**Assessing Wildlife Crop Raiding and Community Response to Conservation Initiatives in the Kimbi-Fungom National Park and its Buffer Zones, Cameroon**

**Abstract**

**Aim:** Wildlife crop raiding is a serious problem facing communities around protected areas today. This study set out to investigate the impact of wildlife crop raiding on conservation efforts in the Kimbi-Fungom National Park and its buffer zones, Cameroon.

**Method:** Both biological and socio-economic methods were used to achieve the aim of this study. The biological method made use of transects walk, reccee movement and opportunistic observation to identify and classify the different wildlife species in and around the park. The socio-economic methods employed the use of interviews, questionnaires and focus group discussion. A total of 20 long transects were randomly generated with the use ARCGIS and a GPS was used to trace the starting point and end point of each transect. Along each transect all wildlife species either through direct observation or indirect signs were recorded. A questionnaire and interview guide was purposely deigned to farmers to identify the wildlife species that visit the farms and their magnitude of destruction. A total of 150 questionnaires were administered to 150 households who were all farmers in 10 communities in and around the parks using the purposive random method. Interviews were granted to key informants and to forest guards in the park.

**Results:** Results showed that there are16 species of wildlife involved in crop raiding from sowing through flowering to maturing. Among the species, 100% of respondents opined that rodentsfrequent the farms more than any other species while those primates are the most destructive wildlife. A majority of the respondents (42%) confirmed that they guard their crops against wildlife invasion. This was followed by those who use scary items to frighten wildlife on their farms (23%). Crop raid remains a threat to their livelihood and confirmed by majority (68%) of respondents. From the results got from the field, a majority of the respondents (50%) strongly agreed that there is always frustration and anger whenever their crops are damaged by wildlife. This was followed by those who strongly agreed that animals are not useful to them than crops (45%).

**Conclusion and Recommendation:** Most of the species causing havoc are least concern species. However, for the fact all of them are threatened from hunting and habitat destruction. It is highly recommended that conservation education be encouraged in the park region.

**Introduction**

Agriculture is the back bone of many countries across the globe especially developing countries where over 80% of the population still depends on agricultural products for sustenance. However, agriculture is faced with physical problems stemming from climate change, soil erosion, floods and drought as well biological crisis such as pests and diseases as well as crop raiding by wildlife (Hill, 2017). Crop raiding by wildlife is one of the serious problems facing many agricultural landscapes today. This interaction between wildlife and crops is an old concept characterized by pains, sorrow and conflicts between wildlife and humans (Mamo et al, 2021). The wildlife crop raiding concept has emerged worldwide as one of the main issues threatening the lives and livelihoods of rural communities depending on agriculture for their survival (Campbell-Smith et al, 2010; Iddi et al, 2011). The raiding of crops by wildlife creates a situation of competition for resources between humans and wildlife. The severity of damage caused can be highly variable, depending on the animal and crop species involved and the value of affected crops to their owners or local economies (Hill, 2017). The losses of crop to wildlife are often cited as a threat to effective conservation because of people’s lack of capacity or willingness to tolerate sharing landscapes with animals that could threaten their livelihood security. This also applies to primates, many species of which incorporate crops within their diets (Mamo et al., 2021).

It has been noted that wildlife crop raiding can have severe consequences for agricultural communities where raiding is frequent. Loss of crops can lead to food shortages, economic hardship, and increased human-wildlife conflict (Hill, 2017; Mamo et al., 2021). Most often, when crops are damaged by wildlife, they caused conflicts between human and wildlife. Therefore, crop raiding is a serious course for a human‐wildlife conflict which is largely a negative interaction that occurs when wild animals come out of their natural habitats (forests) to the crop fields to rob the crops that the farmers have grown for their own and their families consumption (Hill, [2017](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8019031/#ece37268-bib-0016); Madden, [2004](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8019031/#ece37268-bib-0023)). Such phenomenon has been in existence since humans and wild animals have begun sharing the same landscapes and resources. Today, human‐wildlife conflict exists in one form or another (crop raiding, livestock depredation, property damage, and human injury) across the globe (Hariohay & Røskaft, [2015](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8019031/#ece37268-bib-0012))

Human-wildlife conflict affects negatively the survival of many endangered animal species as well as undermining people’s food security and tolerance for wildlife. Habitat and biodiversity conservation strategies collide with farmer’s views and so hindering the success of their implementation (Campbell-Smith et al., 2011). Moreover, the success of agricultural development projects by promoting sustainable farming systems and improving agricultural practices can be also affected by competition for resources between farmers and wildlife (Baranga et al., 2012). The impact caused by animals raiding farms is not easy to assess objectively. Farmers’ perception is often greater than the actual loss and it is more accentuated if the plantations are in the proximity to protected land (Saj et al., 2003; Hill, 2004), although some studies have proven that farms closer to forests do actually suffer significantly more crop raiding than farms situated further away (Baranga et al., 2012; Karanth et al., 2013). Assessing the impact of crop raiding by wildlife is of paramount importance to help inform of alternative measures aimed at mitigating and/or preventing future crop-raiding and conflicts (Campbell-Smith et al., 2011; Hsiao et al., 2013).

In many protected areas across the globe, the human‐wildlife conflict is severe and has become a growing challenge mainly due to the mismatches between the interests of conservation and local residents' livelihood improvement (Ango et al., [2017](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8019031/#ece37268-bib-0002)). To minimize such mismatch there is need to understand the socio‐ecological system pertinent to the human‐wildlife interaction mainly in biodiversity hotspot ecosystems (Hill, [2000](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8019031/#ece37268-bib-0013); Gillingham et al., 2003). As more agricultural lands encroach into wildlife habitat, which do not only decreases its available space for wildlife and destroys natural food sources, but also positions crops within close range of those food-depleted animal populations. This makes it possible for wildlife to subsequently begins feeding on these crops, becoming problem animals (Wang et al., 2006; Riley, 2007). Thus, if people and wildlife are to coexist outside of protected areas, then ways must be found to resolve conflict. Identifying successful methods will provide major enhancements to conflict resolution and wildlife conservation in general (Sillero-Zubiri & Switzer, 2001). Therefore, current threats to wildlife stemming from conflict require strategies to manage and contain conflict if populations are to persist (Lee & Priston, 2005)

In Cameroon, crop damage by wildlife is an old fashion and has been very significant to farmers which has been existing for a very long time. From the North to South and East to West of the country, the problem of crop raiding is very crucial and need attention. Despite the fact that studies on this topic are still skeletal in the country due to its agricultural nature, there is evidence of crop raid across the country. For instance a study conducted by Melle et al. (2018) in the Kumba Municipality noted that rodents are considered by the farmers to be the most destructive to farm crops. In the South, crop raid has been reported at Campo maan National Park where there is an increase in human-wildlife conflict (Eyebe et al., 2012; Djoko et al., 2022). In Northern Cameroon, Human-Elephant Conflict were reported in the Waza-Logone Region of Northern Cameroon (Tchamba & Foguekem, 2012).

In the Kimbi-Fungom National Park, found within a mixed ecosystem of both forest and savanna, the issue of crop raiding is very pronounced. Many wildlife species identified to have been causing threats to crop from sowing, through flowering to maturity and harvesting. These species that post both pre and post-harvest threats to agricultural production can be grouped under rodents, ungulates and primates as well as birds. As crops are being raided, peripheral communities affected respond to conservation in diverse ways. Many of them express anger and frustration, some resort to retaliatory killings of the offending animals, others may seek compensation or support from conservation organizations, while some may implement their own deterrent measures such as guarding their farms. It is therefore very vital to engage local communities for successful wildlife conservation. This can be done through the involvement of local community members in decision-making processes which can enhance the acceptance and effectiveness of conservation initiatives. This study is therefore set out to improve the knowledge toward coexistence between farmers and wildlife to promote wildlife conservation.

**Materials and Methods**

* **Study area**

The Kimbi-Fungom National Park is located between latitude 6.5 and 6.9° N and longitude 9.8 and 10.5° E in the North West Region of Cameroon covering a total land surface of 95,380 ha. This national park is located in three divisions of the North West Region of Cameroon cutting across four sub divisions. These divisions are Menchum, Boyo and Dongo Mantung and found in the respective sub divisions of Fungom and Fru Awa, Misaje and Bum. The Kimbi-Fungom National Park (K-FNP) is a newly created national park and the only national park in the region (Map 1).



 Map1:Kimbi Fungom National Park (K-FNP)

This region experiences two seasons; a long rainy season from mid-March to mid-November and a short dry season from mid-November to mid-March. The wettest months are July, August and September and the driest months being January and February. Hawkins and Brunt (1995) described the climate as a “sub-montane cool and misty climate” with an annual mean maximum temperature of 20 to 22°C and mean minimum of 13 to 14°C. Annual rainfall varies between 1780 and 2290 mm with most of the rainfall occurring between July and September. A dry season occurs from mid - October to mid-March (Tata, 2015).

Geographically, the Kimbi-Fungom National Park has a heterogeneous landscape. The Fungom area lies east of Weh-Esu and South of Esu to Kung and Fang reaching a height of 1524 m. This area is made-up of woody savanna with hills running from Weh to Kuk. It is characterized by a rugged terrain from steep rolling hills into extensive flat valley at lower altitude. The Munkep-Gayama axis is an extensive valley about 6 km wide in the Munkep area to over 10 km in Gayama zone. It is in the midst of chains of some steep rocky hills which are almost impassable. The lowlands take another orientation from Munkep at a place called Last Town‟ towards the eastern forest. The valley starts behind the eastern forests where it extends for more than 15 km wide to over 30 km long. This extensive eastward valley is fertilized by alluvial silts from the Southern near Escarpment chain of long hills that stretched from the West towards the East in the Fungom Reserve. This relief has greatly influenced the vegetation types and distribution within the park. The Munkep Gayama axis lies on an extensive valley between chains of two hills. These valleys gradually protrude into near long rolling steep hills which are characterized by the woody vegetation. The hills are sandwich by galley forests which form the basis for the numerous tributaries in the park. It is drained by a wide range of rivers and streams, notably the Kimbi, the Katsina Ala, and the Kendassamen Rivers, along with significant streams that include: the Batum, Akum, Bissaula, Kenda, Yemene and Imia. These streams flow into the bigger ones that eventually flow through the Katsina Ala River and finally enter the River Benue (Tata, 2015).

**Data Collection and Analysis**

Ten settlements or communities in and around the park were selected based on their location within and proximity to the park. These communities were those engage in farming most of which were subsistence farmers. The study adopted the random sampling technique with 10 percent confidence interval at 95 percent confidence level. Crop raiding information was gotten from 150 respondents. This collected using semi-structured questionnaires. For each household, we interviewed the family head or the elder of the family who has been into agriculture for at least two years. The questionnaires were focused on types of crops cultivated, the pattern of crop raiding incidences, types of crops damaged, type of wild animal responsible for the crop damage, estimates of crop loss and coping strategies against crop raiding and their response to wildlife conservation. The villages surveyed were Munkep, Gayama I, Gayama, II, Munka, Esu. Tengheuka. Kimbi, Subum, Etchem and Mbwi-Mbwi.

Data gotten from transect walk, structured questionnaires and interview were coded and entered into an excel spreadsheet. The Data were exported to SPSS and analysis was conducted using the statistical package for social science (SPSS) version 21. Descriptive statistics were used to interpret the data. The frequency of the individual animal to the different stages of crop were determined by assigning the different values; 1-3 with 1 being more frequent, 2 frequent and 3 less frequent. These numbers were translated into + signs for coherent.

**Results**

**Demographic characteristics of Respondents**

Socio economic and cropping characteristics of respondents age gradation was within the range of 21 to above 61 years. A majority of respondents (69.3%) were males while female respondents made up a minority (30.7%) of the respondents. Concerning the age group, the higher proportion of respondents (36.7%) were between the ages of 41 and 50 years. It was followed by those who were between the ages of 51 and 60 (21.3%). The least were those who were between the ages of above 61 years (6.7%). The majority of the women respondents were in the age category of 31– 40 (8%) while the majority of the male was within the category of 41 – 50 (10%). All respondents above 61 years (6.7%) were males. As far as education of respondents were concerned, a majority of the respondents (51.3%) have attended the primary level of education and so could read and write. It was followed by those who have attended the secondary school level (26.7%). The least were those who have reached the tertiary level of education (10%). Concerning the years that respondents have been involved in farming, a majority of the respondents have spent 13 to 16 years of farming around the park (30%). This was followed by those who have respectively spent 5 to 8 years as well as 9 to 12 years (21.3%). The least were those who have spent just 1 to 4 years (12%). The demographic characteristics are summarized in table 1.

Table 1: Demographic characteristics of Respondents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** |  | **No of Respondents** | **% of respondents** | **Total % of Resp** |
| Gender | Male Female | 10446 | 69.3%30.7% | 100% |
| Age Group | 21-3031-4041-5051-6061+ | 2330553210 | 15.3%20%36.7%21.3%6.7% | 100% |
| Level of education | No formal EducationPrimarySecondaryTertiary  | 18774015 | 12%51.3%26.7%10% | 100% |
| Major occupation | FarmingOthers  | 14109 | 94%6% |  |
| Years of farming  | 1-45-813-169-1216+ | 1832453223 | 12%21.330%21.3%15.3 | 100% |

1. **Crop raiding species in and around the park**

Result revealed a total of 16 wildlife species that raid crops in and around the Kimbi-Fungom National Park. These species affect crops at different levels of the crop life cycle and at different magnitude. This was confirmed by 100% of respondents in and around the park. These species are presented in table 2. Some affect crops during planting especially rodents such as squirrels, mice and birds especially the village weaver bird and francolins as confirmed by 100% of the respondents.

**Table 2:** Crop Raiding Species in the Park

|  |  |  |  |
| --- | --- | --- | --- |
| Species | Family | Scientific Name | Common Name |
| Ungulates |  | *Tragelaphusscriptus* | Bushbuck |
| Antelopinae (duikers) | *Cephalophusdorsalis* | Bay duiker |
|  | *Philantombamonticola* | Blue duiker |
| Suidae | *Potamochoeruslarvatus* | Red River Hog (Bush Pig) |
|  | *Papioanubis* | Olive baboon |
| Primates |  | *Cercopithecus sp.* | Patas monkey |
| Cercopithecinae | *Chlorocebuspygerythrus* | Velvet monkey |
|  | *Cercopithecusmona* | Mona monkey |
|  | *Cercopithecusnictitans* | White nosed monkey |
| Hystricidae | *Hystrixcristata* | Porcupine |
| Thryonomyidae | *Thryonomysswinderianus* | Cane rat |
| Rodents | Sciuridae | *Protoxerusstanger* | Ground giant squirrels |
| SciuridaeProcaviidae |  | Red-legged squirrels |
| SciuridaeProcaviidae | *Fukomys foxi* | Rat moles |
| *Mus musculus*  | Mouse |
|  *Procaviacapensis* | Rock Hyrax |
|  |  |
| Hyraxes | ploceidae | *Ploceus cucullatus* | Weaver bird |
| Birds | phasianidae  |  | Francolin |
|  |  |  |  |

These species raid different crops at each stage of the crop. At sowing, rodents are the dominant raiders and may render a whole farm without crops. This was confirmed by 100% of the respondents. Ungulates feed on the leaves of plants at all stages of the crop after sprout. Primates feed mainly on mature crops

**Crop raids by wildlife**

The park is a fertile landscape for both subsistence and commercial farming. The major crops planted in the park are maize (Zea mays), groundnut (Arachis hypogaea) rice (Oryza sativa), millet (Pennisetum glaucum), beans (Phaseolus vulgaris), soya beans (Glycine max) coco yams (Colocasia esculenta), sweat potatoes (Ipomoea Batatas), banana (Musa acuminata) and plantains (Musa paradisiaca). These crops were identified to be vulnerable to wildlife raid in and around peripheral communities. These crops have been raided in different magnitude by different wildlife species. This was confirmed by 100% of the respondents. All respondents also confirmed that maize and groundnuts are most vulnerable to wildlife raid than other crops (100%). This is the most cultivated crops in the agricultural landscape that form their main stable food.

 At sowing, maize and ground are most vulnerable to rodents (100%) followed by primates as confirmed by 100% of our respondents and the least is ungulates. During germination to flowering, ungulates dominate the raid as they feed on leaves. It is followed by rodents and especially cane rat the least primates. At majority, primates dominate the raid, followed by rodents and the least undulates.

Table 3. Magnitude of crops raid by different species

|  |  |  |  |
| --- | --- | --- | --- |
| Wildlife species | Sowing | Germination to flowering  | Maturity |
| Primates | 7% | 12% | 58% |
| Ungulates | 12% | 35% | 2% |
| Rodent | 65% | 50% | 28 |
| Birds | 16% | 3% | 12 |
| Total | 100% | 100% | 100% |
|  |  |  |  |

**Perception on the Stages of crop raid by wildlife and aftermath**

Crop raiding in the study site was found to be according to stages. The magnitude of the crop stage raided determines the potential loss incurred. While some species were identify to raid crops at sowing, some raided during germination to flowering and some raided at maturity. A majority of the respondents (74%) confirmed that crop raided at sowing no matter the magnitude do not leads to many losses because these crops are easily replaced during the growing period except affected by other factors like climate and soil. Crops raided after germination to flowering post threats to losses because most of the times they are hardly replaced. All respondents (100%) confirmed that crops raided at maturity results to high losses, possess threat to food security and lead to financial burden to the farmers. This financial burden results from the fact that the farmers affected are short of surpluses to sell and purchase other foodstuff, instead they are allow with no choice than to buy food due to losses incurred from raid.

**Frequency of Species on the farms**

This study revealed that rodents were the species that frequently visit the farms in the park. It was confirmed by 100% of respondents in and around the park that in every week, rodents visit at farms at least 2 times. Their visit is traced from their activities through digging, cutting stems or feeding on mature crops especially maize and groundnut. The respondents (100%) also confirmed that primates are the second group of wildlife that visits the farms and the same respondents confirmed that ungulates visit the farms. In terms of individual species, cane rats frequent the farms from germination to harvesting, followed by porcupine. It is however noted that, cane rats and porcupine effects on maize and groundnut outweighs other rodents combined especially due to their nocturnal nature.

**Table 4. Species Frequency to Farms at different stages of plant life**

|  |  |
| --- | --- |
| Wildlife Species |  Frequency to the Farms at different Stages of Crop cycle  |
| Wildlife Species | Sowing | Germination to Flowering | Maturity to harvesting |
| Cane rat | + | +++ | +++ |
| Porcupine | + | ++ | +++ |
| Rock Hyrax | + | ++ | ++ |
| Rat moles | ++ | ++ | ++ |
| Mice | ++ | ++ | ++ |
| Bushbuck | + | ++ | ++ |
| Blue duiker | + | ++ | + |
| Red duiker | + | + | + |
| Olive baboons | + | ++ | ++ |
| Mona monkey | + | + | +++ |
| Putty nose monkey | + | + | +++ |
| Velvet monkey | + | + | +++ |
| Patas Monky | + | + | ++ |
| Birds | +++ | ++ | +++ |
|  |  |  |  |

Not Frequent + frequent ++ Very Frequent +++

**Most raided species and magnitude of loses incurred**

According results, 100% of respondents concluded that primates are the most dangerous crop raiders in and around the park. In line with this, putty nose monkeys, mona moneys frequently raids crops in the forest regions of the park while vervet monkeys and patas monkey frequently raid crops in the woodland and savanna. According to 100% of the respondents, baboons are confirmed to be the dangerous crop raiders among all primate species. Due to their ecological survival, they are very numerous in the park and their one time raid without human intervention can outweighs the combine raid of putty nose monkey, Mona monkey, and Vervet monkey. This is confirmed by 100% of respondents. Crops vulnerable to baboon raids are maize of respondents follow by groundnut as confirmed 100% of respondents. The survival of baboons in all landscapes put crops at risk in all areas.

**Community Preventive methods against crop raiding**

The local population in and around the peripheries of the park use different responses to crop raiding. The level of effectiveness is determined by those who applied it. A majority of the respondents (42%) confirmed that they guard their crops against wildlife invasion. This was followed by those who use scary items to frighten wildlife on their farms (23%). The least were those who shout when an animal is sighted (2.7%). Concerning the effectiveness of these methods, crop guarding, fences and shooting of wildlife are very effective method to control wildlife from crop damage. Table 4 shows the different methods and effectiveness to crop raiding in the park

Table 4: Community Preventive methods against crop raiding

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SN | Method | No of Resp | % of Resp | Level of Effectiveness  |
| 1 | Crop guarding | 42 | 28 | Very effective |
| 2 | Scary instruments | 23 | 15.3 | Not effective |
| 3 | Fences  | 7 | 4.7 | Very effective |
| 4 | Beating Drums /bottles | 12 | 8 | Effective |
| 5 | Throwing of stones after animals | 6 | 4 | Effective |
| 6 | Use of guarding Dogs | 10 | 6.7 | Very Effective |
| 7 | Gunshots | 18 | 12 | Effective |
| 8 | Trapping of animals | 20 | 13.3 | Effective |
| 9 | Shooting with arrows/spears | 8 | 5.3 | Effective |
| 10 | Shouting when animal is sighted  | 4 | 2.7 | Very effective |
|  | Total | 150 | 100 |  |

Not effective +, Effective ++ very effective +++

**Community Response to Conservation Initiatives**

Crop raid by wildlife has put local communities in and around the park in lock ahead with conservation effort in the park. Considering the fact that conservation effort was still at the baby stage before the Anglophone crisis, effort towards sensitization remain fragile. The perception of local people towards conservation on the face of crop raiding which is their main way of life is very frustrating. From the results got from the field, a majority of the respondents (50%) strongly agreed that there is always frustration and anger whenever their crops are damaged by wildlife. This was followed by those who strongly agreed that animals are not useful to them than crops (45%). The least were those who strongly disagreed that frustration and anger should be an option after a raid (2%). These are those who have knowledge on conservation issues.

Table 5: Community Response to conservation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SN** | **Responses of respondents in %** | **SA** | **A** | **N** | **D** | **SD** | **Total**  |
| 1 | Frustration and Anger | 50 | 28 | 2 | 18 | 2 | 100% |
| 2 | Retaliation to wildlife through killing  | 25 | 40 | 5 | 27 | 3 | 100% |
| 3 | Deaf ear to conservation need | 12 | 33 | 15 | 32 | 8 | 100% |
| 4 | unwillingness to participate in conservation education | 30 | 21 | 10 | 29 | 10 | 100% |
| 5 | Need for Compensation | 40 | 32 | 0 | 23 | 7 | 100% |
| 6 | Perception that animals are not useful to them than crops | 45 | 30 | 3 | 15 | 7 | 100% |
| 7 | Perception that National Park deprive them from their God given Resources | 35 | 35 | 4 | 4 | 22 | 100% |
| 8 | Beneficiaries of these wild animalsare tourists and park management | 25 | 35 | 15 | 10 | 15 | 100% |

**Discussion**

**Socio-economic characteristics**

From the results gotten from the field, a majority of respondents (n=104) were males while female respondents made up a minority (n=46). This study shows that farming activities are male-dominated. The majority of large maize farms are owned by the males in the park while woman own large or many groundnut farms. In the general sense, male farmers dominate females in the park. This observation is in consonance with Adebowale et al. (2021), who had similar findings in agrarian communities around Old Oyo National Park and Yaduma, et al. ( 2024) who assessed wild-animal crop raiding and its influence on wildlife conservation around Kainji lake national park, Nigeria. This result can be justified by the assertion of Twyman et al. (2015) that farming activities are dominated mainly by men due to the need to provide food for the family.The male population around the park due to their polygamous nature needs to feed their large family sizes, thus this can only be achieved through increased number of farms and large farm sizes

**Crop raiding wildlife in and around the park**

The Kimbi-Fungom National Park is an ecosystem that host both subsistence and commercial farming. Crops such as maize, groundnuts, beans, soya-bean, cassava, sweet potatoes, coco-yams, plantain, banana are usually raided by wildlife at different stages of the life time: from sowing through germination, flowering and maturity. Among the different crops in the area, maize and groundnut have suffered great losses since these two crops are the dominant crops cultivated by all farmers in the park. These findings are in line with those of Mwakatobe, et al. (2014) who noted that economic loss incurred by the household residing near the protected area from crop damage by wild animals was significant. Other researchers also observed that crop raider has high desire for maize because it has a greater affinity for maize due to its high protein content (Sukumar, 1989; Sonam, 2019).

 The magnitude of raid at each stage was a function of the species of wildlife that raid the crop at that stage. It was realized in the park that most of the crops are raided at maturity. While rodents were noted to cause more damaged at sowing, primates were noted to cause more damage at maturity, bringing more loss, food insecurity to the local population. The damage caused by primate raid at maturity is outstanding because the losses incurred cannot be replaced. Primates especially baboon can cause a lot of damage to crops whenever a farm is raided without any human intervention. Baboons are found throughout the different vegetation types where farming activities are carried out. Although they do not really frequent the farms, but their one time raid is sufficient to have a story. This is stem from the fact that despite their aggressive method of feeding in farm products, they are also very numerous in the park, than any other primate species. This study is similar to those of Hill (2000) who found baboons to raid crop more often than any other species and were responsible for 70% of all crop damage events. Within the primate order, almost all families have been identified as crop raiders (Lee & Priston 2005), but Cercopithecidae (baboons, macaques and to a lesser extent colobines) top the list of the crop raiding culprits (Nijman & Nekaris, 2010). Within this family, Papio (baboons) are among the most frequently cited primate crop raiding species (Hill, 2000).

In respect to the frequency of species to the farm, it was realized that different crop stages receive different species of wildlife and the magnitude of destruction is a reflection of the species that visit the farms. This study revealed that rodents were the species that frequently visit the farms in the park. It was confirmed by 100% of respondents in and around the park that in every week, rodents visit at farms at least 2 times. Their visit is traced from their activities through digging, cutting stems or feeding on mature crops especially maize and groundnut, cocoyams, cassava. This was followed by those who opined that primates are the second crop of wildlife that visits the farms and the least were those who noted that ungulates visit the farms. The nature and magnitude of crop damage by the respective wild animals were reported to be different. Cane rats, Porcupine and rat mole are known to raid the crop at night while monkey and others are active at day time resulting in a need to guard the crop throughout the day and night. Nocturnal animals caused damage by uprooting and cutting the stems of standing crops right from the young shoot until harvesting, while diurnal primates destroy the crops at times of maturity. The frequency of rodents to farms and damaged has been known to cause havoc to farms. For instance, in a study conducted on crop raiding in Kumba Municipality, it was realized that rodents were considered by the farmers to be the most destructive to farm crops (71.00%). This area seems to be very rich in rodents’ population and with the State government deterrent wildlife protection laws on even some of these rodents their increase in population is obvious and their destruction capacity to farm-crops is inevitable in Kumba and other parts of Cameroon (Melle et al., 2018)

**Community Preventive methods used to against crop raiding**

The local population in and around the peripheries of the park use different responses to crop raiding, These preventive measures include crop guarding , scary instruments, fences , shouting when animal is sighted , beating drums /bottles, throwing of stones after animals, use of guarding dogs, gunshots, trapping of animals and shooting with arrows/spears. Crop guarding and trapping are widely use in the park. These deterrent methods are currently implemented by agriculturalists that suffer from damage by wildlife (Kaplan, 2013). However, most of these methods are employed with limited effectiveness and could be significantly improved.

Crop guarding, animal trapping and scaring instruments were some of the widely adopted strategies to minimize the loss of crops to wild animals. A majority of respondents reported that guarding their crop throughout the day and night by actively chasing the wild animals away from crop using dog and building watch-out huts at a strategic location in the field. Making noise by shouting and beating of empty tin left hanging in various parts of the field and keeping the fire burning in the watch- out hut were some of the strategies used to scare the animals in the night. Guarding is mostly done by children during holidays and weekends and so may not be effective if crops are matured before summer holidays. Trapping and catching nocturnal raiders such as porcupines and cane rats were also very effective means of preventing crops from further raid. These nocturnal species were also victims of night hunting by skillful hunters/farmers to prevent them from continuous raid. Gunshots were also very effective methods to control crop raiding animals. Retaliatory killing of conflict species was also reported despite their unwillingness to report the kill with the fear of getting penalized by the forestry laws. Gunshots were heard all over the park prior to mid-2018 prior to the extension of the Anglophone crisis to the park region. At the later part of 2018 to the end of 2024 when this work was carried out, there were very few gunshots due to the ban on gunshots and seizure of many firearms from the occupants of the park. This increase the raid especially by primates and many losses are incurred. These adopted preventive measures in the study, have earlier been confirmed as common strategies employed by farmers in protecting their crops from wildlife (Magama et al., 2018; Geleta et al., 2019).

**Community Response to Conservation in the face of crop raid**

Community response to conservation in the face of crop raiding is with mixed feelings. The perception of local people towards conservation on the face of crop raiding which is their main way of life is frustrating though to some who have knowledge on conservation have different perception. From the results got from the field, a majority of the respondents (50%) strongly agreed that there is always frustration and anger whenever their crops are damaged by wildlife. This was followed by those who strongly agreed that animals are not useful to them than crops (45%). These are people who solely depend on farming for survival and they think that protecting wildlife against their crops is not the best. They were of the opinion that wildlife is God’s given resources as well as agricultural land. They noted that the destructive nature of wildlife on their farmlands is not accepted as their labour is being compromised. They destruction caused by wildlife most of the times place them at high risk of hunger which further frustrate their income level. These results agreed with Hill (2004) and Anthony (2007) that surrounding communities’ attitudes towards protected areas are often influenced by existent or perceived damage caused by wildlife. According to Hill and Wallace (2012), crop raiding has a negative impact on the conservation of wildlife in the wild since people dislike the species because of property loss that contributes to food insecurity and poverty, while Eniang et al. (2011) observed that crop raiding has become more frequent, severe and serious obstacles to conservation efforts in Africa.

 However, lower proportions of respondent were aware of conservation issues and so advocated that engaging the population in conservation should be the best option. This, according to them should be through aggressive education and sensitization campaigns. Taking note, care and addressing possible conflict that can arise due to crop raiding is a crucial conservation issue (Hockings and Humle 2009); hence, the farmers in the study area suggested that park authority should endeavor to compensate the victims of wildlife crop raiding. Farmers suggested that park authority should endeavor to compensate victims of wildlife crop raiding. This is agreed with Wagner et al. (1997) that a significant benefit attributed to compensation programs is that they may increase tolerance of wildlife and promote more positive attitudes and support for conservation among people who live closest to endangered and dangerous animals

Control techniques may become successful if the risk to animals of crop raiding is increased to outweigh its benefits. Therefore, techniques need to be developed that artificially enhance the perceptions of risk by reducing the accessibility or palatability of crops (Lee & Priston, 2005; Strum, 2010). Moreover, because crop raiders save foraging time they are able to ‘sit and wait’ for opportunities to raid. Control techniques therefore need to use up much of the raiders’ time (Strum, 2010). To be effective mitigation must also meet the following criteria. First and foremost, the value of the resource to be protected, in this case the crops, must exceed the cost of a deterrent (Kaplan, 2013). Secondly, any strategy must be appropriate to the site concerned and acceptable to those living there (Hill, 2000). Lastly, the technique must meet the needs of both the people and the wildlife involved to make conservation of wildlife a reality

**Conclusion**

The increase in crop raiding by wildlife has increased the incidence of human wildlife conflicts in communities located in and at the buffer zone of the Kimbi-Fungom National Park with 100% of the surveyed households confirming the incidence of crop damage by wild animals. Since agriculture is the vital part of community’s livelihood, Human wildlife conflict is inevitable in future which calls for wildlife managers, researchers and policymakers to join hands to devise an effective conservation management strategy that fulfills the needs of both wildlife and communities. Thus, if people and wildlife must coexist outside of protected areas, then ways must be found to resolve conflict. Identifying successful methods will provide major enhancements to conflict resolution and wildlife conservation in general. Current threats to wildlife stemming from farmland conflict require strategies to manage and contain them if wildlife populations are to persist. Conflict resolution is also important in reducing the vulnerability of people that come into conflict with wildlife, by reducing the magnitude of wildlife damage sustained. If problems are allowed to persist, losses will only get worse and difficulties in management magnified. Furthermore, providing solutions helps encourage positive attitudes towards wildlife so that peaceful people-wildlife coexistence can be maintained. Hence, the various stakeholders, wildlife conservationists and the State government wildlife management authorities have a crucial role to play in joining the local farmers in mitigating the unnecessary killing of wildlife in farmers. This strategy would as well ensure sustainable agricultural growth for the local farmers in and around the park

**References**

Ango, T. G., Börjeson, L., & Senbeta, F. (2017). Crop raiding by wild mammals in Ethiopia: Impacts on the livelihoods of smallholders in an agriculture-forest mosaic landscape. Oryx, 51, 527–537. https://doi.org/10.1017/S0030605316000028

Ango, T. G., Börjeson, L., Senbeta, F., & Hylander, K. (2014). Balancing Ecosystem Services and Disservices: Smallholder Farmers’ Use and Management of Forest and Trees in an Agricultural Landscape in Southwestern Ethiopia. Ecology and Society, 19, 30. <https://dx.doi>. org/10.5751/ES- 06279-190130

Antoine Justin Eyebe, Guy Patrice Dkamela, Dominique Endamana (2012). Poverty and Conservation Learning Group Discussion Paper No 05 (Use same referencing style).

Baranga, D., Isabirye Basuta, G., Teichroeb, J. A., & Chapman, C. A. 2012. Crop raiding patterns of solitary and social groups of red-tailed monkeys on cocoa pods in Uganda. Tropical Conservation Science Vol. 5(1):104-111. Available online: www.tropicalconservationscience.org

Campbell-Smith G, Simanjorang HV, Leader-Williams N, Linkie M. (2010). Local attitudes and perceptions towards crop-raiding by Sumatran orangutans (Pongo abelii) and other non- human primates in Northern Sumatra, Indonesia. Am J of Primatol 72: 866–876

Djoko et al. (2022). Human-wildlife conflict in the Campo-Ma’an Technical Operational Unit, Southern Cameroon. International Journal of Biodiversity and Conservation. Vol. 14(4), pp. 190-205

Eyebe, AJ, Dkamela GP, Endamana D (2012). Overview of Human Wildlife Conflict in Cameroon. Poverty and Conservation Learning Group Discussion paper n°05 1-26.

Gillingham S, Lee PC (2003) People and protected areas: a study of local perceptions of wildlife crop- damage conflict in an area bordering the Selous Game Reserve, Tanzania. Oryx 37: 316−325

 Hariohay, K. M., & Røskaft, E. (2015). Wildlife Induced Damage to Crops and Livestock Loss and how they affect Human Attitudes in the Kwakuchinja Wildlife Corridor in Northern Tanzania. Environment & Natural Resources Research, 5, 72–79. https://doi.org/10.5539/enrr.v5n3p72

Hsiao, S. S., Ross, C., Hill, C. M., & Wallace, G. E. (2013). Crop-raiding deterrents around Budongo Forest Reserve: an evaluation through farmer actions and perceptions. Oryx, 1–9. doi:10.1017/S0030605312000853

Hill, C. (2000). Conflict of interest between people and baboons: Crop raiding in Uganda. International Journal of Primatology, 21, 299–315.

Hill CM. 2017a. Crop raiding. In The international encyclopedia of primatology ed. A. Fuentes, Hoboken: Wiley

Hill CM. 2017b. Primate crop feeding behaviour, crop protection, and conservation. Int. J. Primatol. 38:385-400

Hockings KJ, Humle T. 2009. Best Practice Guidelines for the Prevention and Mitigation of Conflict between Humans and Great Apes. Gland, Switzerland: IUCN/SSC Primate Specialist Group (PSG)

Iddi M. Mfunda & Eivin Røskaft (2011) Wildlife or crop production: the dilemma of conservation and human livelihoods in Serengeti, Tanzania, International Journal of Biodiversity Science, Ecosystem Services & Management, 7:1, 39-49, DOI: 10.1080/21513732.2011.602028

Karanth, K. K., Gopalaswamy, A. M., Prasad, P. K., & Dasgupta, S. (2013). Patterns of human– wildlife conflicts and compensation: Insights from Western Ghats protected areas. Biological Conservation, 166, 175–185. doi:10.1016/j.biocon.2013.06.027

Lee PC, Priston NEC. 2005. Human attributes to primates: Perception of pests, conflict and consequences for primate conservation. In Commensalism and conflict: the human– primate interface, eds. JD Paterson, J Wallis, pp. 1-23. Norman: American Society of Primatologists

Lee PC, Poole JH, Njiraini N, Moss CJ. Moss CJ. et al. 2011. Male social dynamics: Independence and beyond. In The Amboseli elephants: a long-term perspective on a long-lived mammal. Pp. 260-271. Chicago: Univ. Chicago Press

Madden F. 2004. Creating coexistence between humans and wildlife: global perspectives on local efforts to address human–wildlife conflict. Hum. Dimens. Wildl. 9:247–257

Mamo A, Lemessa D, Diriba OH, Hunde D. (2021). Pattern of crop raiding by wild large mammals and the resultant impacts vary with distances from forests in Southwest Ethiopia. Ecol Evol. 2021; 11:3203–3209. <https://doi>. org/10.1002/ece3.7268

Kaplan BC, O’Riain MK, van Eden R, King AJ. 2011. A low-cost manipulation of food resources reduced spatial overlap between baboons (Papio ursinus) and humans in conflict. Int. J. Primatol. 32:1397-1412

M.N. Tchamba¹ & D. Foguekem²\* (2012). Human Elephant Conflict in the Waza-Logone Region of Northern Cameroon: An Assessment of Management Effectiveness. TROPICULTURA, 2012, 30, 2, 79-87

Sillero-Zubiri, C., & Switzer, D. (2001). Crop raiding primates: Searching for alternative, humane ways to resolve conflict with farmers in Africa. People and wildlife initiative. Wildlife Conservation Research Unit, Oxford University.

Strum, Shirley, C. 2010. “The Development of Primate Raiding: Implications for Management and Conservation.” International Journal of Primatology, 31: 133–156. DOI:10.1007/s10764-009-9387-5

Mamo A, Lemessa D, Diriba OH, Hunde D. Pattern of crop raiding by wild large mammals and the resultant impacts vary with distances from forests in Southwest Ethiopia. Ecol Evol. 2021 Feb 14;11(7):3203-3209. doi: 10.1002/ece3.7268. PMID: 33841777; PMCID: PMC8019031.