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Causes and Effects of Human-Wildlife Conflict in Zambia: a Case of South Luangwa Game Management Area

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Abstract: *Conflicts between people and wildlife presently rank amongst the main threats to conservation in Africa. In Zambia for example, different forms of Human Wildlife Conflicts (HWC) exist in Game Management Areas (GMAs) where people co-exist with wildlife and practice semi-subsistence agriculture. The HWC experienced in the GMAs have negatively impacted both humans and wildlife. An understanding of the causes, effects, and mitigation measures of the HWC is critical in developing and establishing sustainable conservation measures in the GMAs. We investigated the causes, effects, and strategies applied to mitigate and manage HWC conflicts in South Luangwa National Park (SLNP). Data were gathered through interviews with key informants and surveys conducted among households sampled within and adjacent to SLNP. Descriptive statistics was used to analyze the data. The result showed that there were a number of factors that influence HWC, which include short distance between SLNP and communities, poverty, and overpopulation in the communities adjacent to the national park. The study further found that HWC in SLNP has more negative impact on human beings than wildlife. This is because wild animals were destroying more crops, livestock, killing people, and demolishing people's houses than human beings were killing the animals. On the current mitigation measures put in place to resolving HWC in SLNP, the results indicated that the measures were ineffective. We therefore strongly recommend effective mitigation measures to be put in place in order to resolve HWC in SLNP.*

Keywords: *Community-Wildlife Conflict, crop raiding, management, protected area, Zambia*

1. INTRODUCTION

Human-wildlife conflict (HWC) has existed for as long as humans and wild animals have shared the same landscapes and resources (Lamarque *et al.*, 2009; Hoffman, 2011and Amaja *et al.*, 2016). It occurs when the needs and behavior of wildlife impact negatively on humans or when humans negatively affect the needs of wildlife(Mekonen, 2020).There are different types of HWC globally and most of these conflicts are experienced more in developing countries (Amaja et al., 2016; Makindi *et al.*, 2014; Fairet *et al.*,2012; Lamarque *et al.*, 2009; IUCN, 2005).This is mainly due to increasing human and livestock populations as well as changing socio-economic and land use patterns taking place in developing countries (Amaja *et al.*, 2016). Studies such as those conducted by Madden, 2008 and Johansson, 2002) have identified HWC as one of the most important threats to the survival of many wildlife species.

Habitat fragmentation, settlements and fast growing human population in Africa and Zambia in are reducing wildlife habitats (Hill *et al*., 2002; Blair, 2008; Mwamidi et al., 2012; Amaja *et al*., 2016).The habitat fragmentation experienced in most developing countries is increasing the interactions between humans and animals (Milupi *et al* 2022, Madden, 2008; Blair, 2008; Lamarque *et al.*, 2009; Mwamidi *et al.*, 2012).Changes in the natural landscapes of the earth from primarily wild to anthropogenic has particularly created competition between humans and wildlife for space and resources which has reached unmatched levels (Hanks, 2006; Ellis *et al*., 2010; Kate, 2012). In Zambia for example, communities surrounding the South Luangwa National Park often face huge losses due to elephant conflicts caused by farming activities such as prevalent in the area. In 2017, Zambia recorded a total of 6,085 reports of HWC across the country (MTA, 2018). The major types of wildlife damage on the human being in Zambia comprise livestock predation by lions, crop raiding, property damage, crop damage and sometimes killing of humans (Chomba *et. al* 2012; Umar and

Kapambwe 2020).These types of conflicts negatively impacts on both human and wildlife. Linnell *et al.*, 2011 observed that the main aim of conducting research on HWC is to identify potential techniques to reduce or prevent conflicts for the better wellbeing of both people and wildlife. A criterion therefore for finding effective solutions is to appreciate the details, mechanisms, and nature of conflict (Linnell*et al.*, 2011). This particular study therefore aims at investigating the causes, effects and mitigation measures of HWC in SLNP.

2. MATERIALS AND METHODS

2.1. Description of the Study Area

The study was conducted in Kakumbi chiefdom located in Lupande Game management Area (GMA) in the Eastern part of Zambia. Lupande GMA was established in 1972. It comprises six chiefdoms, namely: Jumbe, Kakumbi, Malama, Mnkhanya, Msoro and Nsefu (Nshimbi & Vinya, 2014).

The GMA is adjacent to SLNP. The national park is located between 13°0′S 31°30′E and 13°0′S. SLNP is a world-renowned wildlife haven covering an area of 9059 km2. It has over 60 species of wild animals, over 400 bird species and diverse vegetation (Umar and Kapambwe 2020). The landscape is dominated by the Mopane tree (*Colophospermum mopane*) but also has large quantities of winter thorn (*Faidherbia albida*), lead wood (*Combretum imberbe*), ivory palms (*Hyphaene petersiana*), marula (*Sclerocarya birrea*), tamarind (*Tamarindus indica*), baobab (*Adansonia digitata*) and ebony (*Diospyros ebenum*) trees (Storrs 1995**).** The study area was chosen as the site for the study because of the ecological and economic importance of the national park and its proximity to South Luangwa national park.

The chiefdom has 2872 households and 14714 people (CSO, 2012). Administratively, Kakumbi chiefdom is managed by local government councillor and traditionally by Chief Kakumbi of the Kunda people. Economically, the majority of the people in Lupande GMA and Kakumbi chiefdom in particular are subsistence farmers who grow crops such as maize, cotton, millet, sorghum, beans, pumpkins, and sweet potatoes (Milupi *et al.*, 2020 a; Nyirenda, *et al.*, 2013). Other crops grown in the area include cassava, groundnuts. A small number of population in Kakumbi chiefdom are employed as tour guides, maids, gardeners and casual workers in the tourism industry in the National park. Very few people are entrepreneurs selling household groceries and food staffs in stores along the roads. Only a small fraction of the population in Kakumbi ward has white collar jobs.

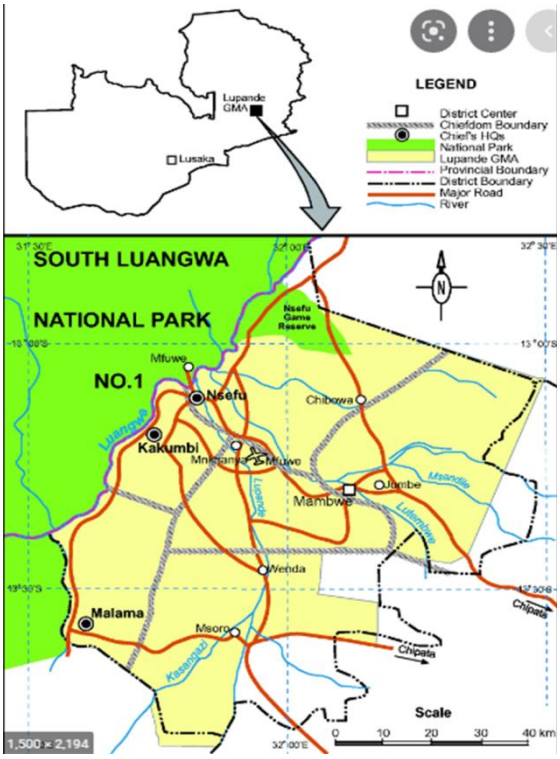

Figure1. *Location of Kakumbi Chiefdom in Lupande Game Management Area*

Source: *Field data, 2019*

2.2. Data Collection Methods

Our study was based on primary and secondary data collected from June to August 2019. The primary data were collected through two methods: a household survey and key informant interviews as briefly outlined below. Secondary data were obtained from published materials and policy documents, and we reviewed the included indicators used to evaluate utilisation soas to improve the sustainability of wildlife resources and food security in GMAs. Documents such as journal papers, the Zambia Wildlife Act (1998), Zambia National Wildlife policy (1998), Zambia Wildlife Act (2015) and government records like the national policy on the environment were examined before conducting interviews. These documents provided background information for the research and allowed for assessment of the suitability of the project before conducting interviews. The data from the documents reviewed, further provided an overview of policies and legislation for wildlife management in the country.

2.3. Household Surveys

Household surveys was carried out using researcher- administered questionnaires comprising both closed and open-ended questions that generated quantitative and qualitative data. The sampling unit for the chiefdom was the household, with the target respondent being the household head. Households were randomly selected. In total, 50 household heads from Kakumbi chiefdom were interviewed. Both men and women were interviewed during the survey. Of the respondents interviewed in Kakumbi chiefdom, 33 (66%) were male and 17 (34%) were females. The sample size for the study was justified for use because the subjects were homogenous hence the sample was representative as they all came from the same location. With respect to the key informants, three (3) ZAWA officials were ideal for this research because they had adequate information with regard to human-wildlife conflict.

The households were interviewed as regards the following aspects of HWC.

- Nature of Human – wildlife conflict
- Factors influencing HWC in the national park
- Effects of HWC to humans and animals in South Luangwa national park
- Current mitigation measures put in place to resolving human-wildlife conflict in the national park

2.4. Key-Informant Interviews

Interview guide was used to collect data from key informants who included three (3) Zambia Wildlife Authority (ZAWA) officials. This involved a one–to-one interview with the respondents. Interview guide enabled the respondent to give a wide range of information about the subject. ZAWA officials were specifically asked questions about the causes and effects of HWC in South Luangwa national park. They were also asked questions with regard to the mitigation measures put in place by ZAWA in place to resolving human-wildlife conflict in the national park. Quantitative data were coded and processed using Statistical Package for Social Sciences (SPSS) software to generate the frequencies of responses. Below, we report the results of the study, highlighting the causes and effects of HWC in South Luangwa national park.

2.5. Data Analysis

The data was analyzed by using simple descriptive (qualitative) method and quantitative (numerical) method. The study was interpreting the data based on the survey questionnaire, interview and filed observation. The data was analyzed by using simple descriptive statistics such as mean percentage and the data was presented on tables, charts, picture and percentage also further represented by using graphs and other diagram in order to analyses more information about our research study.

3. RESULTS

3.1. Type of Human Wildlife Conflict

The type of human wildlife conflict common in Kakumbi chiefdom include human injuries and loss of life, crop damage and destruction of property by wild animals. (Table 1).As a result, local communities disliked wildlife inhabiting in and around their surroundings. This has a great negative impact in conservation of the wildlife. Proximity of the national park was also another cause of HWC in Kakumbi chiefdom. For example the distance from south Luangwa national park to respondents' homes ranged between one (1) to five (5) kilometres. (Figure 2).

Table1. *Showing Types of Human Wildlife conflicts in Kakumbi Chiefdom*

Type of HWC	Frequency	Percent
HUMAN INJURIES AND LOSS OF LIFE	11	22.0
CROP DAMAGE	14	28.0
DESTRUCTION OF PROPERTY	24	48.0
NOT APPLICABLE	1	2.0
Total	50	100.0

Source: *Field Survey data, 2019*

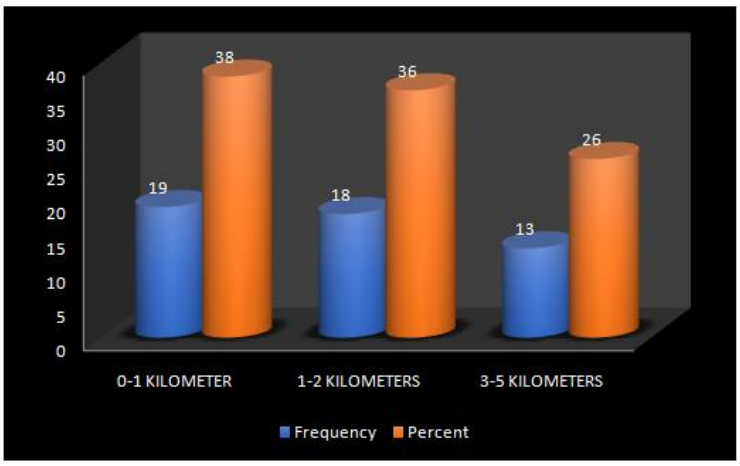

Figure2. *Distances from national park to respondents' homes.*

Source: *Field Survey data, 2019*

The study further showed that the wild animal species which are frequently in conflict with human beings were elephants (*Loxodanta africanas*), lions (*Panthera leo*), hippos (*Hippopotamus amphibious)*. Monkeys (*Cercopithecidae*) and crocodiles (*Crocodylidae)*. Table 2.

Table2. *Showing Wildlife species frequently in conflict with people*

Animal species	Frequency	Percent
ELEPHANT	41	82.0
LION	2	4.0
HIPPO	2	4.0
MONKEY	3	6.0
CROCODILE	1	2.0
NOT APPLICABLE	1	2.0
Total	50	100.0

Source: *Field Survey data, 2019*

When asked on whether they get compensation for their loss, most respondents (78%) said that they were not getting any compensation. Only (22%) said that they were compensated. (Figure 2).

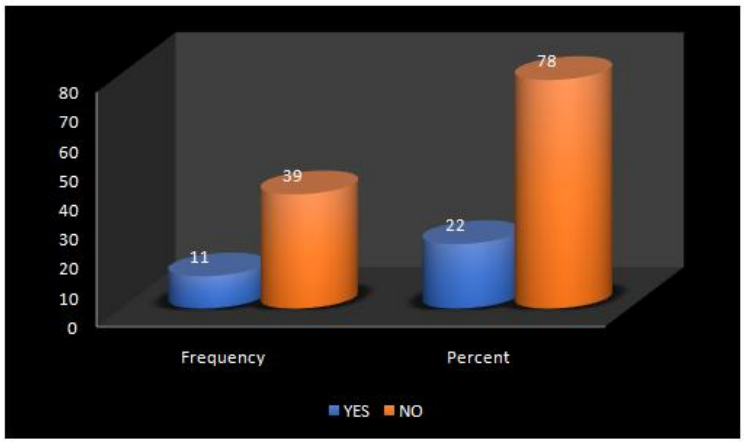

Figure2. *Responses whether People get compensation for their loss*

When asked whether wild animals were causing more harm to human beings than human beings were causing harm to wild animals, most respondents 74%) strongly agreed and only 2% disagreed. Table 3.

Table3. *Animals causing more harm to humans than humans have done to animals*

	Frequency	Percent
STRONGLY AGREE	37	74.0
AGREE	3	6.0
NEUTRAL	5	10.0
DISAGREE	1	2.0
STRONGLY DISAGREE	4	8.0
Total	50	100.0

Source: *Field Survey data, 2019*

Responses on whether wildlife species are depleting due to overpopulation and poverty in the area the respondents gave mixed responses shown in Table 4.

Table4. *Wildlife species depleting due to overpopulation and poverty in the area*

	Frequency	Percent
STRONGLY AGREE	18	36.0
AGREE	3	6.0
NEUTRAL	1	2.0
DISAGREE	10	20.0
STRONGLY DISAGREE	18	36.0
Total	50	100.0

Source: *Field Survey data, 2019*

3.2. Factors Influencing HWC in the National Park

Factors influencing HWC in Kakumbi chiefdom were the close proximity to South Luangwa national park. Other factors were over population (60%) and poverty (60%).

3.3. Effects of HWC to Humans and Animals in South Luangwa National Park

*The study indicated that c*rop-raiding undermines food security in the study area. The other effects of HWC in the study area showed by the study was loss of domestic animals that were killed by wild animals. Loss of human life was another effect of HWC in Kakumbi chiefdom

3.4. Current Mitigation Measures Put in Place to Resolving Human-wildlife Conflict in the National Park

Current mitigation measures practiced by the local people in Kakumbi chiefdom, included chasing the animals away (90%) and calling on the ZAWA officials (5%) whenever they come in contact with wild animals.

3.5. Suggestions on what should be done to Minimize HWC in the Study Area

When asked on what should be doneto minimize human-wildlife conflict in the study area, 48% of respondents said that the park must be fenced, 46% said that ZAWA must increase protection to both human and wildlife, 2% said that people must be relocated to other areas away from the game management area 4% of respondents said that ZAWA must conduct conservation awareness to the community members regularly. Table 5.

Table5. *Showing suggestion on what should be done to minimize Human Wildlife Conflicts*

Suggestion	Frequency	Percent
Fencing The Park	24	48.0
Zawa Must Increase Protection To Both Humans And Wildlife	23	46.0
Relocating The People	1	2.0
Conducting Conservation Awareness	2	4.0
Total	50	100.0

Source: *Field Survey data, 2019*

3.6. The Key Informants

Responses from key informants, confirmed the type of HWC common in the study area to be crop damage, *house demolishing and human injury and loss of life.* They further said that there is no compensation mechanism for HWC in the area. However the key informants revealed measures such as translocating problematic animals and controlled shooting of problematic animals as ways in which ZAWA deals with HWC in South Luangwa national park. On the causes of HWC in South Luangwa national park, the key informants identified poverty and increase in human population in the area. Challenges faced by ZAWA officials in the area included lack of motivation and shortage of man power in the area. The key informants suggested that government must employ more wildlife officers, start giving compensation to those who suffer losses.

3.7. Policy Provision/Position on Human Wildlife Conflicts

Information from policy documents that were examined, such as the National Wildlife policy (MTERN 2007) and ZAWA Act of 1998 and 2015 shows that there are no insights into compensation mechanisms with regard to HWC. The policy therefore does not make provisions for compensation mechanisms for the affected.

4. DISCUSSIONS

The main objective of this study was to assess the causes and effects of HWC in south Luangwa national park and the surrounding communities. The study revealed a number of factors that causes HWC and the negative effects to both human beings and wildlife. Factors causing HWC in the study area were poverty and overpopulation in the communities adjacent to the park. This is in line with Amaja *et al.*, 2016 who observed that HWC mostly experienced in developing countries is mainly due to increasing human and livestock populations. The study also indicated that human injury and loss of life, crop damage and property destruction were the major effects of HWC taking place in the area. The causes of HWC found in Kakumbi chiefdom agrees with Chomba *et.al.* 2012 who found that crop raiding, property damage, crop damage and sometimes killing of humans were the main causes of HWC. Another cause of HWC exhibited in the study area was the proximity to South Luangwa national park. The distances ranged from one to five kilometres. This also agreed with Amaja *et al.*, 2016 who identified proximity to natural resources as one of the causes of HWC. However, despite these conflicts and losses taking place in the area, the study found that there was no compensation to the affected people from the government. The findings were in line with ZAWA Act 1998 and 2015 which did not provide for compensation.

On the species commonly in conflict with human beings, the study showed that elephants (*Loxodanta africanas*), lions (*Panthera leo*), hippos (*Hippopotamus amphibious)*. Monkeys (*Cercopithecidae*) and crocodiles (*Crocodylidae)* were always in conflict with human beings. Chomba *et al*. 2012 also observed some of these species to be problematic with regard to HWC.

On the effects of HWC to humans and animals in South Luangwa national park, the study reviewed that *c*rop-raiding undermines food security in the study area. This was in line with Mekonen, 2020 who also found crop raiding to lead to food insecurity. However, the findings also showed that wildlife species are depleting due to overpopulation which also agrees with Mekonen 2020 who believed that increasing human population adjacent to wildlife habitats is one major cause of HWC.

The study further indicated that HWC in SLNP has more negative impact on human beings than wildlife. This is because wild animals were destroying more crops, livestock, killing people, and demolishing people's houses than human beings were killing the animals. On the current mitigation measures put in place to resolving HWC in SLNP, the results indicated that the measures were ineffective.

In order to minimize HWC in the study area, the study reviewed several mitigation measures which included relocation to some people to other places, conducting conservation awareness to community members, increase protection to both human beings and animals, and to repeal the Act to allow for compensation for the affected people in the area . Some of the suggested mitigation measures from the study agrees with other scholars such as Milupi *et al.*, 2020 b and Amaja *et al.*, 2016 who identified among others conservation awareness to promote conservation education and in turn minimize HWC. The study however reviewed some challenges faced which included among others shortage of manpower and low income.

5. CONCLUSION

The result of the present study has clearly shown that there was a strong conflict between human and wild life living in and around the study area. The cause of human wildlife conflict was over population, poverty and close proximity to the national park. The communities are very near to the national park which makes it easy for the wild animals to invade these communities. As a result, local communities disliked wildlife inhabiting in and around their surroundings. This has a great negative impact in conservation of the wildlife. The main effects for the presence of strong human wildlife conflict in the study area include crop damage, human injury and loss of life, and property destruction are the human-wildlife conflicts taking place in the study area. The study further found that HWC in SLNP has more negative impact on human beings than wildlife. This is because wild animals were destroying more crops, livestock, killing people, and demolishing people's houses than human beings were killing the animals. On the current mitigation measures put in place to resolving HWC in SLNP, the results indicated that the measures were ineffective. We therefore strongly recommend effective mitigation measures to be put in place in order to resolve HWC in SLNP.

Based on the obtained results of the present study, the following points are recommended in the study area:

- There is a need develop strategies of reducing HWC by local people, researchers, wildlife authorities and policy makers by finding mitigation measures for HWC. The strategies can include leaving sufficient conservation areas, better buffer areas for wildlife to move and sufficient connectivity of wildlife habitats so that they can freely move to get their living from the ecosystem.
- Government to start compensation scheme to those who suffer losses in the area. This could only be done if ZAWA Act is repealed to allow for compensation.
- Government to employ more wildlife officers and improve workers' salaries

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