**Assessing Wildlife Crop Raiding and Community Response to conservation initiatives in the Kimbi-Fungom National Park and its Buffer Zones, North West Region of 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 used transects walks, reconnaissance movements and opportunistic observations 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 discussions. A total of 20 long transects were randomly generated using ARCGIS and a GPS was used to trace each transect's starting and end points. Along each transect all wildlife species, either through direct observation or indirect signs, were recorded. A questionnaire and interview guide was purposely given 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 **are** 16 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 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, as confirmed by the majority (68%) of respondents. From the results obtained 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 as useful to them as crops (45%).

**Conclusion and Recommendation:** Primates and rodents are the main raiders of crops in the park, making them more vulnerable to hunting activities. Farmers argued that they cannot spare wildlife at the detriment of their crops. It is highly recommended that conservation education be encouraged in the park region.

Key words: Biological, crop, raiding, Transects, wildlife

**Introduction**

Agriculture is the backbone of many countries across the globe, especially developing countries where over 80% of the population still depends on agricultural products for sustenance. However, agriculture faces physical challenges such as climate change, soil erosion, floods, and drought, as well as biological crises including pests, diseases, and 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). “Crop losses to wildlife are often cited as a threat to effective conservation, due to people's limited capacity or willingness to share landscapes with animals that may 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 negatively affects the survival of many endangered animal species and undermines both food security and people's tolerance for wildlife. Habitat and biodiversity conservation strategies often conflict with farmers' perspectives, thereby hindering successful implementation (Campbell-Smith et al., 2011) Moreover, “the success of agricultural development projects by promoting sustainable farming systems and improving agricultural practices can also be 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 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 informing alternative measures aimed at mitigating and/or preventing future crop raiding and related conflicts” (Campbell-Smith et al, 2011; Hsiao et al; 2013).

In many protected areas across the globe, human-wildlife conflict is severe and has become an increasing challenge, primarily due to mismatches between conservation goals and the livelihood needs of local residents (Ango et al., 2017). “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)

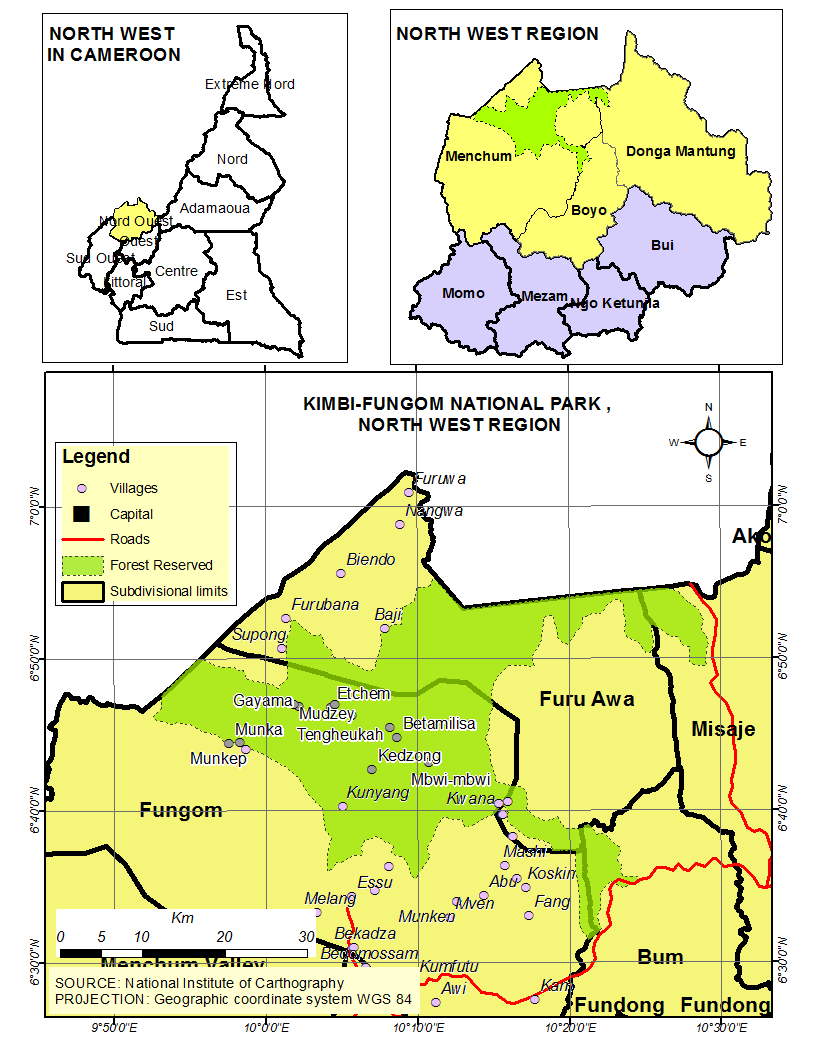
In Cameroon, crop damage by wildlife is a long-standing issue that has significantly affected farmers for many years. From the North to the South and the East to the West of the country, crop raiding remains a serious problem that requires urgent attention. Although studies on this topic are still limited, despite the country's heavy reliance on agriculture, there is clear evidence of widespread crop raiding. For example, a study conducted by Melle et al. (2018) in the Kumba Municipality found that farmers consider rodents to be the most destructive pests affecting their 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 crops from sowing, through flowering, to maturity and harvesting. These species that pose 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 deterrent measures, such as guarding their farms. It is therefore 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 intended to enhance understanding of coexistence between farmers and wildlife in order to promote wildlife conservation..

**Materials and methods**

* **Study area**

The Kimbi-Fungom National Park is located between latitudes 6.5 and 6.9° N and longitudes 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 subdivisions. These divisions are Menchum, Boyo and Dongo Mantung and are 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).



Map 1: 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 a 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 features aheterogeneous 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 the extensive flat valley at a lower altitude.

The Munkep-Gayama axis is a broad valley approximately 6 km wide in the Munkep area, expanding to over 10 km in the Gayama zone. It is surrounded by chains of steep rocky hills that are nearly impassable. The lowlands extend from Munkep, at a place called "Last Town," toward the eastern forest. This valley begins behind the eastern forests, extending more than 15 km wide and over 30 km long. This extensive eastward valley is enriched by alluvial silts from the southern escarpment chain of long hills stretching from west to east within the Fungom Reserve..

This relief has greatly influenced the vegetation types and distribution within the park. The Munkep Gayama axis lies in an extensive valley between chains of two hills. These valleys gradually protrude into long rolling, steep hills, which are characterized by woody vegetation. The hills are flanked by gallery forests, which form the source of 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 communities in and around the park were selected based on their location within and proximity to the park. The villages surveyed were Munkep, Gayama I, Gayama II, Munka, Esu. Tengheuka. Kimbi, Subum, Etchem and Mbwi-Mbwi. Eight of these communities are located inside the park, except for Esu which is one of the the main peripheral community of the entrance into Fungom Forested section the park and Subum which is located at the savanna section of the park.

These communities were those engaged in farming, most of which were subsistence farmers. The study adopted the random sampling technique with 10 per cent confidence interval at a 95 per cent confidence level. Crop raiding information was obtained from 150 respondents. This was collected using semi-structured questionnaires. In each community a total of 15 questionnaires were administered. These structured questionnaires were administered randomly to farmers without gender discrimination. All questionnaires administered were recovered because the researchers waited and retrieved the questionnaires from the respondents on completion. For each household, we interviewed the family head who has been in 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.

Data obtained from the transect walk, structured questionnaires and interviews 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 the crop was 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 coherence.

**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 highest proportion of respondents (36.7%) was 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 61 years (6.7%). The majority of female respondents were in the 31–40 age category (8%), while most male respondents were in the 41–50 age category (10%). All respondents above 61 years (6.7%) were males. As far as the education of respondents was 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 represented group were those who have attained tertiary education (10%). Regarding the number of years respondents have been involved in farming, the majority reported farming around the park for 13 to 16 years (30%). This was followed by those who have spent 5 to 8 years and 9 to 12 years farming (each accounting for 21.3%). The smallest group consisted of respondents who have farmed for only 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** |
| Gender | Male  Female  Total | 104  46  150 | 69.3%  30.7%  100% |
| Age Group | 21-30  31-40  41-50  51-60  61+  Total | 23  30  55  32  10  150 | 15.3%  20%  36.7%  21.3%  6.7%  100% |
| Level of education | No formal Education  Primary  Secondary  Tertiary  Total | 18  77  40  15  150 | 12%  51.3%  26.7%  10%  100% |
| Major occupation | Farming  Others  Total | 141  09  150 | 94%  6%  100% |
| Years of farming | 1-4  5-8  13-16  9-12  16+  Total | 18  32  45  32  23  150 | 12%  21.3  30%  21.3%  15.3%  100% |

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

The results 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 magnitudes. 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 |
| Sciuridae  \  Procaviidae |  | Red-legged squirrels |
| Sciuridae  Procaviidae | *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 cocoyams (Colocasia esculenta), sweet potatoes (Ipomoea Batatas), banana (Musa acuminata) and plantains (Musa paradisiaca). These crops were identified to be vulnerable to wildlife raids in and around peripheral communities. These crops have been raided in different magnitudes 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 raids than other crops (100%). This is the most cultivated crops in the agricultural landscape that forms their main stable food.

**At sowing, maize and groundnuts are most vulnerable to rodents, as confirmed by 100% of our respondents, followed by primates. Ungulates cause the least damage at this stage. During the germination to flowering phase, ungulates dominate the crop raids by feeding on leaves, followed by rodents particularly the cane rat, mouse and rat moles. Primates cause the least damage during this period. At maturity, primates become the primary crop raiders, followed by rodents, with ungulates causing the least damage.**

Table 3. Magnitude of crop raids 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 of the Stages of crop raid by wildlife and the aftermath**

Crop raiding in the study site was found to occur in stages. The magnitude of the crop stage raided determines the potential loss incurred. While some species were identified 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 raids at sowing, no matter the magnitude, do not lead to many losses because these crops are easily replaced during the growing period, except when affected by other factors like climate and soil. Crops are at risk 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 result to high losses, pose a threat to food security and lead to a 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 left with no choice but to buy food due to losses incurred from the raid.

**Frequency of Species on the farms**

This study revealed that rodents were the species that frequently visited the farms in the park. It was confirmed by 100% of respondents in and around the park that every week, rodents visit 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 porcupines. It is however noted that, cane rats and porcupines on maize and groundnut outweigh 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 | ++ | ++ | ++ |
| Ground giant squirrel | +++ | ++ | +++ |
| Red legged squirrels | ++ | ++ | +++ |
| 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 the magnitude of losses 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-nosed monkeys, mona monkeys frequently raid crops in the forest regions of the park, while vervet monkeys and patas monkeys 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 outweigh the combined raid of the putty nose monkey, Mona monkey, and Vervet monkey. This is confirmed by 100% of respondents. Crops vulnerable to baboon raids are maize of respondents followed by groundnut, as confirmed by 100% of respondents. The survival of baboons in all landscapes puts 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 methods to control wildlife from crop damage. Table 5 shows the different methods and their effectiveness against crop raiding in the park

Table 5: 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 lockstep with conservation efforts in the park. that conservation effort was still at the baby stage before the Anglophone crisis, efforts towards sensitization remain fragile. The perception of local people towards conservation in the face of crop raiding, which is their main way of life, is very frustrating. From the results obtained 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 as useful to them as 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 know conservation issues.

Table 6: 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 animals  are tourists and park management | 25 | 35 | 15 | 10 | 15 | 100% |

SA=Strongly agreed, A= Agreed, N Neutral, D= Disagreed, SD Strongly Disagreed

**Discussion**

**Socio-economic characteristics**

Results obtained revealed that, majority of respondents were male (69.3%), while females constituted the minority (31.7%). This study shows that farming activities are male-dominated. The majority of large maize farms are owned by males in the park, while women own large or many groundnut farms. In the general sense, male farmers dominate females in the park. This observation aligns with the findings of Adebowale et al. (2021), who reported similar results in agrarian communities around Old Oyo National Park, and Yaduma et al. (2024), who assessed wild animal crop raiding and its impact 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 an 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 hosts both subsistence and commercial farming. Crops such as maize, groundnuts, beans, soya-bean, cassava, sweet potatoes, cocoyams, plantain, banana are usually raided by wildlife at different stages of the life cycle: 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 the 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 a 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 the 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 damage at sowing, primates were noted to cause more damage at maturity, bringing more loss, food insecurity to the local population. The damage caused by a primate raid at maturity is outstanding because the losses incurred cannot be replaced. Primates, especially baboons, 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 frequent the farms, their one-time raid is sufficient to have a story. This stems from the fact that despite their aggressive method of feeding on farm products, they are also very numerous in the park than any other primate species. This study is similar to that of Hill (2000), who found baboons to raid crops 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 on 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 visited the farms in the park. It was confirmed by 100% of respondents in and around the park that in every week, rodents visit 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, and 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 monkeys and others are active during day time, resulting in a need to guard the crop throughout the day and night. Nocturnal animals cause 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 on farms and damage 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's 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 used in the park. These deterrent methods are currently implemented by agriculturalists who 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 the crop using a 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 was 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 raids. These nocturnal species were also victims of night hunting by skillful hunters/farmers to prevent them from continuous raid. Gunshots were also a very effective method to control crop-raiding animals. Retaliatory killing of conflict species was also reported despite their unwillingness to report the kill due to the fear of getting penalized by the forestry laws. Gunshots were heard all over the park before mid-2018 prior to the extension of the Anglophone crisis to the park region. From the latter 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 increases 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 know about conservation, have a different perception. From the results obtained 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 as useful to them as 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 thought 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. The destruction caused by wildlife most of the times place them at high risk of hunger, which further frustrate their income level. These results agree with Hill (2004) and Anthony (2007) that surrounding communities’ attitudes towards protected areas are often influenced by existing or perceived damage caused by wildlife. According to Hill and Wallace (2012), crop raiding harms 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 respondents 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 conflicts 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 the park authority should endeavour to compensate the victims of wildlife crop raiding. Farmers suggested that park authority should endeavor to compensate victims of wildlife crop raiding. This agrees to 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 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 the 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 fulfils 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 the 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 who 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 will be 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 also ensure sustainable agricultural growth for the local farmers in and around the park

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