monthly investment in guarding and monthly frequencies of crop-raiding events by all diurnal species.

Baboons have the potential to cause large amounts of damage locally. They raid farms more frequently than other species of wildlife do. Maize and cassava are the two most frequently cultivated field crops within this community, and they form the basis of most households' meals as also stated by Hill, in his 2000 report for the study conducted in western Uganda. 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 and the reason for inventing very cruel methods of protection, which unfortunately turn out to be un-selective.

In this regard, the government has categorized some wildlife species as vermin, these include baboons, vervet and red tail monkeys. For these, farmers are allowed to kill them so as to control their populations outside protected areas. During FGD, farmers from Kabwoya said that, sometimes when crop raiding is rampant, energetic youths are hired to do communal hunting of the particular wild animals, and reward is offered to the person who presents many tails to the farmers. Chimpanzees, much as they are also found in unprotected areas and are also involved in crop raiding, especially fruits, are regarded as problem animals rather than vermin, because of their endangered status. They therefore cannot be killed legally. The government, in its strategies to reduce the problem, made attempts to operationalise the control of the wild animals in unprotected areas, by putting in place vermin control units at district level. The vermin control unit is supposed to respond to affected community members by undertaking actions that scare off the crop raiders. Unfortunately, not many districts have fully constituted vermin control units. This grossly undermines effectiveness.

Furthermore, a commonly voiced view among farmers in Munteme Parish, is that wildlife authorities, and conservationists particularly, are either unaware of the costs of crop raiding or they are indifferent to farmers' needs. A similar observation was made by Hill (2000). Such views are not restricted to African farmers. Chalise (2001), reported similar findings from his study carried out in the Lakwuna area, East Nepal. They argue that such a perspective is likely to distance local people, thus reducing their support for and compliance with conservation policy and practice.

On assessing the sustainability aspect of the preventive measures mentioned above, majority (92%) of the farmers expressed dissatisfaction that the method used are not sustainable. Some of the reasons given included the persistence of the problem (crop raiding). They further stated that with the current inflation status, they are realizing retardation in agriculture other than advancing in agricultural development. Furthermore the lack of guarding consistency by locally recruited baboon guards due to sickness or absenteeism can result in serious damage to crops during that period when there is no guarding.

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 this particular study, focus has been on out-of protected areas, setting aside boundaries of national parks and forest reserves respectively.

Keeping animals out of fields by fencing them off, as also observed by Mascarenas, 1971 report or by guarding as King and Lee, (1987) and Strum, (1994) also stated in their findings are considered to be the most successful strategies for limiting crop damage by non-climbing mammals, such as elephants, buffalos, and wild pigs. However, guarding is labor intensive, but effective for primates where it is difficult for farmers to predict when baboons are likely to raid their fields. Consequently, in order to provide effective protection for standing crops, farmers must harass primates extensively, making crop raiding both energetically much more expensive and riskier for them, a similar observed by 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. 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- and Non-Government Organization bringing in money for carbon trading, 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 which needs to be dealt with. Where such conflict issues exist, it is important that the individual farmer's plight is recognized and benefits of particular conservation programmes target such affected farmers. In so doing, costs of crop-raiding by wildlife might be offset though this varies according to local social settings and systems of organization as well as local peoples' perceptions of the issue.

7.0 CONCLUSIONS

This report provides strong evidence that in the two Sub Counties of Hoima district where the study was conducted, farmers perceived crop damage by wild animals as a great hindrance to their agricultural development, and crop losses varied from farmer to farmer depending on the amount of time invested to guard the fields. The majority of the farmers were engaged in different ways of protection, but the dominant measure used by the majority was guarding and scaring away the wild animals.

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 likely 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.

In this regard therefore, Human-Wild life Conflict issues must be treated with concern, and placed in the context of local community and individual needs, as well as conservation objectives and those of the government and industry involved. Measures which might seem to be appropriate strategy to researchers might not necessarily be acceptable and practical to community or individual farmers. To establish measures which are sustainable and efficient may not be an overnight event, requiring adoption of a series of strategies. Interventions that can solve one type of conflict might not be applicable to others.

Intervention methods are therefore likely to be more successful if they are financially and technologically within the capacity of the people, organizations, institutions or bodies who will implement them as also observed by Osbond and Hill in the 2005 report. Farmers need to take responsibility for protecting their own crops, which requires assisting them to develop locally-appropriate schemes to successfully reduce loss.

8.0 ACKNOWLEDGMENTS

I am grateful to everyone who contributed towards the success this study. I would like to express my appreciation to the PCLG - for the financial support offered for this study. I would also like to acknowledge the efforts and support of Dr. Panta Kasoma. Last but not least, I am grateful to my two research assistants, Mr. Byansi Leonard and Mr Wamala Tadeo, for the commitment shown during data collection for this study. Thank you all.

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