



# **The effectiveness of Problem Animal Mitigation interventions around Karangara and Bujengwe Parishes, Kanungu District, Bwindi Impenetrable National Park, SW Uganda**

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## LIST OF ACRONYMS

BINP	Bwindi Impenetrable National Park
BMCA	Bwindi Mgahinga Conservation Area
BMCT	Bwindi Mgahinga Conservation Trust
DRC	Democratic Republic of Congo
FAO	Food and Agriculture Organization
HUGO	Human-Gorilla Conflict Resolution Program
HWC	Human Wildlife Conflict
IGCP	International Gorilla Conservation Program
ITFC	Institute of Tropical Forest Conservation
IUCN	World Conservation Union
MGNP	Mgahinga Gorilla National Park
MUST	Mbarara University of Science and Technology
PAs	Protected Areas
PAC	Problem Animal Control
PAM	Problem Animal Management
UWA	Uganda Wildlife Authority
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature

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## EXECUTIVE SUMMARY

Around Bwindi Impenetrable National Park (BINP), wild animals such as gorillas, elephants, baboons and bush pigs occasionally come out of the forest to into settlements to raid crops and but also end up harming human beings. This leads to negative attitudes within communities towards the Park and animals therein. Around 2000, in Karangara and Bujengwe parishes, interventions to reduce crop raiding by the wild animals were introduced by Uganda Wildlife Authority (UWA) and other development agencies (CARE, BMCT, IGCP). The main interventions were the Mauritius thorn hedge (Akampurira 2011; CARE et al. 2003), Tea growing and Baboon traps. Despite these interventions, local communities continued to experience crop losses attributed to raids from the park due to the ineffectiveness of the interventions.

Previous studies have shown that the ineffectiveness of the Mauritius hedge is mainly a result of poor maintenance and management (Akampurira 2011; Akampurira, Bitariho, and Mugerwa 2015; Babaasa, Akampurira, and Bitariho 2013; Kalpers et al. 2010; Masiga, Biryahwaho, and Akampurira 2011). Local communities consider most of these interventions as time demanding and labour intensive activities that they can't sustain without incentives or financial support (Akampurira 2011; Masiga, Biryahwaho, and Akampurira 2011).

The major goal for this study was to empirically assess the effectiveness of the interventions in Karangara and Bujengwe parishes by combining a quantitative and qualitative approach. To achieve this the study interviewed 90 homesteads (farmers) on the effectiveness of available problem-animal management interventions using semi-structured questionnaires. Furthermore, data on 583 and 5 crop raiding events was collected in standardized plots.

Results show crop raiding by the wild animals is still prevalent in the study area and that millet was most affected by crop raiding animals (26.10%), followed by beans (18.39%) and maize (14.15%). There was no significant difference ( $P>0.05$ ) between species the local people perceived to raid crops most and the study observations on the most raided crops. In both cases baboons were identified as the most crop raiding and destructive species. Most of the crops were raided at their mature (60%) and medium (30%) stages of growth. Guarding was the most trusted and most used intervention against crop raiding in this study. This observation is not unique and has been recorded by other studies. The dependence of local communities on guarding can be attributed to the failure of the interventions introduced by the development agencies such as the Mauritius thorn hedge to offer protection against crop raiding. The Mauritius thorn in its current state cannot stem/reduce crop raiding by the wild animals. Most of the hedge that was planted died out and there exists only few patches of the intact thick hedge of the plant to stem/reduce crop raiding. The study identified that all interventions used in Karangara and Bujengwe were not perfect and had shortfalls. However, we also observed that the interventions the local people improvised for themselves such as guarding were considered more effective and were more trusted even when they took up a lot of people's time. This suggests that local communities are more inclined to actively engage in mitigation efforts if they have a hand in the design and approach.

The study recommends that farmers should be realistically involved in the process of solving the conflict by taking responsibility for the problem. Such an approach is likely to be more successful, and more sustainable in the long term, than interventions that are dependent on external funding. These interventions need to be within the financial and technological capacities of the people implementing them, if they are to provide long-term solutions.

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# 1. INTRODUCTION

The importance of human-wildlife conflict (HWC) management has been well articulated in the Uganda National Policy on Conservation and Sustainable Development of Wildlife Resources, 2011. The policy prioritizes the mitigation of human wildlife conflicts in order to enhance positive attitude by the public towards conservation of wildlife resources in Uganda. The Uganda National Development Plan (2009) also prioritizes the implementation of lasting solutions to human-wildlife conflict. In 2003, the International Union of Conservation of Nature at the World Parks Congress defined Human Wildlife Conflicts (HWC) as “conflicts which occur when the needs and behavior of wildlife impact negatively on the goals of humans or when the goals of humans negatively impact the needs of wildlife.” Such conflicts may result in animosity between wildlife and humans. HWC can take many forms, including the destruction of crops and property, and competition for natural resources. The people most affected by this conflict are the poor rural farmers living close to protected areas. In Africa, conflict between people and wildlife ranks amongst the main threats to conservation (Kangwana, 1993; Conover 2002; Treves and Karanth, 2003).

Around Bwindi Impenetrable National Park (BINP), wild animals such as mountain gorillas, elephants, baboons and bush pigs sometimes come out of the protected areas into human settlements and farms resulting into destruction of crops, causing harm to human beings and livestock. This creates negative attitudes of the adjacent local communities (Kalpers et al. 2010). Masiga, Biryahwaho, and Akampurira (2011) and Olupot, Barigyira, and Chapman (2009) found that among the most raided crops around Bwindi were maize, sweet potatoes, irish potatoes, bananas and millet. The loss of these staple food crops due to wild animals from the park has created and continues to create animosity between the local communities and park management (Eilu 2016). Such conflicts pose a serious threat to wildlife survival and human livelihood. Also, interactions between wild animals and local people can result in transmission of diseases, direct physical attacks and illegal activities (Babaasa, Akampurira, and Bitariho 2013; Kalpers et al. 2010)

In Karangara and Bujengwe parishes adjacent to Bwindi Park, human-wildlife conflict interventions were introduced by UWA and Non-Government Organisations (CARE, BMCT, IGCP) working in the region after Bwindi was gazetted as a National Park. The main intervention was the Mauritius thorn hedge (Akampurira 2011; CARE et al. 2003). Tea growing was also encouraged as human-wildlife conflict mitigation intervention around these parishes (Babaasa, Akampurira, and Bitariho 2013; Masiga, Biryahwaho, and Akampurira 2011). Other interventions such as Baboon traps were tried (Akampurira 2011; Masiga, Biryahwaho, and Akampurira 2011).

# 2. JUSTIFICATION FOR THE STUDY

Since BINP was gazetted as National Park in 1991, there have been persistent negative attitudes and resentments by the local people towards the Park (Bitariho et al, 2006). The resentments were caused and exacerbated by the costs incurred by the local communities in stemming/reducing crop raiding by wildlife from the Park. In order to control and mitigate the conflict caused by problem animals around BINP several interventions were introduced. Top among these was planting a Mauritius thorn (*Caesalpinia decapetala*) hedge. The Mauritius thorn hedge was first piloted in Karangara parish 1994 in Kagoma village with support from CARE (Masiga, Biryahwaho, and Akampurira 2011). Other villages in Karangara parish and neighboring parishes like Bujengwe later adopted the hedge under the support of various stakeholders such as BMCT, UWA and CARE. Initially, the local communities were involved in planting and maintenance of the hedge. In Karangara and Bujengwe parishes, the Mauritius thorn intervention had helped to reduce crop-raiding events especially those of bush pigs and baboons (Akampurira et al, 2011; Masiga et al, 2012; Babaasa et al, 2013). In spite of this observation, local communities continued to complain about crop losses to wildlife from the park and the ineffectiveness of the Mauritius thorn hedge and other interventions. Previous studies have shown that the ineffectiveness of the hedge is a result of poor maintenance and management (Akampurira

2011; Akampurira, Bitariho, and Mugerwa 2015; Babaasa, Akampurira, and Bitariho 2013; Kalpers et al. 2010; Masiga, Biryahwaho, and Akampurira 2011). Local communities consider hedge maintenance to be a time demanding and labour intensive activity they cannot sustain without incentives (Akampurira 2011; Masiga, Biryahwaho, and Akampurira 2011). It is also important to note that some communities see it as responsibility for UWA to manage the conflict since the law does not allow them to lethally take care of the problem animals (Hill 2000; Webber, Hill, and Reynolds 2007).

This study sought to empirically assess the effectiveness of the Mauritius thorn hedge and other interventions by making/comparing both quantitative and qualitative assessments. Most studies (Akampurira 2011; Babaasa, Akampurira, and Bitariho 2013; Masiga, Biryahwaho, and Akampurira 2011) have only sought the perceptions of the local communities on the effectiveness of HWC interventions. Needless to say that perceptions of the local communities are important in identifying the problem from the perspective of those affected (Naughton-treves 1998; Webber, Hill, and Reynolds 2007). Equally important is a quantitative analysis of actual wildlife crop raids in areas where interventions are implemented. The quantitative analysis involves monitoring crop raids and relating them to the characteristics of the hedge that determine its effectiveness against crop raiding species (Akampurira, Bitariho, and Mugerwa 2015). Monitoring also helped us identify and establish the spatial and temporal patterns of crop raiding in the two parishes. This information is important because it informs both park management and local communities on how best to improve current and develop new interventions.

### 3. AIM OF THE STUDY AND OBJECTIVES

#### Aim

The aim of the study was to assess the effectiveness of problem animal interventions in mitigating Human-Wildlife Conflict in the northern sector of BINP (Karangara and Bujengwe parishes).

#### Specific objectives

- Determine the nature, extent and quality of current human-wildlife conflict interventions in Karangara and Bujengwe parishes
- Establish the extent of crop raiding in Karangara and Bujengwe parishes
- Assess the local perceptions on HWC (the animal species and extent of crop damage) and effectiveness of interventions around Karangara and Bujengwe Parishes.
- Identify constraints of adopting HWC interventions and suggest recommendations for improved uptake

### 4. METHODS

#### Study site

The study was carried out in Karangara and Bujengwe parishes adjacent to Bwindi Impenetrable National Park (BINP) in the northern sector. BINP is located in the extreme south-western part of Uganda, between latitudes  $0^{\circ} 53'$  to  $1^{\circ} 08''$  S and longitudes  $29^{\circ} 35''$  to  $29^{\circ} 50''$  E bordering the Democratic Republic of Congo (DRC). BINP is 331 km<sup>2</sup> in size and has been a UNESCO World Heritage Site since 1994 (IUCN, 1994). The Park is most well known for harboring half of the world population of Mountain Gorillas (*Gorilla beringei beringei*) and has many endemic and restricted range species of birds, mammals and amphibians (Plumptre et al. 2007) The Park has diverse vegetation that is: moist evergreen sub-montane and montane forest with a continuum of habitats ranging from 1,190 meters to 2,607 meters above sea level (Babaasa 2000). The major crop raiding animals around Bwindi are Baboons, Bush pigs, and Elephants, Mountain Gorillas and L'hoesti monkeys (Babaasa, Akampurira, and Bitariho 2013; Kalpers et al. 2010; Olupot, Barigyira, and Chapman 2009).

Karangara and Bujengwe parishes are located in the mid-north sector of Bwindi Impenetrable National Park. The Bakiga are the dominant ethnic group in the two parishes. Their main activity is farming, both cash and subsistence crops. The main cash crop in both parishes is tea and it is planted by majority of the households. Beans, sweet potatoes, millet, bananas and ground nuts are the major food crops in the area (Masiga, Biryahwaho, and Akampurira 2011). The most destructive wildlife that have been documented in these parishes are: baboons, bushpigs and L'hoesti monkeys (Akampurira 2011; Masiga, Biryahwaho, and Akampurira 2011; Olupot, Barigyira, and Chapman 2009). Karangara and Bujengwe were some of the first parishes around BINP where the Mauritius thorn hedge was first introduced as an intervention against crop raiding. CARE International first piloted the Mauritius thorn hedge in Karangara in 1994 (Masiga, Biryahwaho, and Akampurira 2011). Subsequently, the hedge was introduced to other parishes like Bujengwe with support from BMCT, UWA, CARE-REPA, and local government. Tea growing is one of the main economic activities in these parishes and also contributes to mitigating crop raiding (Akampurira 2011; Babaasa, Akampurira, and Bitariho 2013; Kalpers et al. 2010). As such local communities are often advised to plant tea immediately adjacent the park boundary so it can act as buffer to food crops that are prone to raiding.

## Data collection

Sampling took place in all frontline villages in the two parishes of Karangara and Bujengwe. Karangara has 4 frontline villages (Nyakabingo, Kagoma, Rwamiyumbu and Rwamiyumbu) while Bujengwe has 6 frontline villages (Byumba, Kacerere, Kazahi, Nyamishamba, Mushorero and Kishegyere). Data on crop raiding was collected over a 6 month period from November 2016 to January 2017 and May 2017 to July 2017. The months were chosen based on cropping calendar generated during the focused group discussions. Three field assistants were recruited from the two parishes to help with data collection. The field assistants made visits to each site every week to record details of crop raiding events with emphasis on date of occurrence, wildlife species responsible, type and stage of growth of crops damaged. The data collected was crosschecked for accuracy and consistency with owners of the garden.

## Establishing the extent and independence of crop raiding events

In order to monitor crop-raiding events, a sampling grid running continuously along the park boundary through the entire length of the parishes and extending 0.5 km away from the park boundary into the village was constructed (Naughton-treves 1998). The field assistants walked along the entire boundary for a minimum of 3 days per week. Using signs such as tracks, teeth marks, claw marks, hair and faeces they identified and recorded the raiding species, crops damaged, severity of damage and stage of growth when the crop was damaged. Severity of damage was assessed visually following the categories: severe, modest and minimal. The field assistants also responded to damage claims made by farmers but independently corroborated the claims by visiting damaged sites. A Crop Raiding Event (CRE) was defined as a behavior when one or more animals entered a farm and destroyed a crop (Hill and Wallace 2012). Each CRE only comprised crop destruction by a single species; simultaneous raiding by more than one species was recorded as separate CREs (Hill and Wallace 2012).

## Determining the nature, extent and quality of interventions in Karangara and Bujengwe

In order to determine the nature, extent and quality of current interventions, field assistants walked the entire length of the community-park boundary in each parish making observations on interventions in place. For every 50 m, the status and characteristics of each intervention (type of intervention and its quality) were recorded and geo-referenced (Mc Guinness 2014). The study defined the status of the Mauritius thorn hedge based on two categories: the thick hedge and thin hedge, Plate 1. (Akampurira, Bitariho, and Mugerwa 2015)





Plate 1: The categories of Mauritius thorn hedge from left to right – thick and thin hedge

### Assessing community perceptions on effectiveness other interventions

Ninety (90) household interviews of farmers in Karangara and Bujengwe parishes were carried out using semi-structured questionnaires. The study used purposive sampling to choose 45 farmers who had suffered crop raids during the 6 months of data collection. Then it used random sampling to choose the other 45 respondents that had gardens in the sampling area but were not crop raided during the data collection period. The 45 farmers were randomly selected based on a list compiled for farmers whose gardens had not been raided. If any of the chosen 45 farmers had experienced crop raiding, the study team chose another un-raided farmer to replace him/her. The issues and questions focused on during the interviews are highlighted in Appendix 2

### Identify constraints of adopting HWC interventions and make recommendations

Focused Group Discussion techniques (FGDs) and Key Informant Interviews (KIIs) were used to identify constraints to uptake and sustainability of interventions. FGDs involved local leaders, Problem Animal Management Committees (PAC) and key opinion leaders. During the Focus Group discussions, the study team ensured that both gender were well represented. This was done to ensure gender disaggregation of the data collected. The key informant interviews focused on representatives of organizations and institutions that have been involved in problem animal management in the two parishes for example: UWA, BMCT, local government, IGCP and ITFC

### Data analysis

Descriptive statistics were used to summarize the interview response data. The Kruskal-Wallis test was used to compare respondents' perceptions and own observations in field. The study team also used Kruskal-Wallis test to compare respondents' perceptions on the degree of effectiveness for the interventions. Analyses on perceptions were conducted using the Statistical Package for Social Sciences (SPSS version 19, Chicago USA)

## 5. RESULTS

### Observed extent of crop raiding

Over the 6 months monitoring period, a total of 583 crop raiding events were recorded by three field assistants during the 190 visits they made on 13.3 km long community-park boundary in Karangara and Bujengwe parishes. Thirteen crops types were recorded as damaged and five large mammals identified as raiders (Table 1,) Millet was most raided crop (26% of the total CRE), followed by beans, maize, sorghum, bananas, potatoes and cassava. Minor occurrences of raiding accounts on other crop types were also observed (Table 1). There was no predation of livestock or property damage recorded. Baboon crop raiding events were the majority (95% of the total CRE), causing more damage than any other raider species (Table 1 and figure 1), while other raider species shared the remaining paltry 5%. Only the baboons raided all the crop types (Table 1), sometimes damaging the crops that they did not even feed on, for example, eucalyptus trees.

Table 1: Crop raiding events per animal raider and crop type expressed as a percentage of the total crop raiding events observed in 6 months (November 2016-July 2017) in Karangara and Bujengwe parishes

Crop type	Baboons	Bushpigs	Elephants	Gorillas	L'Hoest's monkey	Total
Millet	25.22	0.00	0.88	0.00	0.00	26.10
Beans	16.81	0.35	0.88	0.00	0.35	18.39
Maize	14.15	0.00	0.00	0.00	0.00	14.15
Sorghum	9.98	0.00	0.00	0.00	0.00	9.98
Bananas	7.53	0.7	0.18	0.18	0.00	8.59
Potatoes	8.23	0.00	0.18	0.00	0.00	8.41
Cassava	7.71	0.35	0.18	0.00	0.00	8.24
Ground nuts	2.10	0.17	0.00	0.00	0.00	2.27
Trees (eucalyptus)	1.05	0.00	0.00	0.53	0.00	1.58
Coffee	1.23	0.00	0.00	0.00	0.00	1.23
Pumpkins	0.18	0.52	0.00	0.00	0.00	0.70
Avocado	0.18	0.00	0.00	0.00	0.00	0.18
Yams	0.18	0.00	0.00	0.00	0.00	0.18
<b>Total</b>	<b>94.55</b>	<b>2.09</b>	<b>2.30</b>	<b>0.71</b>	<b>0.35</b>	<b>100.00</b>

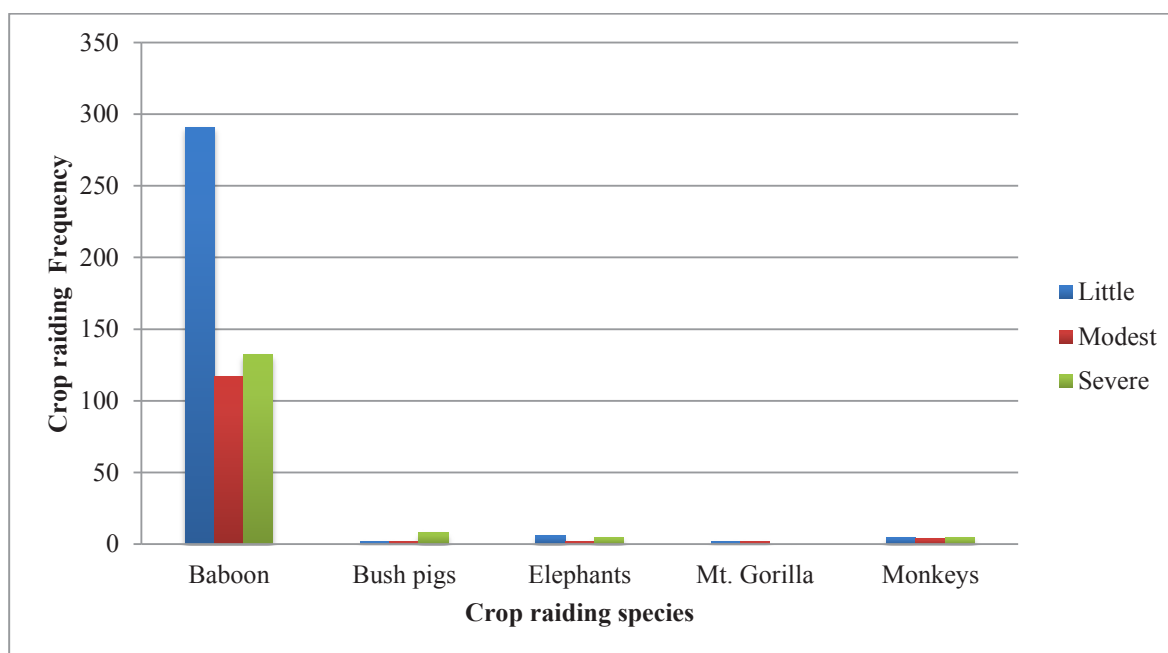


Figure 1: Extent of observed damage by each of the crop raiding species

Figure 1 and 2 show the temporal variation of crop raiding by wildlife species and crop type respectively. Generally there was more crop raiding in the months of November, June and January.

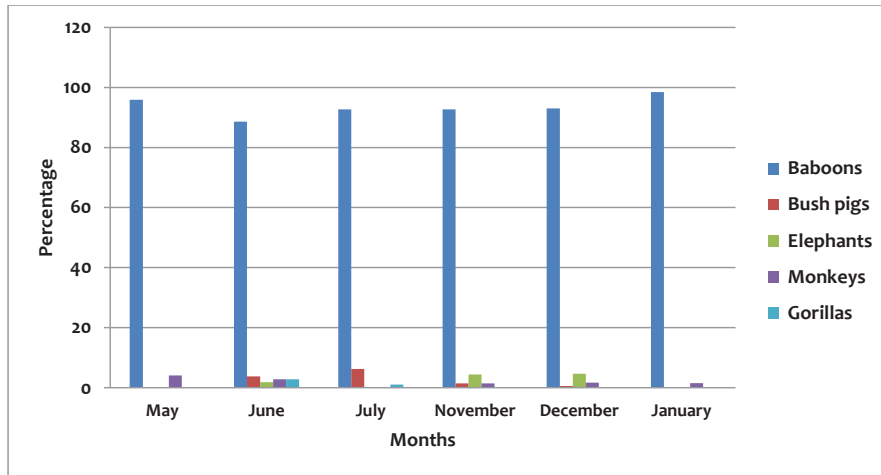


Figure 2: Temporal variation of crop raiding events by wildlife

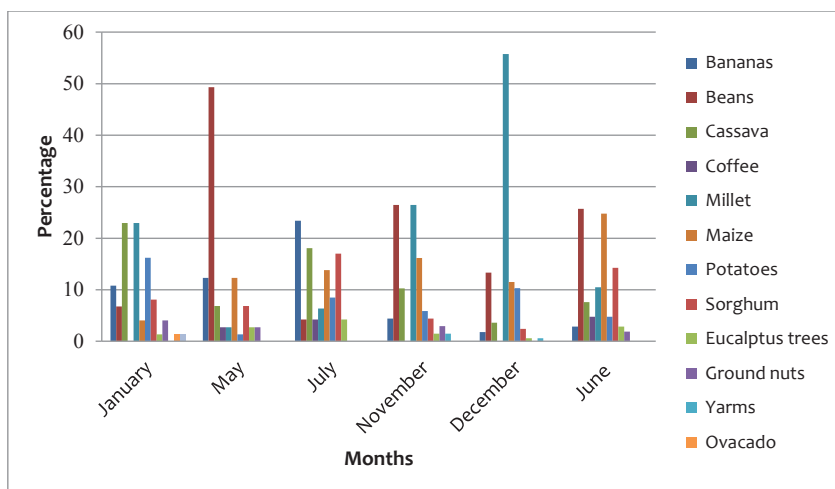


Figure 3: Temporal variation of crop raiding events by crop type

### Stage of growth when crops were raided

Most of the crops were raided at their mature and medium stages of growth (Figure 4). Ninety percent (9%) of bananas, 75% of beans, 65% of maize, 60% ground nuts and 60% of sorghum were raided at their medium stage of growth while 100% of avocado, yams, and pumpkins, 90% of coffee, 60% of millet, and 60% of potatoes were raided at their mature stage of growth. It is important to note that the avocado, pumpkins and yams raided were just a handful.

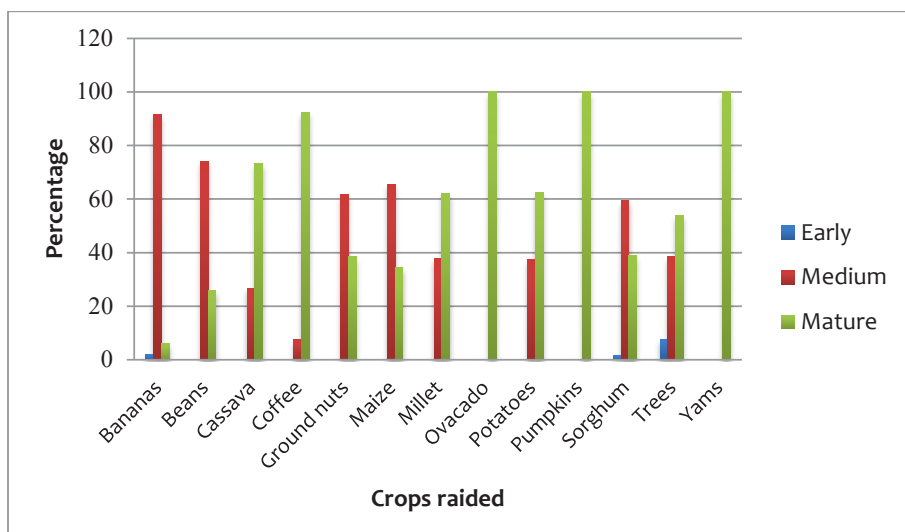


Figure 4: Stage of growth when crops were raided

## Demographic profile of respondents

The study team established various demographic characteristics to confirm whether household samples were representative of the local communities affected and involved in human wildlife conflict mitigation in Bujengwe and Karangara parishes. The identified characteristics were gender, age and distance of respondents' household to the Park boundary. Age and sex composition of a population has significant implications for the reproductive potential and human resource that can affect the way a community responds to issues like human wildlife conflict. Majority of male respondents interviewed in both parishes were in the age category of 21-40, 32.5% and 28% in Bujengwe and Karangara respectively (Figure 5). While majority of the female were in the age category of 21-40, 28% and 20% in Bujengwe and Karangara respectively (Figure 5). The least age group of interviewed respondents were those below 20 years.

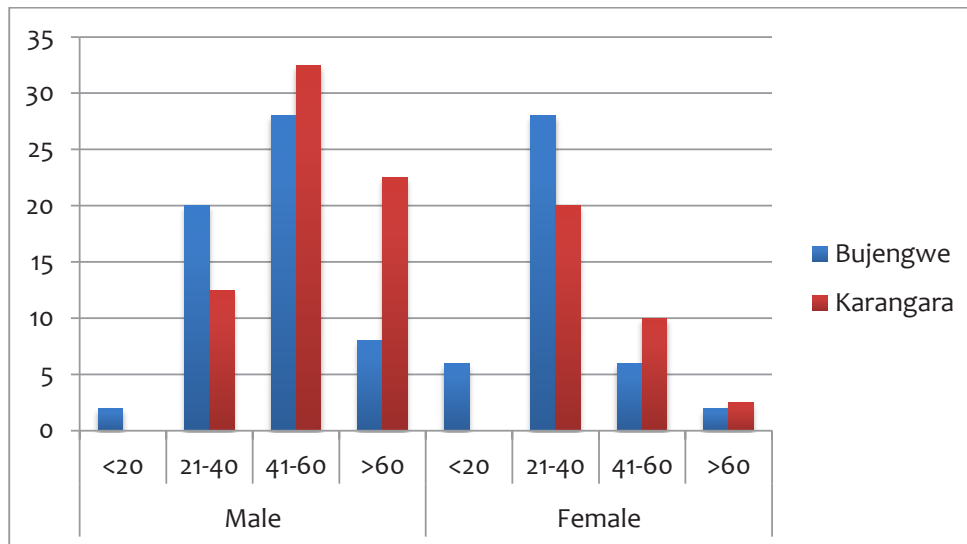


Figure 5: Disaggregation of respondents by sex and age category

## Distance of gardens to the park boundary

A comparison of the distance of respondents from the park boundary to their gardens for respondents that were crop raided and those not raided (Figure 6) showed that there was no significant difference ( $p > 0.05$ ). However crop raided respondents had higher number (68%) of their gardens within 100 m of the park boundary compared to the un-raided respondents that had about (52%) of their gardens within the same distance. This result may suggest that perhaps gardens being closer to the park increased the risk of being raided rather than the non-raided respondents having better protection strategies.

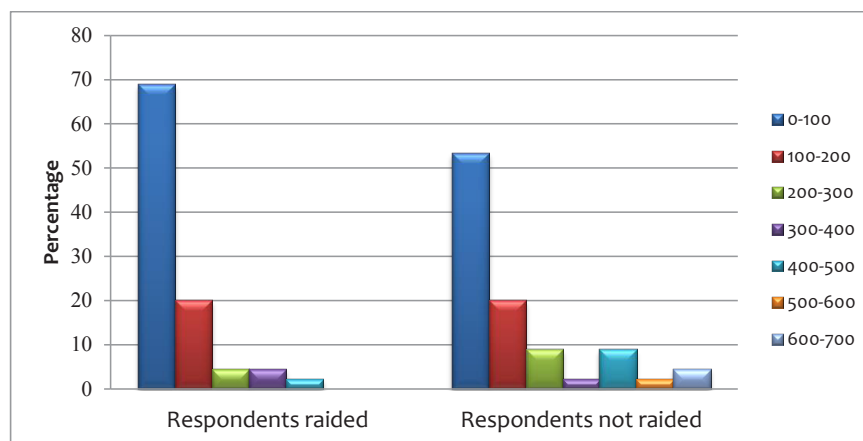


Figure 6: Distance of gardens to the park boundary for crop raided and non crop raided respondents (n= 90)

## Perceived frequency of crop raiding

There was no significant difference ( $p > 0.05$ ) between species the local people perceived to crop raid most (Table 2) and the field observations (Table 1 and Figure 1, 2). In both cases, baboons were identified as the most crop raiding and destructive species. Two per cent and 1.5% of the respondents mentioned that the mongoose and African golden cat were responsible for preying on their chicken and goats. In our 6 months monitoring, the team did not encounter any case of livestock predation. Elephants that have previously ranged only in the south of Bwindi were also recorded as one of three top raiders after baboons and bush pigs

Table 2: Respondents perceptions on the three most important raiding species

Responses on most raiding species (n=88)	% of responses	Responses on 2nd most raiding species (n=68)	% of responses	Responses on 3rd most raiding species (n=36)	% of responses
Baboons	98.86	Monkeys	54.41	Monkeys	30.56
Gorillas	1.14	Elephants	19.12	Gorillas	27.78
		Gorillas	13.24	Bush pigs	22.22
		Bush pigs	8.82	Elephants	11.11
		Birds	2.94	Mongoose	5.56
		African golden cat	1.47	Baboons	2.78
<b>Total</b>	<b>100.00</b>	<b>Total</b>	<b>100.00</b>	<b>Total</b>	<b>100.00</b>

## Intervention assessment

The ground distance of the Bujengwe and Karangara park boundary was 13.3 and 4.6 km respectively (Table 3a and 3b, Figure 7). The Mauritius thorn hedge in Bujengwe covered a distance of 4 km (30.1% of the boundary). Based on the two conditions of the hedge categories of thick and thin 0.2 (5% of the 4 km) and 3.8 km (95% of the 4 km) respectively in Bujengwe (Table 3a). In Karangara, the hedge measured a total distance of 2.5 km (45.7% of boundary). The thick and thin parts covered 0.2 (8% of the 2.5 km) and 2.3 km (82% of 2.5 km) respectively (Table 3b). The tea plantation along the boundary in Bujengwe covered 5.9 km (44.4% of boundary). Of this distance, the good, fair and poor quality parts covered 1.8 (30.5%), 2.7 (44.1%) and 1.5 km (25.5%) respectively (Table 3a). In Karangara, the total distance covered by tea plantation along the park boundary was 3.2 km (69.9% of the boundary). Of this, the good, fair and poor quality parts covered 1.4 (43.8%), 1.3 (40.6%) and 0.4 km (15.6%) respectively (Table 3b).

In general, there was no Mauritius thorn hedge along most of the boundary of Karangara and Bujengwe parishes. However, during the focused group discussions the study team was informed that nearly all the boundary along the two parishes had been planted with Mauritius thorn. Unfortunately, most of the hedge died out either because the soils were poor or it was poorly maintained. [As shown in Figure 7 the distance with Mauritius hedge along the boundary of the two parishes is very, worse still the areas with a thick hedge (green circles) is even much smaller. The hedge in its current state is unable to prevent crop raiding and as result farmers rely on guarding.

Table 3a Extent and quality of Mauritius thorn hedge and tea plantation along the Bujengwe park boundary

Variable measured on Bujengwe Park boundary	Distance covered (km)	Distance covered by Percentage	Categorization of Mauritius thorn hedge and length covered (km)	Quality of tea and distance covered (km)	Number of guarding huts
Length of boundary	13.3		Thick =0.2(5%)	Good=1.8(30.5%)	20
Length without hedge	9.3	69.9	Thin =3.8(95%)	Fair =2.7(44.1%)	
Length with hedge	4.0	30.1		Poor=1.5(25.4%)	
Length without tea	7.4	55.6			
Length with tea	5.9	44.4			

Table 3b Extent and quality of Mauritius thorn hedge and tea plantation along Karangara park boundary

Variable measured on Karangara Park boundary	Distance covered (km)	Distance covered Percentage	Quality of Mauritius thorn hedge and length covered (km)	Quality of tea and distance covered (km)	Number of guarding huts
Length of boundary	4.6		Thick =0.2(8%)	Good=1.4(43.8%)	8
Length without hedge	2.1	45.7	Thin =2.3(92%)	Fair =1.3(40.6%)	
Length with hedge	2.5	54.3		Poor=0.4(15.6%)	
Length without tea	1.4	30.4			
Length with tea	3.2	69.6			



Plate 2: Photos of a good thick tea plantation that can stop crop raiding and a baboon trap in study area



Plate 3: Un-maintained Mauritius thorn hedge and guarding hat in the study area

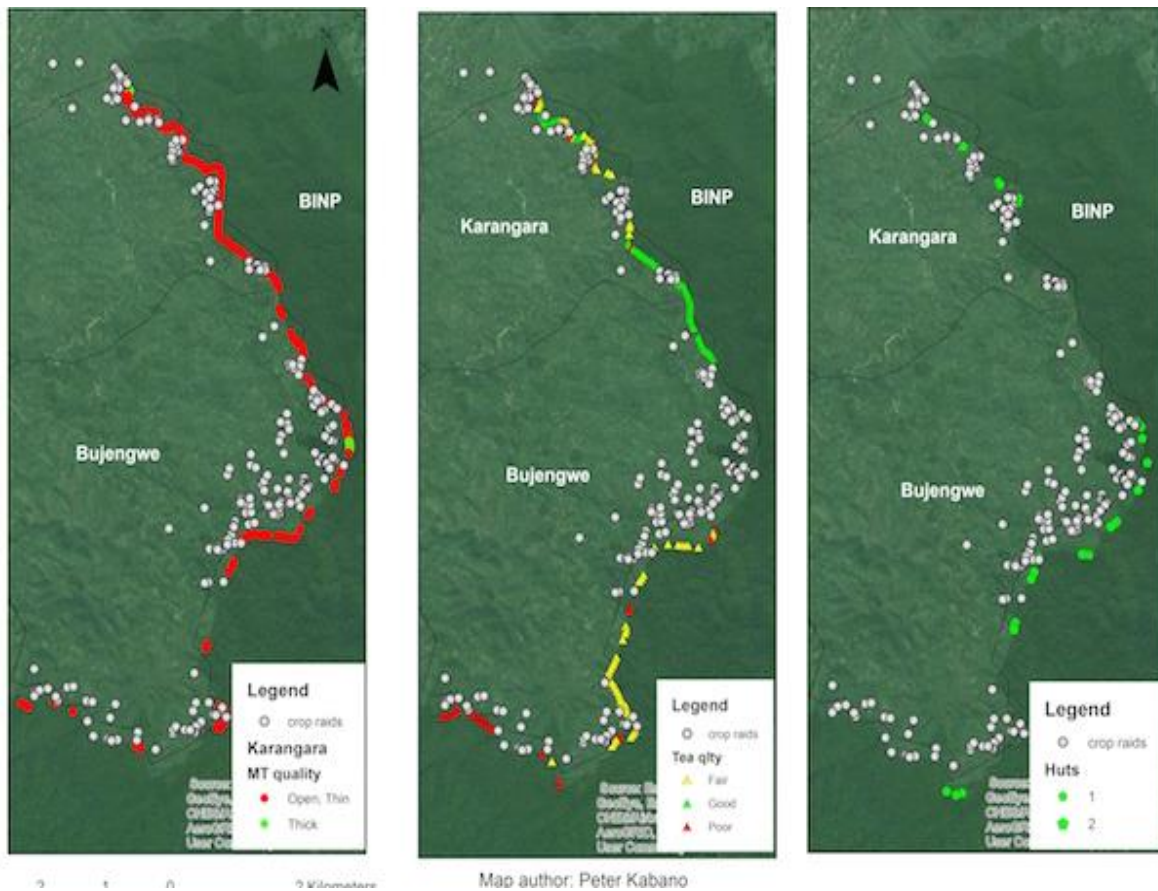


Figure 7: Location of crop raiding events relative to Mauritius thorn, tea plantations and crop guarding huts

### Local perceptions on the interventions

A local people perception on the effectiveness of the different interventions being used in both parishes is shown in Table 4. Respondents rated the degree of effectiveness per intervention on a scale of 1-3: very effective (1), fairly effective (2) and not effective at all (3). In total, seven interventions were mentioned by respondents; baboon traps, wire fencing, guarding, Mauritius thorn hedge, scarecrows and tea plantations. The most effective intervention mentioned by the respondents was guarding (13%), followed by tea (2%) and Mauritius thorn (3%). The most non-effective interventions mentioned were Mauritius thorn (37.8%) and guarding (30.2%)

Table 4: Responses by percentage on assessment of the effectiveness of interventions (n=169)

Interventions	%Very effective	% Fairly effective	% not effective
Baboon traps	0.00	0.00	2.37
Wire fencing	0.00	0.00	0.59
Guarding	7.70	4.10	30.18
Mauritius thorn hedge	0.60	3.00	37.28
Scare crow	0.00	0.00	0.59
Tea	1.20	1.20	11.24

The study team tested whether the respondents' perceptions on the degree of effectiveness for each of the three main interventions (guarding, Mauritius thorn and tea plantations) were significantly different across the two parishes. The study team found that for guarding, the degree of effectiveness was not significantly different across the two parishes ( $\chi^2 = 0.334$ ,  $df = 3$ ,  $p = 0.895$ , Kruskal-Wallis test). Similarly, the degree of effectiveness was not significantly different between the two parishes for Mauritius thorn hedge ( $\chi^2 = 0.02$ ,  $df = 3$ ,  $p = 0.976$ , Kruskal-Wallis test). Lastly, the degree of effectiveness for tea plantations was also not significantly different across the two parishes ( $\chi^2 = 0.456$ ,  $df = 3$ ,  $p = 0.997$ , Kruskal-Wallis test).

## Perceived benefits and challenges of interventions

Respondents identified the benefits and challenges associated with interventions (Table 5a and 5b respectively). Respondents correlated benefits with successful or effective interventions and linked some challenges with unsuccessful interventions. All respondents that mentioned baboon traps (100%,  $n = 4$ ) reduces crop raiding and all the respondents that mentioned guarding (100%,  $n = 83$ ) linked it to the benefits to reducing crop raiding. For Mauritius thorn, the respondents attributed its success to the benefits they got from revenue sharing (49%,  $n = 57$ ) and its effectiveness in reducing crop raiding (50.9%,  $n = 57$ ) and while for tea, benefits were associated with increased income from sale of tea (56.5%,  $n = 23$ ) and its effectiveness in reducing crop raiding (43.48%,  $n = 23$ ) - see Table 5a. In general, all the mentioned interventions' effectiveness was measured by their capacity to reduce crop raiding and also providing financial benefits (Table 5a). The greatest number of respondents (83%) were more convinced that guarding their gardens was a much more effective intervention than the rest of the interventions.

The analysis on constraints affecting interventions (Table 5b) showed that guarding, Mauritius thorn and tea had the most challenges. The biggest challenges for guarding were: the time spent on the activity that could be used for other productive purposes (55%,  $n = 83$ ) and low attendance of children in school because they had guard family gardens (28%,  $n = 83$ ). For tea the biggest challenges (Table 5b) were associated with tea being an expensive venture to start and sustain (74%,  $n = 23$ ) and poor soil fertility, lack of fertilizers and pesticides (13%,  $n = 23$ ). Finally for Mauritius thorn hedge, the biggest challenges (Table 5b) to its sustained use mentioned by respondents were maintenance of the hedge that took up so much time that could be used for other productive activities (35%,  $n = 57$ ), poor soils, for example rocky or boggy soils that do not allow the hedge to grow (21%,  $n = 57$ ) and shade created by trees with huge branches along the boundary that inhibit the hedge from growing well (16%,  $n = 57$ ).

Table 5a: Respondents perceptions on benefits from interventions

Intervention	Perceived Benefits	% of responses
Baboon traps ( $n = 4$ )	Reduced crop raiding	100.00
Wire fencing ( $n = 1$ )	Reduced crop raiding	100.00
Guarding ( $n = 83$ )	Reduced crop raiding	100.00
Mauritius thorn hedge ( $n = 57$ )	Benefits from revenue sharing	49.12
	Reduced crop raiding	50.88
Scarecrow ( $n = 1$ )	Reduced crop raiding	100.00
	Increased income from sell of tea	56.52
Tea ( $n = 23$ )	Reduced crop raiding	43.48



Table 5b: Respondents perceived challenges associated with interventions

Intervention	Perceived challenges	% of responses
Baboons traps (n=4)	Consumes time for other activities	25
	Expensive to sustain	50
	No challenges	25
Wire fencing(n=1)	No challenges	100
Guarding(n=83)	Consumes time for other activities	55
	Expensive to sustain	4
	Low attendance of children in school	28
	Risk associated with Malaria, dangerous wildlife and heavy rain	5
	No challenges	8
Mauritius thorn hedge(n=57)	Consumes time for other activities	35
	Corruption by PAM Committees	2
	Hedge is invasive	11
	Poor soil fertility	21
	Risk associated with Malaria, dangerous wildlife and heavy rain	7
	Shade created by boundary trees	16
	No challenges	9
Scare crow(n=1)	Consumes time for other activities	100
Tea(n=23)	Consumes time for other activities	4
	Expensive to sustain	74
	Poor soil fertility and lack of fertilizers	13
	No challenges	9

## Intervention use by crop raided and non-crop raided respondents

There was no significant difference ( $p>0.05$ ) in the kind of interventions used by respondents that were raided and those not raided. However most of the respondents (68.9%) that were not raided guarded their gardens in comparison to 62.2% of raided respondents that guarded their gardens (Figure 8). For Mauritius thorn hedge, 26.7% of raided respondents compared to 13.3% of the non-raided respondents mentioned were using it as an intervention (Figure 8). It was interesting to note that a portion of the non-raided respondents (11.1%) did not use any intervention (Figure 8). This result signifies that the interventions in place may not necessary guarantee crop protection if there are not technically operational especially for interventions like Mauritius thorn and tea plantations.

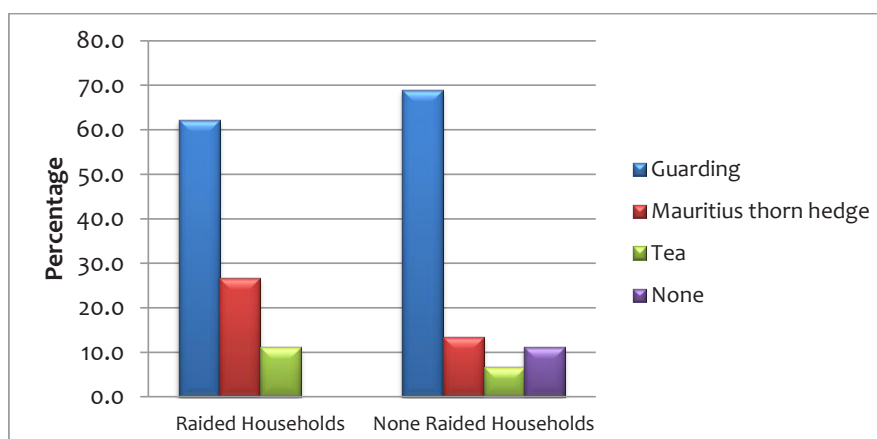


Figure 8: Interventions used by crop raided versus non-raided respondents (n=90)

The management of Mauritius thorn is very important for its sustained use, as it requires labour input from time to time. To understand whether there was any difference in the management of Mauritius thorn hedge by the crop raided and non crop raided respondents, the study team compared their management practices. The study did not find a significant difference ( $p > 0.05$ ) in the management practices between the two groups. It was however observed that there were minor differences between the two groups. For example, 3% of the non-raided respondent applied manure to the Mauritius thorn while the raided did not, 34% of the raided respondents spent time directing the Mauritius plants into the right direction for proper growth and 29% of the non-raided did the same, 5% of the raided respondents spent time filling gaps in the hedge and 10% of the non-raided did the same and 18% of the raided respondents spent time pruning the hedge and 15% of the non-raided also did the same (Figure 9). It was also discovered that the last time any management activity was done on the hedge was about three years ago in both parishes. The study found out that in some places, the hedge was being cut down to be replaced with tea.

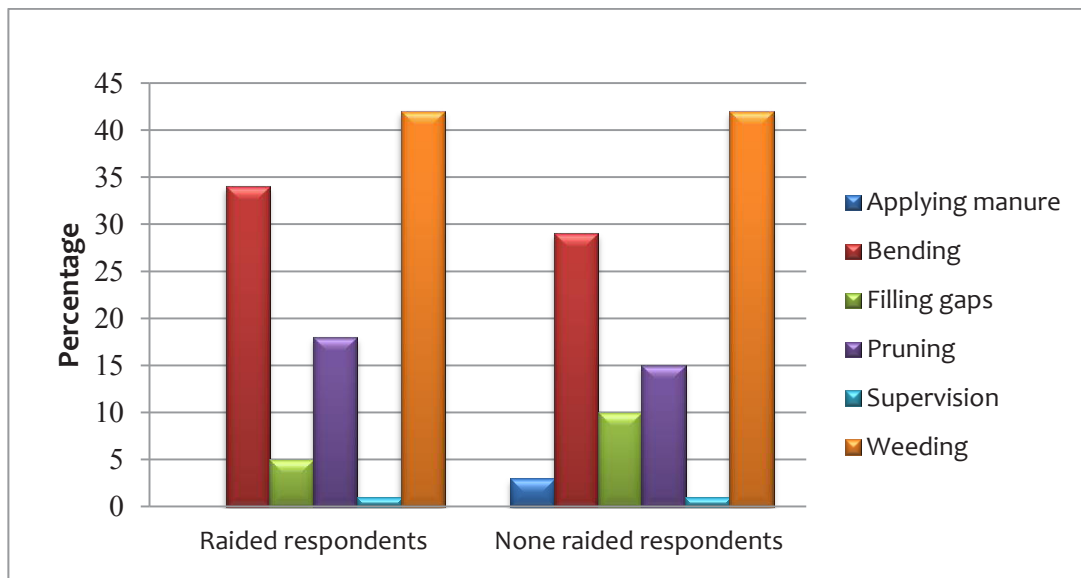


Figure 9: Management practices used by crop raided and non-crop raided respondents in maintaining Mauritius thorn hedge.

## 6. DISCUSSION

### Demographic profile of respondents and implications to human wildlife conflict mitigation

Age and sex composition are important because they inform the kind of responses that can be generated from respondents (Kumar 1989). Majority of respondents interviewed were in the age category of 21-40 years. A social economic study carried out by (ITFC 2017) covering part of these parishes also had a similar result. In this study, women dominated this age group as with the study by Akampurira, Bitariho, and Mugerwa 2015. During the interviews, most of the men were away from their homes or did not have the time to engage with the interviewers. The women were always present at home or could be found in their gardens and were willingly participated in the interviews. The men were uninterested in engaging with us because they think issues related to human wildlife conflict have been ongoing for a very time and yet they continue to loose their crops to problem wildlife. Amidst this all the research, meetings and interventions have not been able to help them. This is an indication that some local communities have lost hope to finding a sustainable solution and have resigned to the status quo. This consequently makes it hard for organizations both governmental and non-governmental that would want to work with local communities to reduce this problem.

### Distance of respondents' gardens to the park boundary and its implication on HWC mitigation

The most crop raiding events were recorded within 0-100 meters of respondents' garden. This result is not unique as other similar studies (Akampurira, Bitariho, and Mugerwa 2015; Hill 2000; Huklop 2000) have observed the same result. Huklop (2000) in Kibale National Park, Uganda, showed that crop raiding by elephants was more rampant within a distance of 200 m from the park boundary while Akampurira, Bitariho, and Mugerwa 2015 observed that food preferences were a significant factor in influencing distances moved and hence intensity of crop damage by a particular problem animals. In this study a comparison of distance from the park boundary of the raided and non-raided respondents showed no significant difference but the raided respondents had more gardens with 100m than the non-raided respondents. This further emphasizes the point that gardens closer to the park boundary are more exposed to the risk of being raided by problem wildlife. This raises issues of land use planning in human wildlife conflict mitigation.

### Observed and perceived extent of crop raiding in the two parishes

Studies on HWC tend to focus either on the qualitative or the quantitative approach alone. This creates a knowledge gap on how the perceptions of local communities to crop raiding versus the observed crop raiding maybe able to help in conflict mitigation. For example, people may complain about losing crops to wildlife yet it is not so much crop damage that is the issue as their fear of the particular species they claim is causing the damage. Elephants are complained against more frequently and more vociferously than other species, yet they are sometimes not the species that causes the most damage to crops (Naughton, Rose, and Treves 1999). For example, in this study we noted that there was no significant difference between the species mentioned by local people and our own observations. However, we also noted that local communities mentioned gorillas as the second most important crop raiding species after baboons while in our quantitative observations we noted bush pigs. This result maybe related to the value attached to the gorilla as a key species of conservation and tourism. Other studies (Akampurira, Bitariho, and Mugerwa 2015; Babaasa, Akampurira, and Bitariho 2013; Kalpers et al. 2010) have reached similar findings and attributed this to the income generated by gorilla tourism vis a' vis the benefits the communities get. It is also important to note that where revenue from wildlife is distributed to rural communities equitably, there is some evidence that such negative perceptions toward animals that crop-raid can change (Archabald and Naughton-Treves 2001).

Elephant crop raiding in this part of Bwindi is new and though still restricted to very few sites, many of the local people we talked to expressed a lot of worry on the amount of destruction one elephant can do in one foray. The local communities were also clueless on any mitigation measures and interventions they could use to protect their crops from elephants apart from calling the UWA rangers to scare shoot. In other areas like in the south of Bwindi, Kibale and Queen Elizabeth national parks, elephants have caused problems to farmers and huge conflicts between the wildlife authority and farmers (Babaasa, Akampurira, and Bitariho 2013; Huklop 2000; Naughton-treves 1998; Naughton, Rose, and Treves 1999). Elephants are highly social and intelligent animals and their excellent communication and cognitive skills, combined with dietary and behavioural flexibility, make them extremely adaptable and effective crop raiders (Barnes 1996; O'Connell-Rodwell et al. 2000) have devised means of repelling elephants raiders.

### Stage of growth when crops were raided and implications on guarding efforts

During the focused group discussions and household interviews, the respondents informed the team that they guarded most of their crops from the time they were planted to the time they were harvested. This kind of life frustrated them because it keeps them away from other activities and kept the children away from school. However in our observations, we noted that most of the large mammal raiding started at medium and mature stage of most crops. This result contradicts the information from FGDs that indicated that many of crops were raided from when they were still young right to the time when they were harvested.

They were a few exceptions where birds picked out seeds of sorghum, millet, maize and beans immediately after they were sown. Similar results were obtained by Andama (2009) and Akampurira et al. (2015) in Nkuringo in the south of Bwindi. The degree of crop damage by problem animals varies with type the crops, stage of growth and crop raiding animals involved (Thapa 2010). Most animals are known to eat the ripening or fruiting stage of the crops whereas a few others are able to feed on all stages of development of a crop. In this study we observed that baboons could eat crops like maize and bananas from the time they were planted to the time they were harvested. Other studies (Akampurira, Bitariho, and Mugerwa 2015; Naughton-treves 1998) recorded maize as the most damaged crop and this was attributed to its attractiveness to many animals because of the high nutritional content animals obtain in shorter period of time (Naughton-treves 1998). In this study millet was the most damaged crop. The destruction of millet can be attributed to its morphology whereby any slight contact with animals as it feeds leaves behind a substantial damage. It is also important to note that animals' activity patterns and ranging behaviour influence the types of crops damaged, and particularly daily and seasonal patterns of crop damage, which can have a significant impact on the degree to which a farmer's coping strategies are effective or not (Sukumar 1990). For example in this study we observed that bush pigs and elephants always crop raided in the night which made it hard for farmers to prevent. That is why it is important to understand how crop-raiding behavior fits into overall foraging strategies and the ecology of problem species, as this can help managers and local people develop practically realistic interventions.

### Assessment of Interventions

Guarding was the most trusted and most used intervention against crop raiding in this study. This result is not unique and has been recorded by other studies such as Eilu (2016), Hill, Osborn, and Plumptre (2002), Kalpers et al. (2010), Masiga, Biryahwaho, and Akampurira (2011). The dependence of local communities on guarding can be attributed to the failure of other interventions like Mauritius thorn hedge to offer protection against crop raiding. Guarding does not come without short falls as many respondents complained that it took up much of their time and kept children away from school. It should be noted that most interventions used to reduce crop damage are often species specific (Osborn and Hill 2005). However, guarding seems to be a universal intervention used against most of the crop raiding species. Even when its effectiveness is not 100% guaranteed, it remains a better option for most local communities faced with problem animals. Farmers tend to rely on guarding because they believe they are in control of the situation unlike with other interventions like physical barriers.

Tea plantations were mentioned as the second most important interventions. This is attributed to the fact that in addition to reducing crop raids by baboons, tea also benefits them monetarily. Most crop raiding species find tea unpalatable and therefore it is used as a buffer crop for other crops. For baboons known to move deeper into the community in search for food, a continuous thick and intact tea plantation restricts their movement.

The Mauritius thorn in its current state in the study area cannot reduce crop raiding. Most of the hedge that was planted died out and the very few patches of the intact thick hedge that remain, can hardly stop crop raiding because they are not continuous. Mauritius thorn has the potential to be a dependable intervention, but unfortunately its implementation and sustainability remains nearly impossible to achieve. For example, most communities around Bwindi are unwilling to participate in the planting and maintenance of hedge without any form of incentives (Akampurira, Bitariho, and Mugerwa 2015; Babaasa, Akampurira, and Bitariho 2013; Kalpers et al. 2010). Local communities have failed to own the intervention and believe wildlife must be contained within protected areas, and that one of primary functions of the wildlife authority is to keep wildlife away from areas occupied by people. Needless to say there are other reasons like poor soils and shade created by trees at boundary of park that do not allow the hedge to grow well.

## 7. CONCLUSION

This study has been able show that despite the interventions introduced over a decade ago; HWC still persists in Karangara and Bujngwe parishes mainly through crop raiding. The most important crop raiders being baboons that have overwhelmed many farmers forcing them to guard their crops from the time they plant them to the time they harvest them.

The study is the first document crop raiding by elephants in Bujengwe (northern sector of Bwindi) in more than 60 years. This is an interesting undertaking for conservation in Bwindi but also raises interesting questions for forest ecology research and uncertainties, which may arise from elephant crop raiding of neighboring agricultural fields. Whereas local communities in the northern sector of Bwindi are accustomed to crop raiding by baboons and other primates, crop raiding by elephants is new to these communities, and their attitudes towards elephant presence and potential crop raiding remains to be investigated.

We identified that all interventions used in Karangara and Bujengwe were not perfect and had shortfalls. However we also observed that the interventions local people devised themselves like guarding were considered more effective and were more trusted even when they took up a lot of their time. This suggests that local communities are more inclined to actively engage in mitigation efforts if they have a hand in the design and approach. Karangara parish was one of the first areas Mauritius thorn was piloted and for many years it was a model parish for many other places in Bwindi and other national parks. Unfortunately what we observed in our study is the opposite, as most of the Mauritius thorn had died mainly due poor management and abandonment. The Problem Animal Committees (PAC) that used to rally local communities to engage in management were no longer active. When the development agencies that had been supporting the communities stopped, the PACs no longer had the incentives to keep people active in the management of the hedge and consequently most of the hedges have died out. In its current status in both parishes, the hedge can hardly prevent any crop-raiding animal.

Finally, no single management option will resolve all problem animal conflict situations. Centralized interventions suffer from logistical problems, and 'traditional' methods are generally ineffective. Most interventions aimed at reducing crop-loss come from organizations outside of the affected community, which include government wildlife departments and external development organizations. Farmers expect the conflict to be resolved and, when it is not, often turn against the responsible agencies. Donor-funded technical solutions are often not sustainable because of the high maintenance costs that external agencies are reluctant to provide and the lack of ownership of these solutions by the local people.

## 8. RECOMMENDATIONS

- This study has shown that the largest part of Bwindi Park/ local community boundary is devoid of the Mauritius thorn hedge and where the hedge exists, it is very poorly managed, maintained and has been abandoned. There is therefore need by the development agencies to not only upscale the planting of the Mauritius thorn hedge along the Bwindi/local community park boundary but to also introduce ways through which the local people increasingly own the hedge and actively participate in its maintenance. Ownerships of such interventions can be increased through the sensitisations and involvement of the smallest local community governance structures such as the stretcher groups (Engozi groups).
- There is need to continue the collection of crop raiding data in parishes of Karangara and Bujengwe and generally for the rest of Bwindi. Without continuous data collection on crop raiding incidences, it will be difficult to monitor the different interventions and therefore ascertain the effectiveness of the interventions in other places. The reliance on local people perspectives/opinions may not help in identifying all the shortfalls.
- In order to improve the implementation, sustainability and further ownership of interventions, wildlife conservation strategies should encourage tolerance of communities to crop damage. This can only be achieved by increasing the benefits from tourism and conservation to communities and also providing long-term incentives that can support sustainability of interventions.
- More specifically NGOs like BMCT that work with communities need to encourage local communities and the wildlife authority to agree through MOUs on what can be done to boundary trees that create shade that retards the growth of the hedge. It can be agreed to cut down the branches or communities can be supported to grow the Mauritius thorn further away from the park boundary. In regard to the stony and water logged areas along the boundary, communities need to be supported and advised on ways they can circumvent such areas for example by use of fertilizers or encouraging local communities to make a detour from such obstacles to their farmland. For such to happen communities need to recognise that they are equal partners with UWA in conservation of Bwindi and this can only be reflected in the benefits they accrue from conservation.
- It is essential to bring farmers into the process of solving the conflict by taking responsibility for the problems of crop raiding species. Such an approach is likely to be more successful, and more sustainable in the long term, than interventions that are dependent on external funding. These interventions need to be within the financial and technological capacities of the people implementing them, if they are to provide long-term solutions
- We recommend that a study should be conducted to understand why elephants have expanded their range to areas they were last sighted more than 60 years ago. It is important to understand whether this expansion is driven by: 1) emerging and/or increasing human threats in the southern sector of the park, 2) an increase in elephant population and 3) increased safety and reduced human threats in the northern sector. This information can be used to develop sensitization campaigns in this part of Bwindi to help local communities understand and learn more about elephant conservation. More importantly building the capacity of local communities on elephant conflict mitigation measures would support the conservation initiatives

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## 11. APPENDIX 2:

### Household survey

Survey questionnaire on understanding HWC and the effectiveness of the Mauritius thorn hedge and interventions in Karangara and Bujengwe parishes.

Introduction and Request for Consent to participate in the study

Greetings Sir/Madam, my name is..... We are conducting a study on problems you experience from wildlife in Bwindi Impenetrable National Park and issues focused on addressing these problems. We humbly seek your participation. The responses you give us will help us assess the impact of problems animals and also help us evaluate the interventions in place from your perspective. All that you share with us will be kept confidential and we will not write your name on this form if you wish us not to.

Your participation in this study is voluntary and you may decide not to respond to some or to all the questions.

However, we hope that you will participate in this study because your ideas are important to us.

Are you willing to participate in this study? YES/NO

Date: \_\_\_\_\_

INTERVIEWER'S NAME: \_\_\_\_\_

#### **Part 1 Demographic and Back ground assessment**

1. Name.....Respondent ID.....
2. Sex..... Age.....
3. Marital status.....
4. Parish..... Village.....Sub county.....  
GPS Points of Homestead.....
5. Plot where farm land is Located.....
6. Gender of house hold head (a) Female (b)Male
7. How many people currently live in your household? (including person being interviewed)

Age (years)	Number of males in this household	Number of female in this household
+60		
41-60		
21-40		
Below 20		

8. What is your level of education? (tick)
  - (a) No formal education
  - (b) Primary school
  - (c) Secondary school
  - (d) Other(please specify)
9. How do you currently use land in this household? (Tick more than one)
  - (a) Livestock farming and Arable farming
  - (b) Arable farming/cultivation alone
  - (c) Woodlot and Arable farming
  - (d) Other(please specify)\_\_\_\_\_
10. What has influenced your current use of land?

11. List the 3 most important sources of income (most important first) - such as farming, livestock, tourism-related activities, forest resource utilization, village market sales etc

Income-generating activity	Who in household does this?	Average income/month
1.		
2.		
3.		

12. How much land do you own?(a)Less than one Plot (b)1 to 3 plots (c) 3 to 6 Acres (d) More than 6 plots six Acres

13. How much of this is under cultivation usually (a) a quarter (b) half (c) Three quarters (d) all

14. How far are your gardens from the park boundary?

Part 2 Crop raiding assessment

15. Do you have any problems with animals from the Park? If yes, list them in order of most destructive

16. During which months of the year do you cultivate and harvest specific crops? (complete table below)

17. At what stage of growth (early, flowering, fruiting, ripening) is each of the above mentioned crops most vulnerable to raiding and by which species in particular? (Complete table below).

Name of crop	Month (s) of cultivation	Month (s) of harvesting	Vulnerable stage of growth	Major crop raiders	Estimate damage normally done in area of garden plot

18. Have you ever lost livestock to wild animals? YES/NO



22. I'm going to read some of the statements about the effectiveness of the Mauritius thorn hedge please express your level of agreement with these statements by choosing one of the options given

	strongly disagree	Disagree	Agree	Strongly agree
Mauritius thorn hedge has stopped crop raiding				
Mauritius thorn hedge has stopped wildlife human injuries				

23. How do you maintain and manage the Mauritius thorn hedge and other interventions associated with it?

24. Is the level of your investment (Time, man power and money) in the Mauritius thorn and other interventions worth the gain you get from them? (a) Yes (b) No. Please give reason to support your response

25. Do you have any further ideas or comments on how buffer zone and interventions can be made more effective?

26. Are you aware of alternative interventions not associated with the buffer zone that could help reduce crop raiding by wildlife in your area (a) Yes (b) No. If yes please mention them

27. I'm going to read out some issues related the relations between the park management and local communities, please tell me how you think the following areas have improved by the planting of the Mauritius thorn hedge (2008): Very much improved, Much improved, Somewhat improved, Not at all improved.

	Very much improved	Much improved	Some what improved	Not at all improved
The park authorities visit our area regularly				
Local people in our area voluntarily participate in the management and maintenance of the Mauritius thorn hedge				
Local people help the park authorities to identify poachers and illegal activities in the protected area				
Local people have organized themselves to help the park authorities				

Appreciation of the importance of the park by people of our area				
Local authorities sensitize communities about the importance of the park				

28. If there is no improvement at all, what are the reasons for the lack of improvement between the park and local people relations in your area?

## 12. APPENDIX 3.

### Focus Group Discussions

Group location and identity: Name, village, parish and sub-county, District:

#### 1. Background to crop raids by problem animals and gender roles

Which crops do you cultivate and when do sow and harvest them

Crops grown	Months planted	Months harvested	Months most vulnerable to crop raiding	Months least Vulnerable

Are your crops being raided by wild animals?

Which crops are raided by the animals? Give reasons why.

During which seasons are crop raid most? Why?

Where do these crop raiders come from? (From the park or in community)

Which mammal species raid crops?

If yes which crops are raided most?.....

Which of the crop raiders do you think raids most of the crops? Why do you think so?

#### 2. Trend of human wildlife conflicts with time.

Before the park was gazetted in 1991 what were the extent of problem animals in the area?

Since the park was established in 1991 to date, has the human wildlife conflict

(a) increased, (b) remained the same or (c) decreased?

Before Mauritius thorn was established what strategies were the communities using to reduce crop damage by the wild animals?

#### 3. Effectiveness of Mauritius thorn hedge to reduce crop raids

Do you have crops where Mauritius thorn hedged is established? (Elaborate and give specific localities)

Briefly compare crop raids before and after Mauritius thorn was established.

How is Mauritius thorn hedge planted and maintained?

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Do you think the hedge is effective in reducing crop raids?

What are the Key challenges of using Mauritius thorn hedge to reduce conflicts with the community?

In your opinion how can these challenges be overcome?

#### 4. Other human wildlife conflicts and mitigation strategies

Apart from crop raids, what other problems do the wild animals cause to the community? (Probe - Attacks to humans, livestock e.g. chicken, goats, sheep?)

What are the alternative strategies you use to reduce wild animals coming from the park?

Which method would be effective in your opinion?

#### 5. Land use around park boundary

How do the community use the land around the park boundary?

What crops can be planted near park boundaries that are not raided by the animals?

Which crops do you suggest to be planted near the park boundary which may not be raided by wild animals?

#### 6. Institutional structures for managing human wildlife conflicts

How is your committee organised? (Probe - At village or parish levels? Registration status?)

How do you mobilise resources to undertake the management of the hedge? Who facilitates your team in undertaking the problem animal interventions?

What is the leadership structure, dynamics (e.g. getting new leaders) within your system?

What other activities does your team undertake apart from boundary maintenance and managing Mauritius thorn hedge?

What would you consider as your roles/responsibilities in the management of crop raids?

#### 7. Skills and sustainability

What trainings have you been given in relation to management of human-wildlife conflicts

Are the communities willing to take the responsibility of maintaining the hedge? If not who do you think or suggest is responsible?

According to you who is responsible for controlling vermin and problem animals within the community? (a) The park management (a) local government (c) individual families (d) any other

What do you think is the future of supporting your activities in terms of financing and other support?

Which NGOs/CBOs are involved in effort to mitigate crop raids by wild animals in the area?



They year 2019 will be the year when we commemorate the Twenty-fifth Anniversary of BMCT. It gives us great pleasure to make this announcement now and to extend our advance gratitude to our friends and to those that have supported us through the times. We still have the goals of the Organization at heart and will continue to take pride in their achievement. We will be informing you of the date and venue for the commemorative event.

## About Bwindi Mgahinga Conservation Trust

Bwindi Mgahinga Conservation Trust (BMCT) was established in 1994 under the Uganda Trustees Laws. Its mission is to foster conservation of biodiversity of Mgahinga Gorilla National Park (MGNP) and Bwindi Impenetrable National Park (BINP) through investments in community development projects, grants for research and ecological monitoring, funding park management and protection and programmes that create greater conservation awareness. It is mandated to work with communities surrounding Mgahinga Gorilla National Park (MGNP) and Bwindi Impenetrable National Park (BINP). This area is also known as Bwindi Mgahinga Conservation Area (BMCA). The area of operation is located in South Western Uganda, bordering DRC and Rwanda with operational headquarters in Kabale at Bwindi Trust House and a sub office in Kampala.

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