

**FACTORS INFLUENCING HUMAN WILDLIFE CONFLICT IN  
COMMUNITIES AROUND THE PARK: A CASE OF LAKE NAKURU  
NATIONAL PARK.**

**BY**

**MAURINE MUSIMBI**

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## **DECLARATION**

This research project report is my original work and has not been presented for an award in any other university or college or learning institution for examination or academic purposes.

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**Maurine Musimbi**

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**Date**

**Reg. NO.L50/74962/2012**

This research project report has been submitted for examination with my approval as university supervisor:

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**Mr. Joseph Chege Mungai**

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**Date**

**Lecturer, Department of Extra-Mural Studies**

**University of Nairobi**

## **DEDICATION**

I dedicate this work to my husband Joel and son Wayne, thank you for all your support and patience.

## **ACKNOWLEDGEMENT**

I would like to give a very special thank to my supervisor Mr. Joseph Chege Mungai for the helpful advice and encouragement throughout the course of this study. Thank you for being such wonderful and inspiring teacher and role model, this research project would have not reached where it has and I therefore sincerely thank him.

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## TABLE OF CONTENTS

	<b>PAGE</b>
<b>DECLARATION.....</b>	<b>ii</b>
<b>DEDICATION.....</b>	<b>iii</b>
<b>ACKNOWLEDGEMENT.....</b>	<b>iv</b>
<b>TABLE OF CONTENTS .....</b>	<b>v</b>
<b>LIST OF TABLES .....</b>	<b>ix</b>
<b>LIST OF FIGURES .....</b>	<b>x</b>
<b>ABBREVIATION AND ACRONYMS .....</b>	<b>xi</b>
<b>ABSTRACT.....</b>	<b>xii</b>
<b>CHAPTER ONE .....</b>	<b>1</b>
<b>INTRODUCTION.....</b>	<b>1</b>
1.1 Background to the study .....	1
1.2 Statement of the problem .....	4
1.3 purpose of the study.....	5
1.4 Objectives of the study.....	5
1.5 Research questions.....	6
1.6 Significance of the Study .....	6
1.7 Limitations of the Study.....	7
1.8 Delimitation of the study.....	7
1.9 Assumptions of the Study .....	7

1.10 Definitions of Significant Terms .....	9
1.11 Organization of the study.....	9
<b>CHAPTER TWO .....</b>	<b>10</b>
<b>LITERATURE REVIEW .....</b>	<b>10</b>
2.0 Introduction.....	10
2.1 Competition for resources between people and wildlife.....	10
2.2 Encroachment to protected areas and HWC.....	11
2.3 Management of Human Animal Conflict.....	13
2.4 Human population growth and HWC .....	17
2.5 Climatic factors and HWC.....	18
2.6 Compensation due to wildlife damages .....	19
2.7 Increasing wildlife population as a result of conservation programmes.....	20
2.8 Habitat factors resulting to HWC .....	22
2.9 Gender and human-wildlife conflict .....	23
2.10 Typology of Human Wildlife Conflict .....	24
<b>CHAPTER THREE .....</b>	<b>29</b>
<b>RESEARCH METHODOLOGY .....</b>	<b>29</b>
3.1 Introduction.....	29
3.2 Research design.....	29
3.3 Population of the study.....	29
3.4 Sample size and Sampling procedures.....	30

3.5 Data collection procedures.....	31
3.6 Data collection instruments.....	32
3.7 Validity .....	32
3.8 Reliability.....	33
3.9 Data analysis.....	33
3.10 Ethical considerations.....	33
<b>CHAPTER FOUR.....</b>	<b>37</b>
<b>DATA, PRESENTATION, ANALYSIS AND INTERPRETATION</b>	
4.0 Introduction.....	38
4.1 Questionnaire return rate.....	38
4.2 Presentation of findings.....	39
4.2.1 Demographics characteristics of the respondents.....	39
4.2.2 Competition over resources as a factor influencing HWC .....	41
4.2.3 Human encroachment on wildlife corridor/ PA as factor influencing HWC.....	43
4.2.4 KWS strategies in mitigating HWC.....	44
4.2.5 Human population increase around PA as a factor influencing HWC.....	46
4.2.6 Indicators of Human Wildlife Conflict.....	48

<b>CHAPTER FIVE.....</b>	<b>49</b>
<b>SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS</b>	
5.0 Introduction.....	49
5.1 Summary of findings.....	50
5.1.1 Response rate and demographics.....	50
5.1.2 The level of competition for resources as a source of HWC.....	50
5.1.3 Human encroachment into wildlife territories as a source of HWC.....	52
5.1.4 The response strategiesby Kenya Wildlife as a way of mitigating of HWC.....	52
5.1.5 Human population increase as a source of HWC.....	53
5.1.6 Indicators of HWC.....	54
5.7 Conclusion of the study.....	55
5.8 Recommendations.....	56
5.9 Suggestions for further research.....	57
5.10 Contribution to the body of knowledge.....	58
<b>REFERENCES.....</b>	<b>59</b>
<b>APPENDICIES.....</b>	<b>66</b>
APPENDIX 1: Letter of Transmittal To KWS.....	66
APPENDIX 2: Letter of Transmittal to The Respondents.....	67
APPENDIX 3: Community respondentsQuestionnaire.....	68

## LIST OF TABLES

Table 3.1 sample Table.....	31
Table3.2 Operationalization of variables.....	35
Table 4.1 Return rate.....	38
Table 4.2 gender of the respondents.....	39
Table 4.3 Age of the respondents.....	40
Table 4.4 Occupation of the respondents.....	40
Table 4.5 Wild Animals visitation to people’s residents.....	41
Table 4.6 Level of agreement on competition over resources.....	41
Table 4.7 Rating of resources that human and wildlife are competing over.....	42
Table 4.8 Level of agreement on human encroachment to PA.....	43
Table 4.9 Rating of Human encroachment Indicators.....	43
Table 4.10 Level of agreement on the existence of KWS strategies in mitigating HWC.....	44
Table 4.11 Rating of KWS mitigating strategies.....	45
Table 4.12 Level of agreement on human population increase as a factor influencing HWC.....	46
Table 4.13 Rating of human population Factors.....	47
Table 4.14 Rating of Human Wildlife Conflict.....	48
Table 5.1 Contribution to the body of knowledge.....	57

**LIST OF FIGURES**

Figure 1: Conceptual framework ... .....27

## **ABBREVIATION AND ACRONYMS**

**HWC** – Human Wildlife Conflict

**IUCN**- International Union for Conservation of Nature

**KWS** – Kenya Wildlife Service

**LNNP** – Lake Nakuru National Park

**PA** – Protected Area

**WWF** – World Wildlife Fund

**AWF**- African Wildlife Fund

**HCV**- High Conservation Value

## ABSTRACT

Human-wildlife conflict, is a growing problem in today's crowded world, and can have significant impacts on both human and wildlife populations. Human-wildlife conflict occurs when there is close interaction between wild animals and human beings, resulting to injuries, death, predation, transmission of diseases and even human threats. Human beings in turn tend to retaliate back and even killing or injuring the same animals due to lack of compensation and proper framework to mitigate the conflict. This so-called 'human-wildlife conflict' (HWC) needs to be addressed to ensure that local people do not unfairly bear the negative side-effects of conservation, becoming more opposed to it and further jeopardizing the survival of high conservation value (HCV) species. The purpose of the study was to assess the factors influencing human wildlife conflict in communities living around Lake Nakuru National Park. In order to accomplish this study, the study objectives were: To examine competition over resources as a factor influencing human wildlife conflict, To establish human encroachment to protected areas as a factor influencing human-wildlife conflict, To assess the response strategies by Kenya wildlife Service in mitigating human wildlife conflict and To determine the relationship between human population increase and human wildlife conflict. The study provided the results in terms of qualitative and descriptive research design. The research questions were based on the four objectives stated above. Literature review in this study was drawn from several related studies and it particularly touches on the objectives of the study it ends with the conceptual framework describing how independent variable influence the dependent variables (Human-wildlife conflict), moderating variable being government policies for instance compensation policies though this policies try to intervene by trying to solve the problem they need to be reviewed so as not to bring more problems as it is now in Kenya where; crop destruction, predation on domesticated animals by wildlife and property damaged are not compensated thus causing more conflict. The target population of the study was 925(nine hundred and twenty five) households from urban villages closer to the park who are mostly affected by the human animal conflict. The study used a manageable sample size of 270 respondents out of which 254 out of the total 270 questionnaires were filled and returned. Data was collected by use of questionnaires and was analyzed with the aid of Statistical Package for Social Scientist (SPSS) descriptive statistics (Frequencies, percentages) were computed. The findings were presented in form of tables. The study successfully addressed the set research objectives. The findings revealed that human population contributes a lot in competition of resources between human beings and wildlife and that migration of people for security reasons has also led to the increase in the said conflict, the study also shows that people are satisfied with the strategies put in place by KWS thus the Kenya wildlife service has done enough to counter the cases of human- wildlife conflict reported by people but with the manifestation of human wildlife conflict still existing then reviewing of Kenya wildlife strategies to mitigate HWC is recommended. This study finding may provide essential information to KWS in understanding the contributing factors to wildlife-human conflict and also the government and concerned stakeholders as a process of environmental conservation, Tourism and food security as engraved in vision 2030.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background to the study

Human-wildlife conflict has been in existence for as long as humans have existed and wild animals and people have shared the same landscapes and resources. The fossil record shows that the first hominids fell prey to the animals with which they shared their habitats and shelters. For instance, forensic evidence has recently shown that the “Taung skull”, perhaps the most famous hominid fossil which was discovered in South Africa in 1924, came from a child killed by an eagle two million years ago (Berger and Clarke, 1995; Berger, 2006).

HWC does not only occur in Africa. Today, there is no corner of this earth where HWC does not exist in one form or another. In America Bears raid dustbins in the national parks and even at the edge of towns in the northern USA, waking up residents and creating disorder in the streets. In the USA too, deer collisions with automobiles injure an average of 29,000 people annually and cause more than US\$ 1 billion in damages (USDA, 2004). In Alberta, Canada, over a period of 14 years (1982-1996) wolves caused 2,806 deaths among domestic animals, mainly cattle and to a lesser extent dogs, horses, sheep, chickens, bison, goats, geese and turkeys. In Idaho, Montana and Wyoming (USA), during a similar time period (1987-2001) wolves killed 728 animals, mainly sheep and cattle (Musiani *et al.*, 2003).

In Australia direct use of forage by wild rabbits results in fewer livestock, lower wool clip per sheep, lower lambing percentages, lower weight gain, lower wool quality and earlier stock deaths during droughts. At the end of the 1980s, the cost of lost production was estimated to be US\$ 20 million per year for the pastoral districts of South-Australia alone and \$115 million annually for the wool industry over the whole Australia (Williams *et al.*, 1995).

Australian farmers have always regarded kangaroos as a pest, damaging crops and competing with sheep. Every year the federal Government authorises a certain number of kangaroos to be eliminated and, without taking into account the animals killed by farmers

and poachers, a possible total of 9 million individuals would be harvested per year (Therin, 2001).

Human deaths and injuries, although less common than crop damage, are the most severe manifestations of HWC and are universally regarded as intolerable. An assessment of the scale of human deaths caused by wildlife species in Africa at the end of the seventies, concluded that hippopotamus was responsible for more deaths than any other large animal in Africa (Clark, 1977). But, today, this “crown” seems to belong to crocodile.

Kenya is endowed with an enormous diversity of ecosystems and wildlife species. In particular, it is renowned for its diverse assemblage of large mammals like elephant (*Loxodonta africana*), black rhino (*Diceros bicornis*), leopard (*Panthera pardus*), buffalo (*Syncerus cafer*) and lion (*Panthera leo*) numerous species of ungulates. This rich wildlife together with other attractions has for decades made the country an important tourist destination and hub for the lucrative tourist industry. The rich biodiversity is partly attributed to diversity in landscape, ecosystems, habitats and convergence of at least seven bio-geographic units (IUCN, 1990; Young, 1996; Medley & Hughes, 1996). Overall, the interactions between relief, geology, climate and soils have a profound influence on the types of habitats, ecosystems and biota life forms within the country (IUCN 1990; Young 1996; Medley & Hughes, 1996). Thus, most landscapes are characterized by peculiar climatic factors, wildlife life forms and vegetation associations which give rise to distinguishable geographical regions in the country (Grove, 1978; Leifer, 1977; Ojany & Ogendo 1973). Wildlife-human conflicts (WHC) are a serious obstacle to wildlife conservation and the livelihoods of people worldwide and are becoming more prevalent as human population increases, development expands, and global climate changes and other human and environmental factors put people and wildlife in greater direct competition for a shrinking resource base. In addition, as some wildlife conservation activities succeed, wildlife expands into human-dominated areas. National Park, Mt. Kenya National Park, Mt. Elgon, the Mau Escarpment among others have in the past few decades seen substantial human influx for subsistence farming opportunities, collection of both animal and plant resources. The Forest Department and more recently Kenya Wildlife Service have been faced with a new challenge of

regulating and containing this encroachment as a means of minimizing habitat degradation, loss and subsequent biodiversity destruction.

Human wildlife conflict (HWC) is a significant and critical threat to conservation across the world (Nyhus et al. 2005). According to the World Conservation Union, it occurs when human populations overlap with wildlife requirements resulting in costs to both native residents and animals (Distefano 2004). Changes in agricultural techniques (such as reduction of crop rotation, intensification of cropping, and rise in monoculture) and an expansion of global trade in food and plant products have dramatically increased the impact of pests (Yudelman et al. 1998). Various studies indicate that worldwide crop loss from pests ranges from 35% to 42% (Food and Agricultural Organization of the United Nations (FAO) 1975, Pimentel 1992, Oerke et al. 1996, Yudelman et al. 1998). The term 'pest' can encompass insects, which are responsible for the greatest proportion of damage at approximately 15% (Yudelman et al. 1998), as well as any domesticated, native, introduced or wild species. Case studies across several continents suggest that HWC is greater in tropical areas and developing nations in which livestock and agricultural land are an integral part of people's lives and income (Distefano 2004). Thus, the relative impact of HWC on an individual's economic livelihood is directly correlated to the amount of land owned and the dependence on rural activities (Messmer 2000).

Kenya wildlife service is a state corporation established by the wildlife (conservation and management) Act CAP 376 laws of Kenya with the broad mandate to conserve and manage wildlife in Kenya, and to enforce related laws and regulations (Kenya Wildlife Service 2013). KWS manages about 8% of the total land mass of the country. This land contains 22 National parks, 28 national Reserves and 5 National sanctuaries. Also under KWS management are 4 marine National parks and 6 Marine National Reserves at the coast (Kenya wildlife Service 2008).

Among the 22 National parks Kenya is Lake Nakuru National Park where this study will focus on. It covers an area of 188 square kilometers and centrally located within the main tourist circuits – Mara and Samburu Circuits at the heart of Nakuru town in Rift valley, its proximity to Nairobi is 160 km only thus the main entry point for the international visitor. Being a National Park means it's a protected area and therefore prohibited for

human activities hence wildlife protected area. LNNP was gazetted in 1968; it has 550 plant species and varied woodlands, Euphorbia and Olea forest, the fauna include Thompsons and Grant's gazelle, Columbus monkey, rock hyrax, hippopotamus, leopard, Lion, Rhino, waterbuck, Impala, striped hyena, Wild cat, reedbuck, baboon, buffalo, endangered Rhodes child giraffe among other species.

## **1.2 Statement of the problem**

In a scenario where wildlife-induced damages to human property and life are neither controlled nor compensated, negative local attitudes towards conservation and wildlife resources become entrenched (Okello and Wishitemi 2006:90). This is made worse when local communities do not benefit from wildlife resources and are alienated from wildlife-related economic enterprises such as the lucrative tourism industry, when local communities feel that both governments and conservation stakeholder's value wildlife more than their lives, livelihoods or their aspirations retaliation and opposition to conservation initiatives can be swift and uncompromising. According to KWS Annual Report (2011), animal translocation strategy has been used to reduce human-wildlife conflict. The factors driving HWC at the local level are, however, shaped in turn by numerous other factors, including laws and policies. In many cases, legal and policy measures—particularly those involving land use planning and wildlife management—contribute to this growing problem. Yet law and policy can play an important role in supporting the mitigation and prevention of HWC.

Various studies on HWC have been done. According (Sindiga 1995) and (Mwale 2000) shows that human encroachment on critical biodiversity depository sites in search of agricultural land has since the 1970's and 1980's shifted to low potential rangelands which coincidentally are the prime wildlife ecosystems thus creating a myriad of problems like competition for water resources, human wildlife conflicts, habitat fragmentation and blocking of wildlife migratory routes and dispersal areas and negative perception towards conservation. Conflict is linked to factors such as poor land-use planning and flawed development policies (Madden, 2006).

Areas surrounding Lake Nakuru National Park have been experiencing human wildlife conflict year after year to show this; 269 cases of human wildlife conflict was reported in

the year 2012 the cases reported to Kenya wildlife service community department, Nakuru, were as follows; 7 (seven injuries) caused by Monkey, hippopotamus, baboon, Buffaloes and Snake bites, 27 cases of livestock predation of which 80 (eighty) livestock were predated upon, 110 cases of crop destruction by buffaloes, Zebras, hiland and water buck, 95 cases of threats/property damage by buffaloes, leopards, Lion and snake (specifically python) and Wildlife mortality of 30 (thirty) this mortalities were caused by communities retaliating back by killing wildlife whenever they get to their farms, (KWS Nakuru 2012).

With the above stated problem in communities surrounding the Park and the efforts put by KWS in combating the issue with no full success of eradicating the problem this study therefore focused on the factors that influence human-wildlife conflict in communities living around Lake Nakuru National park.

### **1.3 Purpose of the study**

The purpose of this study was to assess the factors that influence human- wildlife conflict in communities around Lake Nakuru National Park.

### **1.4 Objectives of the study**

The study was guided by the following objectives;

1. To examine how competition over resources influences human-wildlife conflict in communities living around LNNP
2. To establish the extent to which human encroachment to wildlife corridors and protected influences human-wildlife conflict in communities living around LNNP
3. To assess how response mitigation strategies used by Kenya Wildlife Service influences human-wildlife conflict in communities living around LNNP
4. To determine the influence between human population increase and human wildlife conflict in communities living around LNNP

### **1.5 Research questions**

1. To what extent does human and wildlife compete over resources and influence human-wildlife conflict around communities living around LNNP?
2. To what extent does human encroachment to wildlife corridors and protected areas influence human-wildlife conflict in communities living around LNNP?
3. How does the response strategies used by KWS influence human-wildlife conflict in communities living around LNNP?
4. To what extent does human population increase influence human-wildlife conflict in communities living around LNNP?

### **1.6 Significance of the Study**

This study is important to various stakeholders. It is specifically important to the following stakeholders for the reasons stated below:

The study findings will help Kenya wildlife service as a whole and Lake Nakuru National Park managers on the understanding of the contributing factors to human wildlife conflict, forms of HWC in order of priority and hence develop good ways of mitigating the human wildlife conflict.

The government is expected to use the findings of the study through Kenya wildlife service to review the policies governing land issues and natural resource specifically on wildlife issues.

This study will be a source of reference material for future researchers on other related topics; it will help other academicians who undertake the same topic in their study and shall recommend areas for further studies.

It is also expected that the communities living around the protected areas will use the findings to keep them informed on the conflict between them and wildlife thus finding ways of co-existing with wildlife hence reducing or eliminating the conflict.

### **1.7 Limitations of the Study**

The greatest challenge that this study encountered was the fact that the houses around were too clustered and movement was limited during data collection. To ease the problem of coverage of the area, sampling method was used to select a representative sample of the target population and research assistants conversant with the geographical dynamics of the areas recruited from the local community to assist in data collection. Due to constrain in the time schedule for the study and the cost, the study was limited to the stated five urban villages

Finally some respondents from the target communities were of low literacy levels hence seemed to deviate from the constructs of the study during interviews. To minimize on the effects of such deviation, the research team judiciously avoided irrelevant information while upholding respect for the concerned respondents, exercising due patience to ensure that relevant data was collected.

### **1.8 Delimitation of the Study**

This study was specific to the extent that it investigated factors that influence human wildlife conflict in communities around LNNP. Therefore, the study focused mainly on influence of competition over natural resources, human encroachment to P.A, strategies used by the KWS and human population increase as factor on human wildlife conflict in communities around LNNP. The study covered 5 urban villages (Kivumbini, Lakeview, Mwariki, Lanet and free area/58) that are bordering LNNP.

### **1.9 Basic Assumptions of the Study**

The study assumed that all target respondents' (community) would generally cooperate and provide all the relevant information that would be used in arriving at valid conclusions and recommendations of the study.

### **1.10 Definitions of Significant Terms used in the study**

**Competition over resources-** In this context is a situation where wildlife and people compete or struggle for a particular resources for instance Land, water, pasture due to its scarcity.

**Encroachment to protected areas-** It is an act of intruding or trespassing into the protected areas designated for conservation and no human activity is permitted

**Human Wildlife Conflict** – conflict that occurs between human beings and wildlife for instance wildlife killing or injuring people and vice versa becomes a conflict.

**National Park-** National parks are essentially state lands which are managed exclusively for the conservation of fauna and flora (plants and animals).

**Protected area** - A region in which human activity has been placed under some restrictions in the interest of conserving the natural environment, its surrounding waters and the occupant ecosystem, and any cultural or historical resources that may require preservation or management.

### **1.11 Organization of the study**

This study contains five chapters and an appendices section. Chapter 1 which is the introduction; contains background of the study, statement of the problem, research objectives and questions, significance of the study, basic assumption delimitation and limitation of the study.

Chapter two contains literature review section. This is a comprehensive review of past studies and background related to human wildlife conflict as per the objective of the study. The chapter also has conceptual framework and concluded with summary of literature review. Chapter three gives a description of the methodology used for the study, the research design and sampling technique used are explained. The methods of data collection, analysis and presentation are discussed. This section is concluded with the operational definition of variables which attempts to associate the objectives with the methodology and provides a map to the expected results. Chapter four contains presentations of the findings arising from data analysis using the techniques described in chapter three.

Finally chapter five contains the summary of findings, discussion of the findings, the conclusion, research recommendations, and a section for suggested areas for further studies and the contribution of this study to the body of knowledge.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

This chapter discussed the literature reviewed in relation to research problem, in this chapter the researcher reviewed literature related to; competition over resources, management of human wildlife conflict, climatic conditions, human encroachment to protected areas, increase in human population, wildlife benefit to communities and human wildlife conflict indicators.

#### **2.1 Competition for resources between people and wildlife**

The continuous decline and fragmenting of ecosystems through increased pressure by human expansion (Bissonette and Adair, 2008) often results in conservation ecosystems that are small, isolated and fenced. This restricts wildlife populations and can result in local overpopulation of a particular species, amongst other problems (van Aarde and Jackson, 2007). The continuous loss of habitat emphasizes the importance of ecosystem conservation and the understanding of how wildlife uses ecosystems (Douglas-Hamilton et al., 2005). Many studies have shown that animals adapt their ranging and foraging behaviour, or their daily movement rhythms, to avoid human-induced disturbance and unexplored or unknown areas (Burke et al., 2008). Once a conservation area is expanded, the response of wildlife can give wildlife managers and conservation planners' good insight into these animals' welfare and their perception of both the existing and new area.

Crop raiding is on the increase and people are competing with wildlife for resources. The development of small scale farming in areas that have historically been known to be prime wildlife habitats, or migration corridors, in Kenya for instance, the remarkable transition from semi nomadism to semi agricultural and settlement. Most natural wildlife buffer zones have led to competition for food, water, habitats, and space for both humans and wildlife hence resulting in a conflict for survival (Kagiri, 2000).

Changing patterns of agricultural land use in parts of Africa have led to increased conflict between farmers and conservationists over crop raiding elephants (Thirgood et al., 2005). Understanding such conflicts requires an appreciation of the economic costs (e.g. crop losses to farmers) and benefits (e.g. non-market benefits of elephant conservation to people living outside elephant habitat) of land management, both in terms of the magnitude of these benefits and costs, and their distribution across stakeholders.

## **2.2 Encroachment to protected areas and human-wildlife conflicts**

Through high population pressures, the rise in demand for land for cultivation means that in many areas much of the suitable arable land is already cultivated. More marginal land is therefore tilled and farming goes right up to boundary of wilderness and protected areas. Pest species are likely to flourish along the edges of natural habitat and agricultural lands, where they can eat both the food available in undisturbed habitats and the crops growing in the adjoining farmland (Sillero -Zubiri, and Switzer, 2001).

Elevated predation pressure in farms with dense cover probably stems from reduced visibility of approaching predators, increasing hunting success. Furthermore, the woodland and scrub habitats included in the 'dense cover' category are often associated with natural succession in farms that have converted from intensive grazing to game farming (Hejmanova et al., 2010). Natural succession is likely to result in generally increased biodiversity and improved ecological function (e.g. reduced soil erosion and improved nutrient cycling). Game farms may therefore support greater carnivore densities, and provide refuge from human disturbance and persecution, leading to co-incidentally high predation levels.

In Kenya, the fencing of farms to keep wild animals away has created physical barriers for migratory species. Conflicts can arise when migratory species such as zebras and wildebeest, which had previously migrated without any hindrance, destroy fences and crops in a bid to reclaim their traditional routes from dispersal areas to the parks. The subdivision of state and trust ranches, sold as smallholdings and cultivated with commercial horticultural crops, also creates a source of conflict.

Land-use fragmentation resulting from the development of small-scale farming has intensified the human-wildlife conflict in many areas where wildlife is abundant, such as Samburu, Trans-Mara, Taita and Kwale in Kenya (Kenya Wildlife Service, 1996).

The San people of the communal Na Jaqna conservancy are critical of the small-scale farming project currently implemented in Namibia for the same reason (Damm, 2008). The eradication of the tsetse fly (*Glossina* sp.) and the development of anti-Trypanosomiasis treatments have opened up abundant new grazing territories for cattle herders in areas that were once inhabited uniquely by wildlife. The concomitant eradication of *Simulium* sp., vector of *Onchocerca volvulus*, responsible for onchocerciasis (river-blindness), has allowed farmers to settle in new areas. With the geographical extension of human activities, especially husbandry, it is increasingly common for livestock and wild ungulates to share the same grazing fields. This is an obvious risk for the transmission of pathogens. The single most important factor contributing to the outbreak of diseases associated with wildlife is probably the direct or indirect (vector) contact of infected wild hosts or populations with susceptible domestic animals at the interface of their ranges, i.e. where mixing has occurred on common rangeland, or where other resources such as water are shared (Bengis, Kock and Fischer, 2002). Baboons have been eradicated from some areas of South Africa and Zimbabwe, particularly where they interfered with commercial agriculture, to the extent that the current distribution range of baboons is largely restricted to areas that are not used for commercial cropping and horticulture. Baboons are now concentrated instead in areas where subsistence agriculture is practised, where they can raid crops grown by subsistence farmers. Subsistence and commercial fishing are common in most African waters. Fishing was formerly concentrated in places where the rewards in terms of fish catch were highest and where crocodiles – being naturally wary of the presence of humans – were scarce. As a result crocodiles tended to inhabit areas that were less heavily fished, where they were less likely to be disturbed. But the growing demand for fish has meant that these areas have also become subjected to fishing pressure. The chances of contact and conflict between humans and crocodiles have increased as a result. The surge in dam construction from the 1940s to the 1980s undoubtedly benefited wild crocodile populations inhabiting the rivers prior to closure.

Although it may be advisable to remove cover in close proximity to livestock enclosures, reducing cover throughout game farms would counteract the benefits of natural succession. Options for reducing predation costs in game farms are therefore likely to rely on measures that prevent carnivores from entering, effectively control problem carnivore abundance (Woodroffe and Frank, 2005), or increase the relative abundance of the least expensive small–medium sized prey species. The latter may be especially important in tribal areas of the province, where aerial surveys suggest that free-ranging ungulate densities are particularly low (personal communication, North West Department of Agriculture, Conservation and Environment, 2009). This approach should be generally acceptable as it appears land owners are already implementing anti-predation measures in ascending order of severity as predation pressure increases (neither lethal nor non-lethal methods, either non-lethal or lethal methods, and finally, both lethal and non-lethal methods). In view of this, the fact that 67% of interviewees practice lethal control indicates that predation pressure is widely perceived to be high.

### **2.3 Management of human-animal conflict**

Literature is full of studies on the management strategies developed to handle human wild life conflict. This section presents some of the empirical findings on how different conservationist deals with this case in different parts of the world.

McGregor (2005) highlighted the need for greater attention to the pestilence discourses that can flourish among marginalized local communities sharing space with dangerous animals, and to the cultural, economic and political contexts, and global connections that produce them. Such discourses may involve a much greater sense of reciprocity with the animal world than is common in the West, in which the actions of culturally embellished animals are fearfully entangled in understandings of social relations. These pestilence discourses may condemn destructive or predatory animal behavior in anthropomorphic terms as criminal or immoral.

Increased diversity of stakeholders has created new management dilemmas regarding the use of traditional approaches to managing wildlife. In some cases, population management techniques such as hunting, fishing, and trapping, which were once mainstreaming, are becoming increasingly unacceptable. Increased concerns for privacy, property damage, and safety may result in larger areas being closed to the use of traditional population management options, thus further exacerbating the conflicts (Messmer et al., 1997).

Decisions regarding the management of wildlife problem by their very nature tend to be controversial. As stakeholders' values, attitudes, and beliefs change the conflicts regarding these decisions will exacerbate. However, if human wildlife conflicts are viewed as a reaction of societal diversity, they may actually become important positive forces of change if handled constructively (Schafer and Tait, 1981). When conflicts are handled improperly, they can be sources of continued public frustration, further reducing the credibility of the agency administering the program and detracting from long-term objectives (Hewitt and Messmer, 1997). More resource agencies are finding that conflict management approaches can be used effectively to manage stakeholder disagreements (Bingham, 1997). These approaches are voluntary processes in which stakeholders seek to achieve a mutually beneficial resolution of their differences. Most of these processes are led by a mediator who serves as a neutral third party in a negotiation process who helps the group to establish a framework within which the negotiations can be conducted.

Elements of a successful conflict management process include: (1) identification of clearly defined objectives; (2) establishment of clearly definition will be made, prior to dealing with the issues; (4) inclusion of team building activities; (5) maintenance of continuity by not allowing substitutes; (6) implementation of guidelines and activities that promote active listening; and (7) achievement of success with smaller issues prior to addressing larger concerns (Guynn, 1997).

Contemporary knowledge about the magnitude of damage or problems caused by wildlife is inadequate to develop accurate conclusions about the extent of social and economic losses caused by wildlife. Specific deficiencies in our knowledge include little or no data on: (1) actual versus perceived economic losses for agricultural producers; (2) forestry losses; (3) the incidence of human diseases for which wildlife may play a role in transmission; (4) the magnitude and socio-economic consequences of deer vehicle collisions; (5) the prevalence and consequences of bird aircraft strikes; (6) damage to rural and urban households; (7) social and economic damage associated with wildlife protection measures that restrict personal property rights; (8) social and economic costs associated with the elimination or restrictions placed on traditional wildlife management strategies of hunting or trapping or the loss of a registered control technique (i.e., toxicants and repellents); (9) increased wildlife damage associated with limitations or restrictions placed on the use of traditional harvest management strategies to control overabundant and nuisance wildlife populations; (10) the impacts of overabundant wildlife populations on other natural resources and the environment; and (11) the social and economic costs associated with lost opportunities for stakeholders to enjoy extirpated native flora and fauna. This information are necessary for the resource management and conservation agencies and organizations in developing proactive programs to address human wildlife conflicts. Given this information, federal, state, and local governments would be able to develop a system to efficiently allocate resources to address human wildlife conflicts (Conover and Decker, 1991; Conover et al., 1995).

To succeed in this environment, wildlife managers may need to shift their focus from trying to maximize wildlife population to the more difficult one of trying to optimize wildlife values for society. A major difficulty in trying to achieve this optimization is that the benefits and liabilities have not been evenly distributed between different segments of society. Unfortunately, most of this burden has fallen on private landowners, particularly the agricultural community. This will continue to fuel disagreements regarding ideal wildlife population numbers and their management.

To better manage these disagreements, wildlife managers, in addition to having better information about the increasing magnitude of the human wildlife conflicts and strategies that can be used to increase stakeholder participation in seeking solutions, must begin to view these new challenges as opportunities to gain wider public support for professional management (Messmer, 2000).

Wildlife is highly valued as a resource by society, but increasingly, wildlife and society are coming into conflict. Anything that wildlife does to cause human injuries or illness, loss of economic productivity, physical danger, or a reduction in quality of life or well-being is considered to be wildlife damage (Conover, 2001).

Curnow (2001) and Conover (2001) provide insights and discussions into the history of wildlife damage management and the trends, changes and progress that have occurred in the field of wildlife damage management and methods development research. Several state agencies, universities, and private organizations have been or are involved in some way in research at local, regional, national, and international levels to define, understand, and resolve wildlife–human conflicts.

Curnow (2001) has recently stated, “Because of the boundless propensity of mankind to develop, inhabit and alter the landscape, wildlife managers of today and the future require different strategies, tools and skills than those who did such a one job of conservation and management in past decades”. Curnow (2001) also highlighted the evolution of changing wildlife–human conflicts. He indicated that research needs would focus on (a) urban-suburban areas with a resultant critical need for management methods acceptable in urban settings; (b) zoonotic diseases vectored by wildlife; (c) overabundant-eruptive wildlife populations; (d) human health and safety; and (e) invasive species. He also identified a number of new skills needed by future wildlife managers to effectively provide integrated, science-based solutions to these new and diverse wildlife situations.

Globally a limitation of using tourism to offset the costs of wildlife conservation may be the scope for local tourism to generate enough revenue in enough places (Walpole and Thouless, 2005). A viable tourism operation requires a marketable and ideally unique, appeal that must be transmitted effectively to the target market that expects value for money and an unforgettable, positive experience. How much of the world's threatened species live in areas of sufficient tourism potential to generate enough revenue to create or preserve positive attitudes and galvanize these into community conservation action? How many of these areas are in politically stable countries with good access for tourists this year; and will these be the same areas in 20 years time? Whilst Southern and Eastern Africa have between them captured 47% and 35% of Sub-Saharan Africa's tourism market, West and Central Africa cater for only 16% and 3% (Clever don, 2002); what scope is there for tourism to add enough value to wildlife in these areas to meet conservation objectives? Whilst these questions might appear glib and dismissive of the potential for tourism to power local conservation initiatives, they need to be addressed openly so that conservationists and communities living with wildlife can properly assess the pros and cons of wildlife based tourism before implementation is attempted.

#### **2.4 Human population growth and human-wildlife conflict**

Demographic and social changes place more people in direct contact with wildlife: as human populations grow, settlements expand into and around protected areas (IUCN, World Park Congress 2003), as well as in urban and sub-urban areas. In Africa, human population growth has led to encroachment into wildlife habitats, constriction of species into marginal habitat patches and direct competition with local communities (Siex et al., 1999), in the state of British Columbia, Canada, conflicts are not restricted to nature reserves or rural areas but often occur in urban conglomerates as well. In the last few years, human population growth is correlated proportionally with the number of encounters and serious incidents with cougar (*Puma concolor*), black bears (*Ursus maritimus*) and grizzly bears (*Ursus arctos*) (Ministry of water, land and air protection, British Columbia, 2003).

The human population surrounding the Kakum Conservation Area in Ghana has increased dramatically during the past 30 years. During the 1970s farmers migrated in large numbers from other regions of the country to take advantage of the ideal cocoa-growing conditions at the edge of the forest. This has contributed directly to the increase in levels of conflict between humans and elephants. In Africa waterside communities have grown in recent years at a rate of about 3 percent per annum (Bryant, 2005), partly as a result of migration of peoples displaced by drought conditions and by political upheavals (McGregor, 2004; Bourdillon, Cheater and Murphree, 1985). In Zimbabwe, the human population occupying fishing camps along the shore of Lake Kariba doubled during the 1991–1992 droughts and subsequently increased again as people was displaced by land reforms and economic collapse. More people are exposed to the risk of attacks by crocodiles now that the numbers of residents drawing water directly from the lake, and the numbers of people informally engaged in subsistence and commercial fishing in the area, have increased. Successive droughts and the subsequent desertification of the land have led to the substantial migration of northern populations southwards. These migrants often settle near the last pockets of natural resources within protected areas where they are particularly exposed to human-wildlife conflict. Conflict is most acute in zones in which a wide range of species coexists with high-density human populations (Ogada *et al.*, 2003). A good example is the Tsavo National Park buffer zone (about 20 000 km<sup>2</sup>) in Kenya, which supports almost 250 000 people

## **2.5 Climatic factors and human wildlife conflict**

Climatic trends are an important cause of human wildlife conflict. Seasonal changes in rainfall are directly correlated with predation intensity in Kenya. In Tsavo National Parks, Patterson *et al.* 2004 quantified a positive association between monthly rainfall and attacks, demonstrating that in this region lions are more likely to attack livestock during seasonal rains. During drought periods, ungulates spend most of their time near a limited number of water sources and thus they are easily found and killed; when rain fills seasonal pools, lions disperse into their habitat, change their diets, and prey on easier targets

(Patterson *et al.*, 2004) in Zimbabwe, in proximity to the Sengwa Wildlife Research Area, the correlation between seasonal changes and intensity of livestock depredation is also found to be strong. However, contrary to the Kenya Tsavo case, wild predators are more likely to attract attention and attack domestic animals in the dry season months, when the vegetative cover does not facilitate the hunting strategies of lions and leopards that are based on surprise (Butler, 2000).

The rise in lion attacks observed in the United Republic of Tanzania in 1999 was largely attributed to the El Niño floods of 1997 and 1998, which caused wildlife in many parts of the country to seek higher ground. As the floods receded in 1999, the wild ungulates returned to their normal ranges, leaving the lions with insufficient prey (Packer *et al.*, 2006).

## **2.6 Compensation due to wildlife damages**

The payment of compensation in the event of loss is usually confined to a specific class of loss, for example livestock killed by predators or elephants or human deaths. The schemes are often funded by a conservation organisation, although government schemes also exist. All are designed to increase the damage tolerance level among the affected communities and prevent them taking direct action themselves, which would have usually involved hunting down and killing the elephants, lions or other species involved (Muruthi, 2005). Payment for damage by large or predatory protected species is common. What or who is eligible for compensation may be narrowly defined. For example, compensation for damage by specific large predators may be limited to livestock owners following specified animal husbandry guidelines. Some programs may target single species damaging specific crops; others may pay for any damage resulting from any protected species or from any species if the damage occurs in a prescribed area (Cozza *et al.*, 1996; de Klemm, 1996). Eligibility for compensation may depend on where an attack occurs, such as inside or outside a protected area, or upon officials' assessment of the danger to farmers of driving animals away from their crops or livestock.

State-sponsored efforts to manage human-wildlife conflict are not new. Historically, governments have used economic incentives to reduce conflict by supporting bounties to exterminate problem animals. The wolf (*Canis lupus*) in North America (Bangs this volume) is just one example where bounties contributed to the successful eradication of an animal from much of its historic range. Many compensation programs have been initiated after management and conservation efforts increased the size of diminished wildlife populations, and so many programs are relatively recent in origin (Wagner et al., 1997).

Legal protection of endangered species can restrict the time-honored practice of lethal control, yet may not provide precedent for state-sponsored compensation for wildlife damage. As de Klemm (1996) suggests, the issue boils down to the elimination of the right of farmers to protect themselves from damage from legally protected animals. The inability of farmers to kill certain species sets up conditions favorable for compensation, even if legal protection of wildlife has not made governments liable for damage.

In fact, in the United States, courts have historically viewed wildlife as *res nullius* (having no owner), thus limiting liability of the State (de Klemm, 1996). The U.S. federal government does not provide direct compensation for wildlife damage (Bangs & Shivik, 2001) leaving states to fill the void. Where government programs are unavailable, non-governmental organizations have occasionally spearheaded compensation programs, particularly for endangered species.

A major 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 (Wagner et al. 1997).

## **2.7 Increasing wildlife population as a result of conservation programmes**

Beyond the ongoing problems of HWC, new questions have emerged. In recent years, the successful recovery of declining or near extinct species populations (fall and Jackson, 2002) through wildlife management and protection from overexploitation (Messmer, 2002) has also led to new conflicts. Effective protection and habitat management within the Gir National Park and Sanctuary in the Indian state of Gujarat doubled the Asian lion (*Panthera leo persica*) population between 1970 and 1993.

The social organization, habitat and prey requirements of the species are difficult to accommodate within the human-defined home range, and resulted in many lions straying out of the reserve into local villages (Vijayan and pati, 2002). In the ranches of North America, European settlement almost exterminated wolves. Recent recovery programmes, however have contributed to the re-colonization by wolves of their original home range, including rural areas; and in the process have increased the potential for conflict, especially where domestic livestock is a major economic activity (Musiani *et al.*, 2003).

Strong opposition by international stakeholders to wild population reduction through culling and bans on hunting means that wild animal populations are increasing locally. This, coupled with increased protection, has resulted in a tremendous increase in the wild-life populations as well as changes in animal behaviors. Due to restrictions in culling, populations of large mammal species such as elephants increase resulting in high densities within the protected areas (Naughton -Treves, 1996), thus leading to incursions outside the park.

The combination of elk spending more time on private land, and more private landowners tolerating elk but not elk hunters, has placed a significant portion of the NYEWR “out of administrative control.” Wildlife managers have little ability to achieve elk management targets in hunting districts 314 and 317. Historically these goals were to limit elk population to levels that minimize conflicts with livestock production while providing sustainable hunting opportunities. The urgency of minimizing conflicts with ranchers has diminished in the Upper Yellowstone Valley with the departure of many of the full-time commercial livestock operations and with it, the functionality of an “ecological commons.” Hunter access remains a problem because despite growing elk numbers, there are declining opportunities for (non-fee-paying) hunters to access and harvest elk. This paper has provided evidence that ranch sales over the past three decades have encouraged this loss of access, but that the loss of access also occurred on ranch properties in multi-generational ownership. The historic relations linking (and later separating) private land owners and public hunters is an area that merits further research.

The focus on ranch ownership change during a period of substantial shift in regional demographics and rural residency patterns relates to studies of the recent history of rural land tenure (Walker and Fortmann, 2003) and especially to work that attempts to make connections between contemporary land tenure dynamics and the ecology of western landscapes (Gosnell and Travis, 2005).

Wildlife population increases typically in response to protection measures and limitations placed on the use of direct management approaches. Consequently, because of these restrictions, many contemporary rural and urban environments are inhabited by much larger wild- life populations than were present a century ago. Although rural, suburban, and urban residents generally enjoy seeing wildlife, negative experiences associated with overabundant wildlife populations are increasing public concerns over these species. It is ironic that although these situations may best be resolved by trained biologists and managers, public funding and support for the professional wildlife management continues to decline (Messmer et al., 1999).

## **2.8 Habitat factors resulting to human- wildlife conflict**

The gradual loss of habitat has led to increasing conflict between humans and wildlife. As wildlife range becomes more and more fragmented and wildlife is confined into smaller pockets of suitable habitat, humans and wildlife are increasingly coming into contact and in conflict with each other. In the Kakumng t Conservation Area in Ghana, the forest area available to elephants has decreased by about half since the 1970s. This explains why the density of elephants (about 0.6/km<sup>2</sup>) is now higher than in most other West African forests, thereby resulting in increased crop-raiding activities (Barnes *et al.*, 2003). Nowadays, the last suitable habitats generally survive inside protected areas. This explains why conflicts are particularly common in reserve buffer zones where healthy wildlife populations stray from the protected area into adjacent cultivated fields or grazing areas.

## **2.9 Gender and human-wildlife conflict**

Most of the people killed by large mammals are men, and many of these incidents occur at night. In Kenya, alcohol was found to be a key factor in one third of the deaths; victims were drunk and returning home from the bar. Others died protecting their crops, herding cattle, walking at night between neighbouring villages or even taking the prey of large felines. Information gathered from the Ugandan Game Department archives (1923–1994) reveals that twentieth century agro pastoralists regularly tried to scavenge from leopard and lion kills (Treves and Naughton-Treves, 1999). This hazardous behaviour led to many human deaths. An analysis of conflict with lions in the United Republic of Tanzania showed that, above ten years of age, men are at much greater risk of being attacked by a lion than women. This is because men are more likely to tend cattle or forage for bush meat, and they are more likely to walk around alone at night. Men are also attacked when trying to retaliate against man-eating lions, often relying solely on nets and spears. Although men are more at risk overall than women, both men and women are almost equally at risk when working in fields or near their homes (Packer *et al.*, 2006). Attacks on men however were often less lethal than attacks on women and children.

On the other hand, the gender roles prevalent within traditional African society and the fact that children and adolescents perform many household tasks expose more women and children to crocodile attacks. Attacks on women and children are more frequently fatal than attacks on adult males. A study on human-wildlife conflict carried out by AWF in the Chobe-Caprivi corridor between Botswana and Namibia has also revealed a gender disparity relating to how people are affected by wildlife conflict, which is linked in turn to the ownership of resources. Men tend to view the lion as the most problematic animal because men mostly own livestock, which are prime targets for lions. In Botswana the highest compensation rates are paid for livestock losses. On the other hand, women, who generally tend crops, rank the elephant as the most problematic animal because of its tendency to raid crops. Households headed by women are most affected by wildlife conflict, with over 85 percent reporting damage to crops and 95 percent reporting attacks on livestock. This is because in most cases these households are relatively poor and

unable to invest in mitigation measures such as building strong fences and animal enclosures (Muruthi, 2005).

## **2.10 Typology of human -wildlife conflict**

Human wildlife conflict exhibit itself in different types as stated below:

### **2.10.1 Human deaths and injuries caused by wildlife**

Human deaths and injuries, although less common than crop damage, are the most severe manifestations of HWC and are universally regarded as intolerable.

An assessment of the scale of human deaths caused by wildlife species in Africa at the end of the seventies, concluded that hippopotamus was responsible for more deaths than any other large animal in Africa (Clark, 1977). From 1999 to February 2004, crocodiles killed a minimum of 28 people and injured 57 others in the Jukumu Wildlife Management Area, an area of about 500 km<sup>2</sup> constituted by 22 villages located in the northern buffer zone of the Selous Game Reserve in Tanzania. In one village alone 11 people were taken away within a year (Baldus, 2005).

More than 200 people were killed in Kenya over the last 7 years by elephants alone (WWF, 2007). In Ghana, during the last 5 years, 10 people were killed by elephants within the Kakum Conservation Area alone. In the densely populated Caprivi region of Namibia, a population of 5,000 elephants which is one of the single largest free ranging populations of elephants were responsible for twice as much aggression as a lion in the 90's and attacked over a larger area (O'Connell-Rodwell *et al.*, 2000).

Human death and injury can also be as a result of road accidents caused by wildlife. This phenomenon, well known in Europe and the United States (Mouron *et al.*, 1998; Scanlon, 1998) is also a serious problem in Namibia where vehicle collisions with Greater Kudus are responsible. Additional human wildlife conflicts include human illness and fatalities resulting from wildlife-related diseases, wildlife bites, attacks, and bird aircraft strikes. Research suggests that in the US, each year, approximately 5000 people are injured or taken ill, and 415 people die because of wildlife-related incidents (Conover *et al.*, 1995). Conover *et al.* (1995) estimated the total impact of wild life-related damage incidents to

approach \$3 billion, annually for more human deaths than attacks by both crocodiles and elephants.

### **2.10.2 Destruction of crops and predation on domesticated animals by wild animals**

A wide variety of vertebrate pests come into conflict with farming activities in Africa including birds, rodents, primates, antelopes, buffalos, hippopotamus, bush pigs, and elephants. While it is widely recognised that in most cases elephants do not inflict the greatest damage to subsistence agriculture, they are regularly identified as the biggest threat to African farmers (Parker *et al.*, 2007).

Within the Zimbabwean portion of the AWF Zambezi Heartland, elephants are estimated to be responsible for up to three-quarters of all crop damage caused by wildlife (Muruthi, 2005).

Approximately 80% to 90% of crop raiding around the Kakum National Park, Ghana, is attributed to elephants (Parker, 2002); the 500 households, living around the Kakum Conservation Area lose about 70% of food crops cultivated annually to elephant crop-raiding alone (Barnes *et al.*, 2003).

Another adverse effect of HWC is the killing of domestic animals by wildlife. The number and type of domestic animals killed by wildlife varies, depending on the species, time of year, and availability of natural preys.

Large carnivores are the principal culprits as shown by Patterson *et al.* (2004) who analyzed attacks on livestock over a four-year period on two neighbouring arid-land ranches adjoining Tsavo East National Park, Kenya. A total of 312 attacks claiming 433 head of stock were examined: lions were responsible for 85.9% of the attacks while hyenas and cheetahs were the other culprits. Lions and hyenas attacked mainly cattle and did so at night, whereas cheetahs almost exclusively took smaller sheep and goats. However other smaller carnivore species are responsible for livestock depredation. In Cameroon for instance, around the Bénoué national park, the Civet is the main predator, causing 18% of livestock income lost on average (Weladji and Tchamba, 2003).

### **2.10.3 Transmission of diseases to livestock and/or man by wild animals**

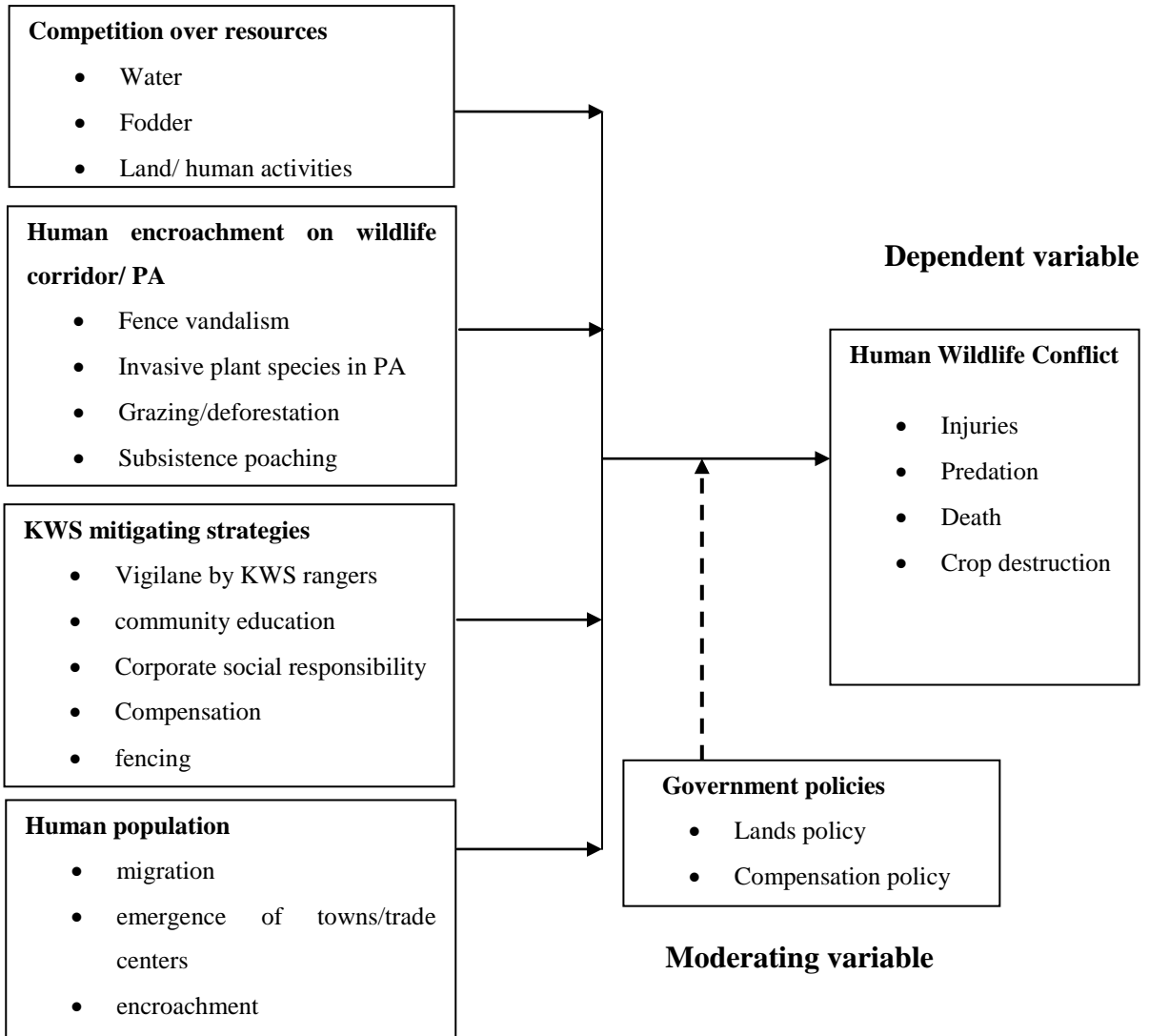
Important diseases are known to be transmitted by wildlife to domestic livestock or possibly man (i.e. rabies). On the other hand, scavengers and predators, such as spotted hyenas, jackals, lions and vultures, play a role in the dissemination of pathogens by the opening up and dismembering and dispersal of infected carcasses. That is notably the case for anthrax the spores of which they ingest together with the tissues of the carcasses and then widely disseminate in their faeces (Hugh-Jones and de Vos, 2002).

It is fairly generally accepted that *Theileria parva parva* is a cattle-adapted variant of *Theileria parva lawrenci* borne by Buffalo. Infection with this organism, which is generally silent in buffalo, causes very high mortality rates in cattle, making farming of cattle in the presence of both buffalo and a suitable vector, a hazardous undertaking (Bengis *et al.*, 2002). In the Gaza Province, Mozambique, 228 cattle of which 76 were pedigree Brahman, died from *Theileriosis* as a result of contracting the disease from buffalo (FAO, 2005).

**FIGURE 1: FACTORS INFLUENCING HUMAN WILDLIFE CONFLICTS**

**Conceptual Framework**

**Independent variable**



The independent variables in this study are; Competition over resource, human encroachment to protected areas, KWS response strategies and human population. The dependent variable is human wildlife conflict measured using the following parameters; injuries, predation, deaths, threats and property damage. The mediating variable is government policies under which land and compensation policies are playing the role of moderating.

All this independent variables plays a role in influencing human wildlife conflict. When competition over resource, human encroachment, KWS response strategies and human population are properly managed through working interventions, assuming land and compensation policies are constant then human wildlife conflict will reduce to a manageable level.

### **Knowledge gap identified**

Several studies on human wildlife conflict have been conducted and scholars studying different issues; Philip J. Nyhus together with others have done a study on “bearing the cost of human wildlife conflict: challenges of Compensation schemes. According to Amelia Jane dickman in her study “Determinants of conflict between people and wildlife, particularly large carnivore”, in her study the driving factors of human wildlife conflict are; intolerant pastoralists with their history of land alienation for conservation, political marginalization and insecurity of land tenure. According (Sindiga 1995) and (Mwale 2000) shows that human encroachment on critical biodiversity depository sites in search of agricultural land has since the 1970’s and 1980’s shifted to low potential rangelands which coincidentally are the prime wildlife ecosystems thus creating a myriad of problems like competition for water resources, human wildlife conflicts, habitat fragmentation and blocking of wildlife migratory routes and dispersal areas and negative perception towards conservation.

From the various studies for instant stated above there is a knowledge gap in that most scholars have embarked on studying on the consequences and impacts of human wildlife conflict and those who have discussed on the factors like Dickman and Sindiga, they have specified on the type of wild animal they want to look at and relating encroachment to a factor leading to competition over resources, habitat fragmentation and wildlife migratory corridor respectively which to my view all those a major factor contributing to human wildlife conflict and should be discussed separately.

No studies have been done on the factors influencing human wildlife conflict in Lake Nakuru National Park and therefore this study seeks to look into these factors influencing human wildlife conflict which this study has identified as the knowledge gap.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter covers the methodology which was used to carry out the study. It specifically focused on the following: the research design, target population, sampling strategy, data collection instruments, and data analysis and data presentation methods.

#### **3.2 Research design**

Burns and Grove (2003) defines a research design as ‘‘a blueprint for conducting a study with the maximum control over factors that may interfere with the validity of the findings’’. Parahoo (1997) describes a research design as ‘‘a plan that describes how, when and where data are to be collected and analysed’’. Polit et al (2001) define research design as ‘‘ the researchers overall for answering the research question or testing the research hypothesis’’.

This study provided the results in terms of qualitative and descriptive research design. Burns and Grove describes a qualitative approach as ‘‘a systematic subject approach used to describe the experiences and situations to give them a meaning’’. Parahoo (1997) states that; qualitative research focuses on the experiences of people as well as stressing uniqueness of the individual. Holloway and wheeler (2002) refer to qualitative approach to explore the behaviour, perspectives, experiences and feelings of people and emphasize the understandings of these elements

#### **3.3 Population of the study**

Shao (1999) defines a population or universe as the aggregate of all the elements. Elements in this context refer to all community members from urban villages next to the park.

The target population of this study consisted of five urban villages next to the Lake Nakuru National park as shown in table 1, and provided for by the Kenya Wildlife service Nakuru Station as at December 2012. Target population comprised of 925 households from urban village next to LNNP of which a sample population of 270 was taken (KWS, 2012).

### 3.4 Sample Size and Sampling procedures

It was envisaged that a sample was used to carry out the research. For a researcher to select a representative sample she or he must first have a sampling frame. A sampling frame is a list, directory or index of cases from which a sample can be selected (Mugenda & Mugenda, 2003). Subjects or cases so selected from the sampling frame shall form the units of observations in the study.

Normally, it would be preferable to collect data from the entire 925 household adjacent to the park fence. However due to various constraints sampling would be inevitable. A systematic random sampling technique was used to select the respondents.

The study adapted Sample size formula by Cochran's as quoted by James E. Bartlett and Joe W. Kotrlík (2001) in an article; titled *Organisational Research: Determining Appropriate sample size in Survey Research*. This is given by the formulae stated below;

$$s = \frac{\{(z)^2 (p) (q)\}}{(d)^2}$$

Where;

“s”= sample size

“z”= value of selected alpha level. In this study 0.25 in each tail=1.96

“d”= acceptable margin of error for proportion being estimated = 0.05

(p) (q) = estimate of variance = 0.25 maximum possible proportion (0.5) (1- 0.5).

This produces maximum possible sample size.

$$s = \frac{\{(1.96)^2 (0.5) (0.5)\}}{(0.05)^2} = 384$$

Cochran's correction formula is used to calculate the final sample size.

$$s_1 = s \div \{1 + (s \div n)\}$$

Where;

$s_1$  = required sample size,

s = uncorrected sample

n = total target population.

$$s = 384 \div \{1 + (384 \div 925)\} = 270$$

The required sample size for this study therefore was 270. The research applied proportionate stratification that was based on the stratum's share of the total population to come up with the sample in each stratum. The respondents who were given questionnaires were arrived at by using random sampling procedures.

**Table 1: Sampling table**

<b>Population category per estate adjacent to Park fence</b>	<b>Population size</b>	<b>Sample size</b>
Mwariki	117	34
Lake View	260	76
Flamingo	120	35
Kivumbini	114	33
Free Area/58	236	69
Lanet	78	23
<b>Total</b>	<b>925</b>	<b>270</b>

*Source: Kenya Wildlife Service Community Department, Nakuru Station (2012)*

### **3.5 Data collection procedures**

The researcher collected primary data that were useful to the study. The researcher used drop and later picked method to deliver and collect the questionnaires since the method eliminates non-coverage error associated with the mail method. Each questionnaire was accompanied by a transmittal letter, explaining the purpose and importance of the study

### **3.6 Data collection instruments**

According to Parahoo (1997), a research instrument is ‘‘A tool used to collect data. An instrument is a tool designed to measure knowledge attitude and skills’’. A data collection instrument was constructed to aid data collection. Both structured and unstructured questionnaires were prepared and their feasibility analyzed during the pre-test study. The list of questions reflected key variables under study.

### **3.7 Validity**

An instrument is valid if it measures what it is intended to measure and accurately achieves the purpose for which it was designed (Patten, 2004; Wallen & Fraenkel, 2001). Patten (2004) emphasizes that validity is a matter of degree and discussion should focus on how valid a test is, not whether it is valid or not. According to Patten (2004), no test instrument is perfectly valid. The researcher needs some kind of assurance that the instrument being used will result in accurate conclusions (Wallen & Fraenkel, 2001). Validity involves the appropriateness, meaningfulness, and usefulness of inferences made by the researcher on the basis of the data collected (Wallen & Fraenkel, 2001). Validity can often be thought of as judgmental. According to Patten (2004), content validity is determined by judgments on the appropriateness of the instrument’s content.

This study relied on advice from experts to determine if the items were representative sample of the skills and traits which comprised the areas to be measured. The language that was used in the instruments for collection of data was simple and of ease for the respondents to understand. Upon the expert’s advice, the study improved the structure and content of the instruments.

### **3.8 Reliability**

This study used a broad sample of content rather than a narrow one; it emphasized on important material, and also wrote questions to measure the appropriate skill. These three principles were addressed when writing the survey items. The researcher formed focused group of five to ten experts in the field of human wildlife conflict who provided input and suggestive feedback on survey items. Equivalent forms was used to determine reliability of the instruments, Two Parallel forms was given for a test to the same people and through SPSS the scores were correlated and found to be reliable.

### **3.9 Data analysis**

Means to organize, provide structure and elicit meaning, analysis of qualitative data is interactive process (Polit et al 2001). Research findings were studied and dominant themes and conclusions made. A discussion on the variables facilitated the understanding of the described nature of the phenomena. Data was analyzed with the aid of SPSS and the findings presented in tables, frequency distribution diagrams, and percentages.

### **3.10 Ethical considerations**

McNamara (1994) identifies five ethical concerns to be considered when conducting survey research. These guidelines deal with voluntary participation, no harm to respondents, anonymity and confidentiality, identifying purpose and sponsor, and analysis and reporting.

In this study each guideline will be addressed individually with explanations to help eliminate or control any ethical concerns.

First, researchers need to make sure that participation is completely voluntary. However, voluntary participation can sometimes conflict with the need to have a high response rate. Low return rates can introduce response bias (McNamara, 1994). In this study the respondents will voluntarily participate without any interference.

McNamara's (1994) second ethical guideline is to avoid possible harm to respondents. This could include embarrassment or feeling uncomfortable about questions and this study will adhere to this guideline.

This study did not include sensitive questions that could cause embarrassment or uncomfortable feelings. Harm could also arise in data analysis or in the survey results, solutions to these harms will be discussed under confidentiality and report writing guidelines.

A third ethical guideline was to protect a respondent's identity. This was accomplished by exercising anonymity and confidentiality. A survey is anonymous when a respondent cannot be identified on the basis of a response. A survey is confidential when a response can be identified with a subject, but the researcher promises not to disclose the individual's identity (McNamara, 1994). Participant identification will be kept confidential and will only be used in determining who had not responded for follow-up purposes.

McNamara's (1994) fourth ethical guideline used was to let all prospective respondents know the purpose of the survey and the organization that is sponsoring it of which it was done. The purpose of this study was provided in the cover letter indicating a need to identify factors influencing human wildlife conflict. The cover letter explained how the results of the study would be used in a project as partial fulfillment for a Masters degree.

The fifth ethical guideline, as described by McNamara (1994), is to accurately report both the methods and the results of the surveys to professional colleagues in the educational community. Because advancements in academic fields come through honesty and openness, the problems and weaknesses experienced as well as the positive results of the study was reported.

**Table 3.2: Operationalization of variables**

<b>Objectives</b>	<b>Independent Variables</b>	<b>Indicators</b>	<b>Measure(s)/questions</b>	<b>Tools of data collection survey</b>	<b>Measuring scale</b>	<b>Data analysis techniques</b>
To examine competition over natural resources as a factor influencing human wildlife conflict	Competition over natural resources	-Fodder -Land -water	-Availability of forage -Is community land enough for human activities? -Obstruction of water for farming purposes -Destruction of habitat	Questionnaire Records	Nominal Ordinal Ratio	Frequencies and percentages
To establish human encroachment to wildlife corridors and protected areas as a factor influencing human wildlife conflict	Human encroachment factor	-Fence vandalism -Invasive plant species in PA -Grazing/ deforestation -Subsistence	size/ kilometers of fence vandalized -Types and intensity of invasive species inside protected areas Reports on poaching both for bush meat and ivory Number of people arrested in PA Reports on fire wood collection and arrest	Questionnaire records	Nominal ordinal Ratio	Frequencies and percentages

		poaching				
To assess the response strategies by KWS in mitigating human wildlife conflict	Response strategies	-community education/awareness -response team -Corporate Social responsibility -electric fence -conservancies	-Number of community education conducted -how many times the response team attends to reported cases -Number of corporate social responsibility (CSR) -effectiveness of the fence, kilometers of the constructed fence and its maintenance -Are there wildlife conservancies to support the communities financially?	Questionnaire Records	Ratio Ordinal	Frequencies and percentage
To determine the relationship	Human population	-Land sub-division	-Initial land size and how many times the sub-division	Questionnaire Records (data)	Ordinal Interval	Frequencies, and

between human population increase and HWC	increase	-settlement	-Satellite imageries of settlement through data base	base)		percentage
	<b>Dependent variable</b>  -Human Wildlife Conflict	Injuries  Predation  Deaths  Crop destruction	-Number of injuries, death and predation report  -number of claims compensated  -reports on county wildlife compensation committee  -number of crop destruction cases reported	Questionnaire  Records	Nominal  Ordinal  Ratio	Frequencies, means, percentages

## CHAPTER FOUR

### DATA, PRESENTATION, ANALYSIS AND INTERPRETATION

#### 4.0. Introduction

This chapter presents the data analysis and interpretation. 254 respondents participated in the study. The study analyzed the data, using statistical package for social sciences (SPSS) version 17.0, descriptive and inferential statistics such as frequencies, tables. Percentages and correlation tests were used in the data analysis and summaries. Relationships between variables were identified using frequencies.

The purpose of the study was to assess the factors influencing human- wildlife conflict in communities living around Lake Nakuru National park.

In this chapter the presentation of data was systematically linked to the format of self developed questionnaire attached in the appendix.

#### 4.1. Questionnaire return rate

To ensure that the entire questionnaire distributed were filled and returned, the questionnaires were administered to the household respondent and the questions read and interpreted to the language they understand without changing their meaning.

Table 4.1 shows the response rate.

*Table 4.1 response rate*

<b>Respondents</b>	<b>Target No. of Questionnaires</b>	<b>No. of questionnaires returned</b>	<b>Response rate</b>
<b>Community</b>	270	254	93%
<b>Members</b>			

The study was able to get a response from 254 respondents out of 270 questionnaires distributed to 6 urban villages bordering the park; this represents a response rate of 93% of the total questionnaires distributed. The rest of respondents did not return the questionnaires citing forgetfulness and lack of time. However the achieved response rate was considered credible enough to provide the basis for arriving to the conclusions of the study.

## **4.2 Presentation of findings**

This section contains the presentation of findings arising from data analysis.

### **4.2.1 Demographics characteristics of the respondents**

The demographic characteristics of the respondents for the study captured gender, sex, occupation and age as presented in the study

#### **4.2.1.1 Gender respondents**

The gender of the respondents used in this study is given in table 4.2

*Table 4.2 gender of the respondents*

	<b>Frequency</b>	<b>Percentage</b>
<b>Male</b>	135	53%
<b>Female</b>	119	47%
<b>Total</b>	<b>254</b>	<b>100%</b>

The analyzed of collected data shows the respondents from the community in terms of gender was fairly represented, it shows that out of 100% responses 53% were men and 47% women this implied that both men and women were willing to participate.

#### 4.2.1.2 Age of the respondents

The age of the respondents and the result is given in table 4.3

*Table 4.3 Age of the respondents*

<b>Community</b>		
	<b>Frequency</b>	<b>Percent</b>
<b>less than 30</b>	12	5%
<b>30-39</b>	47	18%
<b>40-49</b>	123	48%
<b>50-59</b>	49	19%
<b>60-69</b>	22	9%
<b>greater than 69</b>	1	1%
<b>Total</b>	<b>254</b>	<b>100.0</b>

The age distribution shown in Table 4.3 was presented in terms of intervals to enable respondents fit in any of the category listed. Respondents less than 30 years represented by 5% of the respondents, 30-39 years represented 18%. Respondents of age 40-49, 48% were interviewed, 50-59 represents 19%, 60-69 forms 9% and above 69 which represents 1%. These results show that most of the respondents who participated were between aged 40 to 49 years. This shows that most heads of households were the once who responded.

#### 4.2.1.3: Occupation of the respondents

The occupation of the was from various field and the study categorized the occupation into three; employed, self employed and unemployed

*Table 4.4 Occupation of the respondents*

	<b>Frequency</b>	<b>Percent</b>
<b>Employed</b>	48	19%
<b>self –employed</b>	137	54%
<b>Unemployed</b>	69	27%
<b>Total</b>	<b>254</b>	<b>100.0</b>

Table 4.4 shows that the self employed have the highest percentage of 54% they ranged from shoe makers, shop keepers, ‘Mama mboga’ and others. Employed persons interviewed were 19% and 27% for those who are unemployed. This result indicates that most communities living next to the park are self employed this also is supported by the place where they live that is urban villages and in urban village most people do business.

#### 4.2.1.4 : Wild animals visitation to respondents residence

The study asked the question of whether wild animals go to peoples residence, since it could be the reasons as to why conflict between humans and wildlife exist.

*Table 4.5 wild animals visitation to people residents*

<b>Agreement</b>	<b>Frequency</b>	<b>percentage</b>
<b>Yes</b>	251	99%
<b>No</b>	3	1%
<b>Total</b>	<b>254</b>	<b>100%</b>

The study findings show that most of the respondents 99% agree that wild animals have been visiting their residents; this implied that electric fencing of LNNP may not be effective in controlling wild animals from getting out of protected area.

#### 4.2.2: Competition over resources as factor influencing Human Wildlife Conflict

Table 4.6 shows the findings from 254 respondents on the level of agreement on competition over resources as a factor influencing Human Wildlife Conflict.

*Table 4.6 level of agreement on competition over resources*

<b>Agreement</b>	<b>Frequency</b>	<b>percentage</b>
<b>Yes</b>	249	98%
<b>No</b>	5	2%
<b>Total</b>	<b>254</b>	<b>100%</b>

From table 4.6 the researcher findings is that Most respondents, 98% ,do feel that competition over resources between wildlife and human beings has influence the occurrence of human wildlife conflict in and around the park

Table 4.7 shows parameters that were used to evaluate resources that human and wildlife compete over, these parameters are; Competition over land, Water, Pasture and impact of human activities that leads to competition.

**Table 4.7: Rating of resources that human and wildlife are competing over**

Resources that human and wild compete over	Percentages					Total frequency/ percent
	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	
<b>Competition over Land</b>	7 3%	7 3%	12 5%	150 59%	70 30%	<b>254</b> <b>100%</b>
<b>Impact of human activities</b>	3 1%	5 2%	21 8%	160 63%	65 26%	<b>254</b> <b>100%</b>
<b>Competition over water</b>	4 2%	11 4%	48 19%	139 55%	52 22%	<b>254</b> <b>100%</b>
<b>Competition over pasture</b>	5 2%	9 4%	43 17%	133 52%	67 25%	<b>254</b> <b>100%</b>

The results in Table 4.7 indicate that 89% of the respondents agreed that there is increased need of land for development. In addition, the table reveals that 89% of the respondents agreed that human activities have led into competition over natural resources; it can be through deforestation and grazing of domesticated animals by encroaching to protected areas.

The study also indicates that most respondents 77% do agree that competition over water and pasture by wild animals and human beings do exist. All these are indicators that there exists human wildlife conflict around Lake Nakuru National as a result of competition for limited resources.

#### 4.2.3: Human encroachment on wildlife corridor and protected areas as factor influencing Human Wildlife conflict

Table 4.8 indicate the result from how people view human encroachment to protected areas and if it has influenced human wildlife conflict around LNNP

*Table 4.8 level of agreement on human encroachment to protected areas*

Agreement	Frequency	percentage
Yes	246	97%
No	8	3%
<b>Total</b>	<b>254</b>	<b>100%</b>

The results from the data collected show that 97% of respondent said that there is observed human encroachment on wildlife corridor and protected areas.

The respondents were asked to rate the indicators of human encroachment to wildlife protected areas this indicator was to show whether really encroachment of human to wildlife habitations happens. Table 4.9 shows how the respondents rated these factors on a 5-level Likert scale.

*Table 4.9 Rating of Human encroachment Indicators*

Human encroachment Indicators	Percentages					Total frequency/percent
	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	
<b>Fence vandalism</b>	13	26	31	116	68	<b>254</b>
	5%	10%	12%	46%	27%	<b>100%</b>
<b>Invasive plant species</b>	3	13	37	150	50	<b>254</b>
	1%	6%	20%	56%	17%	<b>100%</b>
<b>Grazing in P.A</b>	34	64	43	77	34	<b>254</b>
	13%	26%	18%	30%	13%	<b>100%</b>
<b>Poaching</b>	25	58	51	87	33	<b>254</b>
	10%	22%	20%	35%	13%	<b>100%</b>

The findings from table 4.9 above, shows that most people 73% agree and strongly agree that KWS fence in being vandalized by community, invasive plants are found inside the park again 73% agree to that. On the issue of subsistence poaching of wildlife by unknown people most people 57% also agree as compared to those who disagree or uncertain. 39% of the respondents, who were the most disagreed that livestock grazing is being carried out inside the park

#### **4.2.4: KWS strategies in mitigating Human Wildlife Conflict**

Table 4.10 show the level of agreement on the existence of KWS strategies to curb the issue of Human wildlife conflict.

*Table 4.10 level of agreement on the existence of KWS strategies in mitigating human wildlife conflict*

<b>Agreement</b>	<b>Frequency</b>	<b>percentage</b>
<b>Yes</b>	245	96%
<b>No</b>	9	4%
<b>Total</b>	<b>254</b>	<b>100%</b>

96% of the 254 respondents said KWS has developed some ways by which to control the movement and damages caused by wild animals and that this ways can be managed by the KWS or themselves. From the findings it is obvious that KWS has reached out to communities and that communities are appreciating their work.

Table 4.11 show how the respondents rated the mitigating strategies developed by KWS to manage human wildlife conflict

*Table 4.11 Rating of KWS mitigating strategies*

Mitigating Strategies	Frequency/Percentages					Totals
	Strongly disagree	Disagree	Uncertain	Agree	Strongly Agree	
<b>Education/awareness</b>	15	37	26	132	44	<b>254</b>
	11%	12%	10%	52%	13%	<b>100</b>
<b>Compensation</b>	30	32	27	132	33	<b>254</b>
	12%	11%	11%	52%	13%	<b>100%</b>
<b>vigilance by KWS rangers</b>	8	24	58	122	42	<b>254</b>
	3%	9%	23%	48%	17%	<b>100%</b>
<b>Fencing</b>	3	15	40	137	59	<b>254</b>
	1 %	6%	16%	54%	23%	<b>100%</b>
<b>Voluntary relocation program</b>	25	46	52	101	30	<b>254</b>
	10%	18%	20%	40%	12%	<b>100%</b>
<b>Lethal control programs</b>	8	34	50	99	63	<b>254</b>
	3%	13%	20%	39%	25%	<b>100%</b>
<b>Corporate social responsibility</b>	18	28	49	112	47	<b>254</b>
	7%	11%	19%	44%	19%	<b>100%</b>

The findings in Table 4.11 show that KWS have put in place measures against effects of human-wildlife conflict. Most of the respondents 65% who were interviewed agree that KWS has developed compensation scheme and creation of human wildlife conflict education and awareness for the affected people. KWS has also intensified its fencing to bar wild animals from freely moving to human habitat was rated highly with 82% of the respondents agree or strongly agree on the strategy.

Voluntary relocation program to those affected, lethal control programs and corporate social responsibility offered by KWS to try and mitigate HWC was also rated highly.

Most respondents, 52%, 64% and 63% respectively agree that the stated strategies are in existence.

#### **4.2.5: Human population increase around protected area as a factor influencing Human Wildlife conflict.**

Table 4.12 presents results on the level of agreement over human population growth as a contributor to human wildlife conflict.

*Table 4.12 level of agreement on Human Population increase as a factor influencing human wildlife conflict*

<b>Agreement</b>	<b>Frequency</b>	<b>percentage</b>
<b>Yes</b>	252	99%
<b>No</b>	2	1%
<b>Total</b>	<b>254</b>	<b>100%</b>

The above table indicates the level of agreement on whether human population increase around LNNP has led to HWC. The finding reveals that 252 out of the 254 respondents agree that the increase in number of people around LNNP has created human wildlife conflict

**Table 4.13 Rating of human population Factors**

Human population Factors	Frequency /Percentages					Totals
	Strongly disagree	Disagree	Uncertain	Agree	Strongly Agree	
<b>Migration</b>	8	10	26	164	46	<b>254</b>
	3%	4%	10%	65%	18%	<b>100%</b>
<b>Population increase lead to encroachment into protected area</b>	1	6	21	167	59	<b>254</b>
	1%	2%	8%	66%	23%	<b>100%</b>
<b>Emergence of towns/trading centres</b>	1	5	24	146	78	<b>254</b>
	1%	2%	9%	58%	30%	<b>100%</b>
<b>Easy escape of poachers</b>	7	9	46	128	64	<b>254</b>
	3%	4%	18%	50%	25%	<b>100%</b>

Table 4.13 shows that human population contributes a lot in competition of resources between human beings and wildlife hence leading to conflict. 83% of the respondents agree that migration of people for security reasons has led to increased conflict between people and wildlife. The increase population has also led to encroachment into protected area is factor that 89% of the respondents agree has lead to human wildlife conflict. Emergence of trading centres always attracts people close to it for essential services and as per the findings above most people 88% agree that the growth of the centres next to LNNP has contributed to HWC. The poachers also easily escapes without being caught due high population and differentiating who is a poacher and who is not is a challenge this is agreed upon by 75% of people who were interviewed.

These results are indication that uncontrolled human population growth may lead to increase conflict between the people and wildlife because of competition over natural resource especially land.

#### 4.2.6 Indicators of human wildlife-conflict

Table 4.14 shows the indicators that there exists human wildlife conflict. The respondents rated the indicators and the results show ratings.

*Table 4.14 Rating of Human Wildlife Conflict*

Human Wildlife conflict Indicators	Frequency/ Percentages					Totals
	Strongly disagree	Disagree	Uncertain	Agree	Strongly Agree	
<b>Human Injury by wild animal</b>	5	13	18	146	72	<b>254</b>
	2%	5%	7%	57%	28%	<b>100%</b>
<b>Human death by wild animal</b>	1	18	34	133	67	<b>254</b>
	1%	7%	13%	52%	26%	<b>100%</b>
<b>Crop destruction by wild animals</b>	0	4	19	126	105	<b>254</b>
	0	2%	7%	50%	41%	<b>100%</b>
<b>Predation on livestock</b>	1	7	26	116	104	<b>254</b>
	1%	3%	10%	47%	41%	<b>100%</b>

Table 4.14 shows that 91% of respondents feel that wild animals have destroyed crops in their community, from the findings crop destruction is the most experienced conflict between human and wildlife. The second most rated conflict between humans and wildlife is wild animals killing livestock in residential area with 88% of respondent supporting. This shows that farmers are the most affected in terms of HWC. Injury according to the findings is ranked third with 85% of the respondent supporting while killing of people by wildlife being ranked the least but it is a fact that most people have been killed by wild animals.

## CHAPTER FIVE

### SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

#### 5.0 Introduction

This chapter summarizes and concludes the research findings as carried out. At the end of the chapter, important recommendations are proposed by the researcher to the government and the organizations under study in order to try and solve the problems, the recommendations are based on the findings.

Human and wildlife conflict has increased in Nakuru County, majorly in the areas surrounding Nakuru national park. The increase in the cases of conflict has been so rife that it has called for the need to find an amicable solution to the problem. The resulting consequences from the HWC are equally devastating. In many cases, either side of the antagonizing group have borne the brunt in one way or another. This research study was conducted around the park to ascertain the possible causes and levels of such conflict. It revealed that indeed, the situation is more serious than it may appear on the face of itself.

The study looked into the possible causes of the human and the wildlife conflicts. From the study, it is important to note that various factors have directly or indirectly contributed to the HWC. However, it is important to note that most of the conflicts have been reported in areas where the human settlement is so close to the park creating a possibility of people and animals interactions. The following thematic areas revealed various levels of involvement in the HWC issues.

## **5.1 Summary of findings**

### ***5.1.1 Response rate and demographics***

The study interviewed 254 participants out of 270 distributed questionnaires this was a good response in that three quarters responded. In terms of demographics; gender was well represented by 53% men and 47% women thus showing the willingness and importance of the study to the respondents. The study also found out that those between ages 40-49 were the majority, this is the age for which people actively engage in activities like business in order to support their families, this is clear from the study since the highest percentage (54%) of the respondents were self employed.

### **5.1.2 The level of competition for resources as a source of HWC**

In many cases, people and animals have no formula for sharing the common resources in the region. They tend to use the natural resources at the same time and this only works to create a grudge between the people and the wildlife. Water points, rivers, fruits and grazing grounds have been the major points of contact between the animals and the people living around Lake Nakuru national park. The consequences of such interactions have been very volatile, many of which results in one faction causing great amount of harm on the other.

From the research study results, it is revealed that 98% of the 254 respondents feel that competition over resources between wildlife and human beings has influence the occurrence of human wildlife conflict in and around the park. This is an indicator that there exists human wildlife conflict around Lake Nakuru National. This is in an agreement with other scholars. “Most natural wildlife buffer zones have led to competition for food, water, habitats, and space for both humans and wildlife hence resulting in a conflict for survival (Kagiri, 2000).

Obstruction of water for domestic purpose has led to human wildlife conflict, the water does not flow downstream to reach wild animals inside the park and therefore they tend to move outside to communities in search of the basic need, water. From the findings need for land for human development has led to HWC, concentration of people around protected areas or areas reserved as buffer zones have been developed by people and this has been supported by 89% of the respondents.

### **5.1.3 Human encroachment into wildlife territories as a source of HWC**

Lake Nakuru national park is a property for the government of Kenya and thus the name protected area, an area where no human activities are permitted. As a result, the government has put in strategies to make the place as secluded as possible. It is used for the conservation and the protection of various fauna and flora that are likely to become extinct according to the research studies. In line with the protection, the park also serves as a very good income generating activity to Nakuru County through the high number of tourists that visits the park. The large number of indigenous trees in the park serves a great amount in the environmental care. They act as water catchment areas as well as providing reliable habitat to many of the wild animals.

However, people will always find various reasons to go past the heavy security around the park and go direct into the park. The study shows that poaching activities from the people possess the greatest challenge to the existence of the wild animals in the park. In some locations, the fences surrounding the park have been vandalized by various people with heinous intentions. In some other instances, cattle grazers, firewood collectors and other categories of people have found their ways into the park. This is another major cause of the conflict between the people and the animals.

The results from the data collected show that 97% of respondent agreed there is observed human encroachment on wildlife corridor. Moreover, over 50% of the respondent either agree or strongly agree that KWS fence in being vandalized by community, invasive plants are found inside the park and there is subsistence poaching of wildlife by unknown people. 50% of the respondents strongly disagree and 50% disagreed that livestock grazing is being carried out inside the park

The consequences of such invasions have been greatly borne by the animals. Many gazelles and antelopes have been killed for consumption. Leopards have been hunted down for their valuable skin. Many trees have been cut down for charcoals and even buffaloes have not been left behind in the poaching activities. The invaders always raid anything that comes by and would kill some animals that they really do not need to kill, and to make it worse, just for fun. The invasive plant species that are found inside the park is as a result of human activities some people living next to the fence have resolved to throw away waste from their farms into the park thus leading to the existence of invasive plant species that is harmful and not edible by wild animals.

Vandalism of LNNP fence has contributed to the increase of human-wildlife conflict when the fence is vandalized wild animals do move out from the park to community land and cause destructions and thus conflict arises.

#### **5.1.4 The response strategies by Kenya wildlife service as a way of mitigating HWC**

96% of the 254 respondents said KWS has developed some ways by which control the movement of and damages caused by wild animals that can be managed by the KWS or themselves. The community around Lake Nakuru agrees that KWS have put in place measures to mitigate the causes of human wildlife conflict. For example, 65% of the respondents agree or strongly agree that KWS has developed a compensation scheme for the affected people. KWS has intensified its fencing to bar wild animals from freely moving to human habitat was rated highly with 77% of the respondents agree or strongly agree.

Therefore, from the research, it can be noted out that KWS has done enough to counter the cases of the people and the animals' conflicts. The research reveals that the people are satisfied with the strategies KWS has put in place to contain the possibilities of the HWC. This simply means that the status should be maintained and the other agents that cause the conflicts between the people and the animals addressed. From this research study, it is therefore important to note that the complaints people sometimes put forward to explain their ferocity towards the animals as far as the ineffective KWS services are concerned rarely affects the people in and around Lake Nakuru National Park.

The Kenya Wildlife strategies that are in place are for instance; corporate social responsibility here KWS has been pro-active in providing water and building class rooms for the affected people though this not a direct solution to curb the issue but it helps in reducing enmity between community and Wildlife.

Electric fencing by Kenya wildlife service at LNNP is also a measure to prevent wildlife from moving out, without the fencing wild animals would have been moving out in large numbers but due fence vandalism by some community members especially during power shortage has led to increase in human wildlife conflict.

### **5.1.5 Human population increase as a source of HWC**

The number of a people living in a given place at a given period of time makes up the population in the place. Nakuru town is both an industrial town and an agricultural town. As a result, it has attracted very many people, from various corners of the country. This has put a lot of pressure on the available natural resources in the place. As more people find refuge in the town, more houses needs to be built to accommodate the higher population. The need to build more residential houses have also given a lot of pressure on the national park as various attempts have been made to expand and build more houses right inside the park.

In some other places, the families that live around the park have built houses so close to the park. The study reveals that many houses are built only arm's length away from the fence of the park. As a result, such family's even use the fence as the demarcation for their homesteads. This has posed a lot of possibilities of conflicts between the animals and the human beings. In the estates built very close to the parks, snakes have sneaked into the residential areas, monkeys and baboons are common guests to the families.

In addition, human population contributes a lot in competition of resources between human beings and wildlife hence leading to conflict. 83% of the respondents agree that migration of people for security reasons has led to increased conflict between people and wildlife. This was heightened in the post-election violence that saw many people become homeless and had to seek refuge in and around the park.

The increase population has encroachment into protected area is factor that 89% of the respondents agree has led to human wildlife conflict. These results are indications that uncontrolled human population growth may lead to increase conflict between the people and wildlife because of competition of resource especially land.

Conflict is most acute in zones in which a wide range of species coexists with high-density human populations (Ogada *et al.*, 2003). To help in curbing the increasing HWC, the concerned stakeholders must therefore come in strongly to lay down strategies that would help in resolving the conflicts. The homeless people should have homes elsewhere, away from the parks.

The government should also enforce a regulation and legislation on the safe distance on which the people should build their homes away from the national park's fences. Moreover, the high level of population growth should be addresses to reduce the cases of the resources overuse and overexploitation.

#### **5.1.6 Indicators of human wildlife- conflict**

It clear from the findings of the study that most people have been victims of human wildlife conflict, there is evidence of crop destruction injuries caused by wild animals, deaths and predation of domesticated animals by dangerous wild animals, from the study 85% of the respondents admits that human beings have been injured by wild animals, 78%, 91% 88% of respondents admits occurrence of deaths, crop destruction and predation by wild animals respectively.

The findings is that most people affected are the farmers by 91% admitting of crop destruction, this is a dangerous issue since farmers do contribute to the economy of this country without the basic need, food, then it brings out a sign of poverty. The farmers around the park should be given an alternative source of livelihood to replace their farming activities so that they cannot languish in poverty.

Changing patterns of agricultural land use in parts of Africa led to increased conflict between farmers and conservationists over crop raiding Elephants (Thirdgood2005).

Kenya being in Africa this study agrees with the findings of Third good where crop destruction by wildlife from the findings was rated high.

### **5.7 Conclusion of the study**

The research study conducted with a questionnaire being given out reveals that of the 270 distributed questionnaires 254 responded to the questionnaire.

This research was able to achieve its underlying objectives. The factors that influence the occurrence of human wildlife conflict came out clearly; the issue of competition over natural resource by human and wildlife is a reality, most people do enter protected areas for various reasons and thus conflicting with wildlife in their territories.

Human populations due to various reasons for instance security has greatly led to overpopulation on areas around Lake Nakuru National park leading to increase in conflict between wildlife and people, with overpopulation people will need land to settle, firewood that is mostly found in protected areas and they even end up developing interests in illegal activities like poaching due to lack of employment.

It is important to note that in the instances that the wildlife have caused various forms of chaos and destructive activities either to the people themselves or to the farming assets, people have found various ways to respond to the attacks. This has seen many of the endangered species, some that are almost extinct being killed by the irate community members. This has also worked to worsen the situation that exists in the HWC scenarios in and around Lake Nakuru national park.

With the existing conflicts it is evident that Kenya Wildlife service have tried to curb the issues human wildlife conflict by coming up with mitigation measures.

## **5.8 Recommendations**

The following recommendations were made from the study.

The government of Kenya through Kenya wildlife service needs to consider reviewing its policy for the minimization of human wildlife conflicts for instance enforcement of regulations and legislation on the safe distance on which people should build their houses away from the National Park

Kenya wildlife service community department to re-strategies on the new ways of mitigating human wildlife conflicts, despite the efforts or the methods that are in place still conflict caused by wildlife is rampant.

Lake Nakuru National Park to consider upgrading its electric fence efficiency and even install alarms on the fences to help in detection of any stray wild animals or people from illegal entry to the park.

The government of Kenya through relevant ministry for example lands and Agriculture ministries in conjunction with ministry of Natural resource to come with harmonized policies that will protect the environment and sustainable use of natural resource.

Farmers being the most affected in terms of crop raiding, the government to come up with an alternative way of livelihood that suits the farmers living around Lake Nakuru National Park, especially programs like wildlife enterprises and creation for community conservancies that can assist farmers to accrue revenue.

Community education and awareness by Kenya Wildlife Service to be enhanced in the areas where people have been affected and lastly Post- election violence evictees to be resettled away from the Park to ease competition over resources.

## **5.9 Suggestions for further research**

The study identified various gaps and hence the following recommendations were made in order to fill the gaps for further research.

A study on the role played by technology in the minimization of human wild life conflict at Lake Nakuru National Park should be considered in future research.

A study to investigate the most notorious wild animal that causes human wildlife conflict in Lake Nakuru National Park surrounding so as to assist the management in decision making of how to handle such animals.

The research findings noted that the laws used to curb the issues of HWC is a contributing factor to the occurrence and therefore suggests a study on the effectiveness of the existing Laws and Policies in regard to human-wildlife conflict.

### 5.10 Contributions to the body of knowledge

This section presents the contribution of the study to the existing knowledge

**Table 5.1 contribution to knowledge**

<i>No. Objectives</i>	<i>Contribution to the body of knowledge</i>
1. To examine Competition over resources as a factor Influencing Human wildlife conflict	Competition over natural resources by wildlife and human beings influences Human wildlife conflict
2. To establish human encroachment to Wildlife corridors and protected areas as factor influencing HWC	Human encroachment to wildlife areas has led to conflict between Humans and wildlife
3. To assess the response strategies by Kenya Wildlife Service to mitigate Human wildlife conflict	Strategies used by KWS, community department to mitigate HWC include: Electric fencing of the LNNP, Community education/awareness, Vigilance by rangers, Corporate Social Responsibility.
4. To determine the relationship between human population increase and human wildlife conflict	Overpopulation around protected areas as influenced the occurrence of human-wildlife conflict

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## APPENDICIES

### APPENDIX 1: LETTER OF TRANSMITTAL TO KWS

To Kenya Wildlife Service,  
P.O BOX 40241,  
NAIROBI.

Dear Sir,

REF: PERMISSION TO CARRY OUT ACADEMIC RESEARCH

I am a graduate student at the University of Nairobi. As a partial fulfillment of the requirements of Master of Arts degree in project planning and management requirement, I am doing a research on the factors influencing Human Wildlife Conflict in communities around the park a case of Lake Nakuru National Park.

In my research, I am attempting to find out on competition over resources, human encroachment to protected areas, your response in mitigating human wildlife conflicts and human population increase as a factor influencing the said conflict.

This survey asks questions related to the above mentioned variables and therefore I am requesting and informing your office of the above research that touches on wildlife. Copies of the final findings will be sent to you for necessary action.

Thank you.

Yours Faithfully

Maurine Musimbi

L50/74962/2012

## **APPENDIX 2: LETTER OF TRANSMITTAL TO THE RESPONDENTS**

Maurine Musimbi

P.O Box 416,

KAPSABET.

Dear respondent,

REF: REQUEST FOR INFORMATION AS A RESPONDENT IN ACADEMIC RESEARCH

I am a graduate at the University Of Nairobi. I am required to carry out an academic research as one of the requirement for fulfilment of a Masters degree under the topic Factors influencing human wildlife conflict in communities living around Lake Nakuru National Park. The purpose of this letter is to request you to provide information in the questionnaire by answering the questions honestly and completely.

Please note that you are assured of confidentiality on the information that you are going to provide.

Thanks

Yours Faithfully

Maurine Musimbi

L50/74962/2012

**APPENDIX 3: Community Respondents Questionnaire**

**Part A: Personal Information**

1. What is your age bracket?  Less than 30  30-39  40-49  
 50 – 59  60 – 69  greater than 69
2. Gender  Male  Female
3. Which area do you live?  
 Mwariki  Lake view  Flamingo  Kivumbini  Free Area/58  Lanet
4. Do wild animals from the park come to your residence?  
 Yes  No
5. What is your occupation.....

**Part B: Competition over natural resources as a factor influencing human-wildlife conflict**

- 1 In your opinion do you feel that competition over resources between wildlife and human beings has influence the occurrence of human wild life conflict in and around Lake Nakuru National Park?  
 Yes  No

The table below lists areas where competition over natural resource between wildlife and human occurs, thus causing conflicts. Please indicate your level of agreement of the cases that occur in and surrounding Lake Nakuru National Park by ticking SD – Strongly Disagree, D – Disagree, U – Uncertain, A – Agree, SA – Strongly agree

<b>Competition over natural resource.</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
Need of land for human development					
Impact of human activities e.g. farming					

Obstruction of water for domestic purposes and no water streaming into protected areas for wildlife					
Natural factors like drought that push animals to human habitations for pastures and water					
Natural factors like drought that push animals to human habitation and vice versa					

**Part C: Human encroachment to wildlife corridors and protected areas**

1. Do you think there has been encroachment of human beings in Lake Nakuru National Park and that it has created conflict between human beings and wildlife in and around Lake Nakuru National Park?

Yes  No

The table below shows some of the indicators due to human encroachment to the National Park that has created conflict between human beings and wildlife. Please indicate your level of agreement of the cases that occur in and surrounding Lake Nakuru National Park by ticking SD – Strongly Disagree, D – Disagree, U – Uncertain, A – Agree, SA – Strongly agree

<b>Human encroachment to wildlife corridors and protected areas</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
KWS park fence vandalism by communities					
Availability of invasive plant species inside the Park					
Some community members do graze their livestock inside the park					
Do people in your community enter the park for unspecified reasons					

Subsistence poaching of wildlife by unknown people					
Has anyone in your community found and arrested inside the park for trespassing					
Have you heard of animal snaring and has any one in your community taken it into the park for poaching bush meat					

**Part III A: KWS Response Strategies in Management of human wildlife-conflict**

Has KWS developed some ways by which you or them control the movement of wild animals and the damages they cause in residence/farm/ranch?

Yes  No

The table below lists some of the ways that KWS might have developed to control the movement and damages caused by wild animals. Please indicate your level of agreement of the controls that occur in Lake Nakuru National Park by ticking SD – Strongly Disagree, D – Disagree, U – Uncertain, A – Agree, SA – Strongly agree

<b>Management of human wildlife conflict</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
<b>(Community awareness and education)</b>					
We attend community awareness on importance of wildlife by KWS					
KWS has developed compensation scheme for the affected people					
KWS has developed voluntary relocation program to the affected					
There is intense human vigilance by KWS rangers against attack by wild animals					

KWS has intensified its fencing to bar wild animals from freely moving to human habitat					
We kill the wild animals whenever we sport them to avoid future damages					
KWS had developed lethal control programs to kill dangerous animals which stray to human habitation.					
KWS has corporate social responsibility/community enterprise for the affected communities					

**Part E: Human population increase as a factor to human wildlife-conflict**

1 In your opinion do you think increase in human population around Lake Nakuru National Park has influence human wildlife conflict?

Yes  No

The table below lists some of the ways in which human population increase has led to human wild life conflict. Please indicate your level of agreement of the cases that occur in Lake Nakuru National Park by ticking SD – Strongly Disagree, D – Disagree, U – Uncertain, A – Agree, SA – Strongly agree

<b>Human population increase</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
Migration of people for reasons of security e.g. post election violence has led to the increase in conflict between people and wildlife					
Increase in population leading to encroachment into Protected areas					
Emergence of towns and trading centers next to national park					

Difficult to catch up with poachers whenever they strike due to high population					
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**Part II: Indicators of human wildlife-conflict**

The table below lists some of the damages you have incurred caused by wild animals. Please indicate your level of agreement of the causes that occur in Lake Nakuru National Park by ticking SD – Strongly Disagree, D – Disagree, U – Uncertain, A – Agree, SA – Strongly agree

<b>Human wildlife-conflict</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
Dangerous wild animals have attacked and injured people in my residence					
Some of my community members have been killed by wild animals					
Wild animals have destroyed crops in my community					
Dangerous wild animals have killed livestock in my residential area					