

**STATUS OF POACHING, COMMUNITY PERCEPTIONS OF ITS IMPACTS ON  
WILDLIFE AND PEOPLE, AND ANTI-POACHING STRATEGIES IN THE MOUNT  
ELGON TRANS-BOUNDARY ECOSYSTEM**

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for the Degree of Master of Science in Environmental Science of Egerton University**

**EGERTON UNIVERSITY**

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## DECLARATION AND RECOMMENDATION

### Declaration

I declare that this thesis is my original work and that no part of it has been submitted or presented for examination for an award of any degree in any other university whatsoever.

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### Recommendation

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## **DEDICATION**

I dedicate this work to my parents for instilling in me a sense of hard work, responsibility, discipline, and commitment at an early stage in life and to my siblings for their immeasurable support, prayers and encouragement.

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## ABSTRACT

The rapidly increasing human population and consequently the human activities carried out especially around wildlife areas such as Mount Elgon trans-boundary ecosystem have increased the pressures on wildlife found in the ecosystem. These pressures occur in the form of habitat loss, poaching and trafficking. Poaching whether commercial or subsistence is a major threat to the viability of wildlife. Not only does it lead to decimation and extinction of some vulnerable species but also negatively impacts entire ecosystems and the local communities found around wildlife areas and who depend on this resource for food and or income. Many studies have been done in this ecosystem but there is little documentation of the status of poaching, the community perception of the impacts and the anti-poaching strategies applied. This study sought to assess the status of poaching, community perceptions of its impacts and the anti-poaching strategies within the ecosystem. The study employed a social survey research design. One hundred households were sampled and interviewed using questionnaires. Secondary data was collected from Kenya Wildlife Services and Uganda Wildlife Authority offices and key informants in Kenya and Uganda. Data was analysed using descriptive statistics. Study results showed that the wildlife taxa mostly targeted in poaching is mammals mainly ungulates (77% in Kenya and 47% in Uganda), primates (37% in Uganda) and rodents (17% in Kenya). Snares (30% in Kenya and 46% in Uganda) and chasing with dogs (24% in Kenya and 28% in Uganda) were the most common method used in poaching. The main motivations for poaching within the study area were for household consumption, need for income through local sale and need for trophies. Human-wildlife conflict (protection of self and property) was also found to be a motivation for poaching. Poaching within the study area takes place in both the core zone and the buffer zone. The peak poaching seasons were the wet season in the Kenyan BR and the dry season in the Ugandan BR. Anti-poaching strategies such as ranger patrols, use of technology, community involvement and awareness campaigns were employed. The community had perceptions on the impacts of poaching. The findings of this study can be used by the management of the biosphere reserves in informing interventions to reduce poaching within the ecosystem.

## TABLE OF CONTENTS

<b>DECLARATION AND RECOMMENDATION .....</b>	<b>ii</b>
<b>COPYRIGHT .....</b>	<b>iii</b>
<b>DEDICATION.....</b>	<b>iv</b>
<b>ACKNOWLEDGEMENTS .....</b>	<b>v</b>
<b>ABSTRACT.....</b>	<b>vi</b>
<b>TABLE OF CONTENTS .....</b>	<b>vii</b>
<b>LIST OF TABLES .....</b>	<b>x</b>
<b>LIST OF FIGURES .....</b>	<b>xi</b>
<b>LIST OF PLATES .....</b>	<b>xii</b>
<b>LIST OF ABBREVIATIONS AND ACRONYMS .....</b>	<b>xiii</b>
<b>CHAPTER ONE .....</b>	<b>1</b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
1.1 Background to the Study .....	1
1.2 Statement of the Problem .....	2
1.3 Objectives.....	3
1.3.1 Broad Objective .....	3
1.3.2 Specific Objectives .....	3
1.4 Research Questions .....	3
1.5 Justification of the Study.....	4
1.6 Scope of the Study.....	4
1.7 Limitations .....	5
1.8 Assumptions .....	5
1.9 Definition of Terms .....	5
<b>CHAPTER TWO .....</b>	<b>7</b>
<b>2.0 LITERATURE REVIEW .....</b>	<b>7</b>
2.1 Introduction .....	7
2.2 Biosphere Reserves .....	7
2.3 Wildlife Conservation in Kenya and Uganda-History, Governance, and Legislation ...	10
2.4 Poaching .....	14
2.5 Motivations for Poaching .....	16
2.6 Methods used in Poaching.....	18
2.7 Impacts of Poaching on Ecosystems and Communities.....	19

2.8 Anti-poaching Strategies .....	21
2.9 Theoretical Framework .....	21
2.10 Conceptual Framework .....	22
<b>CHAPTER THREE.....</b>	<b>25</b>
<b>3.0 RESEARCH METHODOLOGY .....</b>	<b>25</b>
3.1 Study Area.....	25
3.2 The Mt Elgon Ecosystem .....	27
3.2.1 Climate.....	27
3.2.2 Physical Features .....	27
3.2.3 Biological Factors.....	28
3.2.4 Cultural and Political Factors .....	29
3.2.5 Socio-economic Issues and Factors .....	30
3.3 Research Design.....	31
3.4 Sampling.....	32
3.4.1 Sample Size .....	32
3.4.2 Study Sample and Sampling Procedure.....	32
3.5 Data Collection.....	33
3.6 Validity and Reliability .....	33
3.7 Data Analysis .....	33
3.8 Ethical Considerations.....	36
<b>CHAPTER FOUR.....</b>	<b>37</b>
<b>4.0 RESULTS AND DISCUSSION .....</b>	<b>37</b>
4.1 Household Characteristics.....	37
4.1.1 Household Size .....	37
4.1.2 Number of Years a Household has lived within the Biosphere Reserve.....	37
4.1.3 Gender of Respondents.....	38
4.2 Wildlife Species Subject to Poaching .....	39
4.3 Spatial- temporal extent of poaching .....	42
4.3.1 Spatial extent of poaching .....	42
4.3.2 Temporal extent of poaching.....	43
4.4 Motivations for poaching .....	45
4.5 Methods used in poaching.....	46
4.5.1 Indicators of illegal activity in the trans-boundary ecosystem .....	48



4.6 Perceived Impacts of Poaching .....	49
4.7 The anti-poaching strategies applied.....	52
4.7.1 Mount Elgon Biosphere Reserve, Kenya .....	52
4.7.2 Mount Elgon Biosphere Reserve, Uganda .....	54
<b>CHAPTER FIVE .....</b>	<b>56</b>
<b>5.0 SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>56</b>
5.1 Summary of Findings .....	56
5.2 Conclusions .....	56
5.3 Recommendations .....	57
5.3.1 Recommendations to policy makers and stakeholders .....	57
5.3.2 Recommendations for further studies.....	58
<b>REFERENCES.....</b>	<b>59</b>
<b>APPENDICES .....</b>	<b>72</b>
APPENDIX 1: Household Questionnaire for Community Members .....	72
APPENDIX 2: Interview Schedule for Biosphere Reserve/Park Managers .....	77
APPENDIX 3: Interview Schedule for Forest Managers.....	78
APPENDIX 4: Interview Schedule for Chiefs (administrative)/ Community Representative .....	79
APPENDIX 5: Research Authorization Letter- Kenya.....	80
APPENDIX 6: Research Application Approval Letter- Uganda.....	81

## LIST OF TABLES

Table 3.1: Population of Mt. Elgon trans-boundary ecosystem.....	30
Table 3.2: Summary of data analysis .....	35

## LIST OF FIGURES

Figure 2.1: The DPSIR Model for Mount Elgon trans-boundary ecosystem .....	22
Figure 2.2: Conceptual Framework .....	24
Figure 3.1: Location Map of the Study Area showing sample areas .....	26
Figure 4.1: Household size in study area of Mt. Elgon trans-boundary ecosystem.....	37
Figure 4.2: Number of years a household has lived within the biosphere reserve .....	38
Figure 4.3: Gender of respondents.....	39
Figure 4.4: Wildlife species subject to poaching in the Mt. Elgon trans-boundary ecosystem	40
Figure 4.5: Wildlife taxa subject to poaching in the Mt. Elgon trans-boundary ecosystem....	41
Figure 4.6: Spatial extent of poaching in the Mt Elgon trans-boundary ecosystem .....	43
Figure 4.7: Temporal extent of poaching in the Mt. Elgon trans-boundary ecosystem.....	44
Figure 4.8: Motivations for poaching in the Mt. Elgon trans-boundary ecosystem .....	45
Figure 4.9: Methods used in poaching in the Mt. Elgon trans-boundary ecosystem.....	47
Figure 4.10: Items recovered in Mt. Elgon National Park Kenya, May 2017- April 2018 .....	48
Figure 4.11: Weapons and illegal gear confiscated in Mt. Elgon Uganda for the year 2017 ..	49
Figure 4.12: Perceived impacts of poaching on species diversity .....	49
Figure 4.13: Perceived impacts of poaching on community.....	50

**LIST OF PLATES**

Plate 4.1: Wire snares seen in the Mt. Elgon National Park, Kenya.....52

## **LIST OF ABBREVIATIONS AND ACRONYMS**

<b>ACODE</b>	Advocates Coalition for Development and Environment
<b>ASALs</b>	Arid and Semi-Arid Lands
<b>AWF</b>	African Wildlife Foundation
<b>BR</b>	Biosphere Reserve
<b>BRAPA</b>	Biosphere Reserves as Model Regions for Anti-Poaching in Africa
<b>CSR</b>	Corporate Social Responsibility
<b>DPSIR</b>	Drivers, Pressures, State, Impact, Response
<b>EEA</b>	European Environment Agency
<b>GoK</b>	Government of Kenya
<b>IIED</b>	International Institute for Environment and Development
<b>IUCN</b>	International Union for the Conservation of Nature
<b>KFS</b>	Kenya Forest Service
<b>KNBS</b>	Kenya National Bureau of Statistics
<b>KWS</b>	Kenya Wildlife Service
<b>MAB</b>	Man and Biosphere
<b>MoTWA</b>	Ministry of Tourism, Wildlife and Antiquities
<b>MENPK</b>	Mount Elgon National Park, Kenya
<b>MENPU</b>	Mount Elgon National Park, Uganda
<b>NFA</b>	National Forest Authority
<b>PELIS</b>	Plantation Establishment and Livelihood Improvement Scheme
<b>TI</b>	Transparency International
<b>UBOS</b>	Uganda Bureau of Statistics

<b>UN</b>	United Nations
<b>UNEP</b>	United Nations Environmental Programme
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization
<b>U-PCLG</b>	Uganda Poverty and Conservation Learning Group
<b>USFWS</b>	United States Fish and Wildlife Service
<b>UWA</b>	Uganda Wildlife Authority
<b>WCMC</b>	World Conservation Monitoring Centre
<b>WNBR</b>	World Network of Biosphere Reserves
<b>WWF</b>	World Wide Fund for Nature

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Background to the Study

In Africa, wildlife resources offer many important benefits for ecosystems and rural communities found within or near wildlife areas. Various ecosystem processes such as plant regeneration, food webs and plant diversity are dependent upon the presence of fauna. Rural communities use wildlife products as a source of food, medicine, in traditional ceremonies and a source of income (Scoones, Melnyk and Pretty, 1992). In Central and West Africa, bush meat is a major source of protein in addition to being a source of income and safety net during times of hardship (Bowen-Jones, Brown and Robinson, 2003). Trade in bush meat is a significant contributor to the economies of countries in this region though it rarely features in national economic statistics (Bowen-Jones *et al.*, 2003). In Eastern Africa more specifically in Tanzania, bush meat hunting is an important economic activity (Mfunda and Roskafti, 2010). Research carried out in Kenya established that 25% of meat in Nairobi butcheries was bush meat (Okello and Kiringe, 2004; Olupot, Alastair and Andrew, 2009).

Human pressure on wildlife resources is increasing (Wilfred and Maccoll, 2015) especially due to increasing human and cattle population around wildlife areas (Ijeomah, Ogogo and Ogbara, 2013; Ogutu *et al.*, 2016). Africa's population largely depends on natural resources for their livelihoods (Syed, Foli, Al Pavel, Al Mamun and Sunderland, 2015). Agriculture which is a major practice in Africa (Nkamleu and Manyong, 2005) requires land and the rapidly increasing human population has led to deforestation, fragmentation and degradation of wildlife habitats increasing human wildlife conflicts (Hill, 2004) leading to revenge killings and poaching. Habitat loss, wildlife poaching and trafficking are the three major threats to the wildlife in Africa (WWF, 2014). Poaching involves the extraction of any wildlife from the wild, by whatever means and for whatever purpose while trafficking involves trade in the poached wildlife, their parts and products. According to WWF (2015), wildlife trade is now the fourth largest illicit trade valued at over US\$ 19 billion annually.

Bush meat hunting either for household consumption or local commercial trade is a major threat to the continued viability of particular wild fauna species as many species are being hunted at unsustainable rates (Fa, Peres and Meeuwig, 2002). An estimated 6 million tonnes of animals are extracted yearly for consumption in the Congo Basin alone (Nasi *et al.*, 2008).

Research suggests that at this rate, it is impossible to sustain the current levels of hunting in the long term (Wilkie, Bennett, Peres and Cunningham, 2011) and this will lead to the eventual collapse of targeted wildlife populations.

Poaching especially for bush meat has a significant effect on wild animal populations. According to Swamy and Pinedo-Vasquez (2014), poaching for bush meat is the primary threat to about 85% of primates and ungulates and 93% of large-bodied ground-feeding birds that are listed as endangered or critically endangered in IUCN Red List. According to Lamprey, Buhanga and Omoding (2003), massive hunting in the 1970's reduced the population of large mammals by 90% in Uganda. Reducing game populations ultimately reduces the availability of food and income to the people who rely on them (Bennett *et al.*, 2007; Nasi, Taber and Van Vliet, 2011) and more importantly the ecosystem services they provide.

Wildlife resource is an important component of the ecosystem. It provides numerous services and benefits for ecosystems and forest dependent communities, maintaining ecosystem functions and serving as sources of livelihoods and protein for human populations (Carrillo, Wong and Cuaron, 2000). However, increasing human pressure especially in the form of poaching is significantly affecting the continuous stream of benefits that can be obtained from this resource. There is therefore need to put in place measures that will reduce the illegal off take of species so as to allow them to thrive. These measures should be informed by studies on poaching in different ecosystems. Such studies include motivations for continued engagement of communities in poaching, community awareness of conservation and poaching, community perceptions of poaching and how it impacts them, wildlife resources and ecosystems.

## **1.2 Statement of the Problem**

Mount Elgon trans-boundary ecosystem is a unique wildlife area that hosts a variety of wildlife species endemic to the ecosystem. Wildlife in the ecosystem continuously face a lot of pressures associated with increasing human population resulting in habitat loss and an increase in the illegal off take of wildlife from the ecosystem through poaching and trafficking. Poaching whether commercial or subsistence is a big threat to African wildlife. Not only does it lead to decimation and extinction of some species but also negatively impacts entire ecosystems and local communities. The depletion of wildlife reduces income from tourism and impacts the ecosystem services provided by wildlife. There is need to



formulate appropriate interventions to reduce pressures to this ecosystem. This should be based on research carried out on various factors including socio-economics, culture, environmental and conservation awareness, and impacts of human activities on the ecosystem among other studies. Additionally, there is little information on the status of poaching, community perceptions of its impacts and the anti-poaching strategies applied in the trans-boundary ecosystem.

### **1.3 Objectives**

#### **1.3.1 Broad Objective**

The broad objective of this study was to assess the status of poaching, community perceptions of its impacts on wildlife and people and the anti-poaching strategies in the Mount Elgon trans-boundary ecosystem.

#### **1.3.2 Specific Objectives**

The study had the following specific objectives:

1. To document the major wildlife species poached in the core and buffer zones
2. To assess the spatial-temporal extent of poaching
3. To determine the motivations for poaching
4. To document the methods employed in poaching
5. To assess the community perceptions of impacts of poaching on wildlife and the local people
6. To assess the successes and failures of anti-poaching strategies applied in Mount Elgon trans-boundary ecosystem

### **1.4 Research Questions**

This study was guided by the following questions:

1. Which wildlife species are poached in the core and buffer zones?
2. What is the spatial-temporal extent of poaching in the Mt Elgon trans-boundary ecosystem?
3. What are the motivations for poaching in Mount Elgon trans-boundary ecosystem?
4. What methods are employed in poaching?
5. What are the community perceptions of impacts of poaching on wildlife and people?
6. Which anti-poaching strategies are employed in Mount Elgon trans-boundary ecosystem and what factors have led to their success and failure?

### **1.5 Justification of the Study**

The aim of this study was to assess status of poaching, community perceptions of its impacts on wildlife and people and the anti-poaching strategies applied. Results from this study could be useful in informing appropriate interventions for reducing poaching and enhancing conservation. Users of these findings include governments, policy makers, international organizations, students and conservation organizations.

This study is in line with Sustainable Development Goal (SDG) 15 which seeks to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss (UN, 2017). Understanding the status and community perceptions of impacts of poaching in particular ecosystems could aid in formulation of appropriate policies, laws and strategies to counter the vice of poaching. Achieving SGD 15 could also mean making progress in SDG 1 on poverty, SDG 2 on zero hunger, SGD 3 on good health and well-being, SDG 6 on clean water and sanitation, SGD 11 on sustainable cities and communities and SDG 13 on climate action.

The study is also in line with Kenya's Vision 2030 which identifies wildlife based tourism as one of the 6 key sectors planned to deliver a 10% growth rate each year (Weru, 2016). Understanding the threats to the viability of wildlife is an important step in the development of management strategies to ensure sustainability.

### **1.6 Scope of the Study**

This study took place in the core (protected area) and buffer (areas surrounding the core zone) zones of the Mt. Elgon Biosphere Reserves in Kenya and Uganda. The core zones comprise of five protected areas (Mount Elgon National Park Uganda, Mount Elgon National Park Kenya, Namatale Central Forest Reserve, Mount Elgon Forest Reserve and Chepkitale National Reserve). The buffer zone borders the core zone and is basically privately held land where agriculture takes place. These are the two zones where wildlife occurs. The area was chosen as it traverses two countries and has different communities leaving around the wildlife areas who utilize the wildlife resources in different ways. The area is also experiencing rapid population increase. The study assessed the status of poaching, community perceptions of its impacts on wildlife and people, and the anti-poaching strategies. The study focused mainly on vertebrate fauna species mainly mammals, birds and reptiles found in this ecosystem. Both the wet and dry seasons were covered in the study.

## **1.7 Limitations**

In the course of the study, the following limitations were encountered: difficulty in obtaining administrative clearances, language barriers, the community members refusing to be interviewed because poaching is an illegal activity, names of wildlife species being given in local names and hence inability to link the wildlife descriptions to its scientific name. Language barrier had an effect on the results in that some wildlife species given in local names were confused with others of similar characteristics hence what was captured was not what was really meant by the respondent.

## **1.8 Assumptions**

The study was based on the assumption that poaching is taking place in the Mt. Elgon trans-boundary ecosystem and people would be willing to provide information given that it is an illegal activity. This assumption was found to be true during fieldwork. The main effect of this assumption on the study was the researcher had to spend more time in the field conducting interviews as some respondents were not willing to take part in the survey because of the fear of being arrested.

## **1.9 Definition of Terms**

This section gives the meaning of terms as they were used in the study.

**Bushmeat:** meat obtained from non-domesticated terrestrial mammals, birds, reptiles and amphibians for consumption or sale.

**Household:** The basic residential unit in which economic production, consumption, inheritance, child rearing and shelter are organised and carried out.

**Impact:** negative consequences that arise from a situation in this case poaching

**Perceptions:** A range of beliefs, judgements and attitudes held in relation to a given phenomenon

**Poaching:** illegal killing and or extraction of any wildlife from the wild, by whatever means and for whatever purpose

**Wildlife:** vertebrate fauna found in the biosphere reserves

**Community:** A group of people who hold a common interest towards a given natural resource

**People:** The community that lives within wildlife areas and interact with wildlife

**Anti-poaching strategies:** Activities undertaken within wildlife areas to reduce or completely stop the illegal off take of wildlife resources

**Biosphere reserve:** An ecosystem that is internationally recognised under the Man and Biosphere program of UNESCO where approaches to conservation and sustainable development are demonstrated

**Core zone:** A protected area within a biosphere reserve

**Buffer zone:** Areas surrounding the core zone in a biosphere reserve

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 Introduction

Herein is an account of relevant published information, including previous research and studies on poaching. This review brings out the knowledge gaps which the specific objectives endeavored to address.

#### 2.2 Biosphere Reserves

This study was conducted in an ecosystem which traverses Kenya and Uganda and within the designated biosphere reserves in Mt. Elgon by the United Nations Educational, Scientific and Cultural Organization's (UNESCO) Man and Biosphere (MAB) program. Biosphere Reserves are internationally recognized under UNESCO MAB Program as areas of terrestrial and coastal marine ecosystems that demonstrate approaches to conservation and sustainable development. They are intended to promote a balanced relationship between people and nature by integrating conservation and sustainable development. These sites mainly seek to promote biodiversity conservation by combining both productive and conservation activities (UNESCO, 1996; Ruida and Miguel, 2013). They are nominated by national governments, recognized under UNESCO's Man and the Biosphere Program, and remain under the sovereign jurisdiction of the States where they are situated (UN Environment and WCMC, 2014).

The Biosphere Reserve concept traces its origin to the 'Biosphere Conference' of 1968 when MAB programme was initiated (Batisse, 1982) and later launched in 1971. The MAB program is an intergovernmental scientific initiative to improve the relationship between people and their environment, by proposing interdisciplinary research on systemic changes as a result of human activities in the biosphere and training in natural resources management. The Biosphere conference asserted the need for conservation of natural resources along with their utilization for human benefit and put forward recommendations, one of which dealt with utilization and preservation of genetic resources. To this end it was proposed that specific measures should be taken to protect ecosystems, habitats and biodiversity. The recommendations of the conference culminated in the development of the Biosphere Reserves concept which were to act as a coordinated world-wide network of protected areas with the main purpose of ensuring the conservation of wild genetic material through interdisciplinary research, public awareness, education and monitoring (Batisse,

1982). The first 57 BRs with only the core and buffer zones were designated in 1976 by the MAB Bureau. Currently, there are 669 biosphere reserves in 120 countries (UNESCO, 2017a).

All MAB reserves form the World Network of Biosphere Reserves (WNBR) which serve three different functions- conservation, development and logistical support (UN Environment and WCMC, 2014). Conservation function involves conservation of biological diversity which include species, ecosystems and landscapes. Development function involves creating an atmosphere for sustainable economic and human development while the logistical support function entails Biosphere Reserves acting as laboratories/learning sites where demonstration projects, environmental education, training, research and monitoring on conservation and sustainable development take place (Makenzi, 2013;UN Environment and WCMC, 2014).

The concept, design and application of biosphere reserves today is markedly different from the time of its introduction. This is the result of four world congresses on biosphere reserves held in 1983, 1995, 2008 and 2016. The 1983 congress held in Minsk, Belarus elaborated the vision of biosphere reserves to “protected areas of representative terrestrial and coastal environments which have been internationally recognised for their value in conservation and in providing the scientific knowledge, skill and human values to support sustainable development” (UNESCO, 1984). The buffer zone was ‘expanded’ to include a larger area that was referred to as “transition zone”. This was a result of the need for more cooperation between researchers, managers, and the local population to ensure planning and sustainable development, harmonious land, and resource use (UNESCO, 1986 and Batisse, 1986). The functions of this transition zone were experimental research, traditional use, and ecological restoration (Batisse, 1986).

The second congress held in 1995 in Seville, Spain adopted strategies aimed at increasing the consistency between the biosphere reserve concept and its implementation in practice. As of 1995, half of all biosphere reserves were national parks that had been accorded the biosphere reserve status and the buffer and transition zones added. There was also no comprehensive evaluation of progress in the economic, social and ecological systems that comprised the biosphere reserve. It was therefore difficult to identify whether the implementation of the objectives of the MAB programme was successful or not hence the need for Seville Strategy adopted in the 1995 congress (Price, Park and Boumrane, 2010). The Seville Strategy

emphasised and supported the logistical function of biosphere reserves and added the idea of sustainable resource use and economic development to the three fundamental functions of biosphere reserves (UNESCO, 1995). The buffer zone was also separated from the transition zone to create three distinct zones of the biosphere reserve that were to contribute to the objectives of the MAB programme (Ishwaran, 2013). More attention was to be focused on the transition zone in order to integrate biological and cultural diversity, traditional knowledge and genetic nature resources, and their mutual role for sustainable development.

The Seville Strategy also outlined the criteria to be followed when designating an area as a biosphere reserve. This criteria outlined in Article 4 of The Statutory Framework of the World Network of Biosphere Reserves includes the ecological characteristics, its significance for biodiversity conservation, nature and landscapes protection, opportunities for sustainable development, appropriate size and zoning (one or more core zones, buffer zone and transition zone), a management policy or plan with actions, a nationally designated authority or mechanism for implementation, programmes for research, monitoring, environmental education, and training that involve stakeholders and communities in the management of the biosphere reserve (UNESCO, 1995).

The third world congress held in Madrid, Spain culminated in the approval of The Madrid Action Plan 2008-2013. The action plan further highlighted biosphere reserves as exemplary learning sites for sustainable development (UNESCO, 2008). The Lima Action Plan 2016-2025 approved after the fourth congress in Lima, Peru also placed strong emphasis on the dissemination of the models of sustainability and success throughout the biosphere reserves (UNESCO, 2017b).

The three zones of Biosphere Reserves that is the Core zone/area, Buffer zone and Transition area (Makenzi, 2013) serve different purposes. Core zones are basically the conservation units/protected areas such as national parks. They are usually surrounded by Buffer zones where activities carried out therein must be in line with conservation objectives of the Biosphere Reserve. Their main purpose is to minimize impacts on the core zones. Buffer zones are surrounded by Transition areas. Transition areas promote improvement of the quality of life of local communities and integration of the Biosphere Reserve with the surrounding urban, agricultural and industrial areas (Makenzi, 2013). The core areas are mostly public land but can be also privately owned or belong to non-governmental

organizations. In many cases, the buffer zone is in private or community ownership, and this is generally the case for the transition area (Makenzi, 2013).

MAB reserves are nominated for inclusion in the WNBR by national governments. Some countries have enacted legislation specifically to establish MAB reserves. In many others, the core areas and buffer zones are designated (in whole or in part) as protected areas under national law. A number of biosphere reserves simultaneously encompass areas protected under other national systems (such as national parks or nature reserves) and other regional or international conventions and agreements (such as World Heritage sites or Ramsar sites). Man and Biosphere Program does not require any changes in the national laws of countries, therefore the legal protection of core zones must stem from existing national legislation (Makenzi, 2013; UN Environment and WCMC, 2014; UNESCO, 1995). Regional and sub-regional collaboration in the management of MAB reserves exists in the form of trans-boundary reserves, twinning arrangements between two sites in different countries and thematic networks based on similar ecosystems (UNESCO, 1995).

In accordance with the 1995 Statutory Framework for the World Network of Biosphere Reserves, all MAB reserves must be reviewed every ten years in order to assess their health, status and progress (UNESCO, 1995). However, in practice, it has been difficult to manage this review process because of the potentially high cost of preparing review reports or lack of adequate national infrastructure. As a result, reviews may be undertaken less often. In theory, MAB reserves not able to meet the criteria are withdrawn from the Network (UNESCO, 1995; UN Environment and WCMC, 2014).

### **2.3 Wildlife Conservation in Kenya and Uganda-History, Governance, and Legislation**

Kenya Wildlife Service (KWS) and Uganda Wildlife Authority (UWA) are the two bodies in Kenya and Uganda mandated with the protection of wildlife and enforcement of laws and regulations related to wildlife (UWA, 2013b; Weru, 2016). Kenya Wildlife Service was established in 1989 through an amendment of the Wildlife Act of 1976 which was Kenya's first comprehensive legal framework for the conservation and protection of wildlife (Weru, 2016). Kenya Wildlife Service maintains a highly trained wildlife security field operations force of game rangers and wardens who are at the frontline in the fight against wildlife poaching and trafficking (Karanja, 2012; Weru, 2016). Uganda Wildlife Authority was established in 1996 by the Uganda Wildlife Act Cap 200 (an act of parliament) through the merging of Uganda National Parks and the Game Department with the role of ensuring



sustainable management of wildlife and coordination, monitoring and supervision of activities related to wildlife management (UWA, 2013b; U-PCLG and ACODE, 2014).

Uganda's wildlife conservation areas managed by UWA include 10 National Parks, 12 Wildlife Reserves, 13 wildlife sanctuaries and 5 community wildlife areas. Uganda Wildlife Authority provides guidance to the management of the sanctuaries and community wildlife areas (UWA, 2013b; MoTWA, 2014; Mariel *et al.*, 2015). Kenya Wildlife Service on the other hand manages 23 national parks, 31 national reserves, 6 national sanctuaries, 4 marine national parks, 6 marine national reserves and 154 field stations for management of wildlife outside protected areas (KWS, 2012).

Traditionally, Kenyan communities lived amongst and used wildlife resources. They ensured conservation of the wildlife resource through cultural and social bonds and traditional practices. Sacred beliefs centred on certain wildlife species ensured that conservation principles became part of their way of life (Ministry of Forestry and Wildlife, 2012).

The first law aimed at controlling hunting was enacted in 1898 immediately after Kenya became a British Protectorate. This law regulated hunting, hunting methods and trade in wildlife with some endangered species being fully protected. Later on in 1907 the British government established the Game Department to administer the Game Reserves, enforce the hunting regulations and protect settler farmer communities' property and crops from wildlife (Steinhart, 1994; Ministry of Forestry and Wildlife, 2012). In 1945, the Royal National Parks of Kenya Ordinance was promulgated to provide for the establishment of national parks (Ministry of Forestry and Wildlife, 2012). In the following year, Nairobi National Park was established (Steinhart, 1994; Weru, 2016).

After independence, the Government of Kenya pronounced sessional paper number 3 of 1975 entitled 'A Statement on Future Wildlife Management Policy in Kenya' as the embodiment of wildlife policy in Kenya, thus laying the foundation for the first wildlife law, the Wildlife (Management and Conservation) Act of 1976. This law identified the primary goal of wildlife conservation as the optimization of returns from wildlife, defined broadly to include aesthetic, cultural, scientific and economic gains, and placed the government as the sole custodian of wildlife. It also pointed out the need to identify and implement compatible land uses and fair distribution of benefits derived from wildlife including from both non-consumptive and consumptive uses of wildlife and the need for an integrated approach to wildlife conservation and management in order to minimize human-wildlife conflicts. The

government assumed the responsibility of paying compensation for damages caused by wildlife (Ministry of Forestry and Wildlife, 2012; Weru, 2016).

The Wildlife (Conservation and Management) Act of 1976 was Kenya's first comprehensive legal framework for conservation and the protection of wildlife. It was enacted to provide a legal and institutional framework for the implementation of the Policy. This Act amalgamated the then Game Department and the Kenya National Parks to form a single agency, the Wildlife Conservation and Management Department (WCMD), to manage wildlife. Driven by the poaching crisis of the 1970s and 1980s, the act was amended in 1989 to establish KWS (Weru, 2016).

Following the adoption of the new Constitution of Kenya in 2010, the Government of Kenya reviewed the Wildlife Act and enacted the new Wildlife Conservation and Management Act (WCMA) in 2013, which provides for stiffer penalties in response to resurgent, increasingly sophisticated poaching threats (Ministry of Forestry and Wildlife, 2012; Weru, 2016). The WCMA of 2013 upholds and strengthens the mandate of the KWS to protect, conserve for sustainable use and management of wildlife in Kenya. Notable changes in the WCMA of 2013 include; higher recognition of the role of community and private conservancies in managing wildlife and more stringent minimum penalties for wildlife crimes {e.g. a fine of KES20 million / USD206 028 as at June 11, 2015, and/ or life imprisonment for the killing of threatened or endangered species} (GoK, 2013).

Wildlife conservation in Uganda is governed under overall guidance of the national Constitution supported by various framework policies and laws including the National Environment Policy (1994) and National Environment Act, Cap 153 of 2000. Other enabling policies and laws include the Local Government Act, 1997; National Forestry and Tree Planting Act, 2003; Wetland Policy, 1995; Oil and Gas Policy for Uganda, 2008; Fish Act, Cap 197 of 2000; Animal (Prevention of Cruelty) Act, Cap 220; Cattle Grazing Act, Cap 222 of 2000; Plant Protection Act; Prohibition of Burning of Grass Act, Cap 33 of 2000; Animal Diseases Act, Cap. 218 of 2000; among others (MoTWA, 2014).

The 1995 Constitution of the Republic of Uganda provides for state protection of important natural resources such as land, water, wetlands, minerals, fauna and flora on behalf of the people of Uganda under Objective XIII. It provides for creation and development of Parks, Reserves, recreation areas and conservation of natural resources by central and or Local Governments under Objective XXVII. The same objective further obligates the state to

promote the rational use of natural resources so as to safeguard and protect the biodiversity of Uganda (Akello, 2007; MoTWA, 2014; Mariel *et al.*, 2015).

Wildlife conservation in Uganda dates back to pre-1880s when local kingdoms regulated and controlled use of all wildlife resources under guidance of culture and traditional way of life. Traditional and sacred practices ensured that particular wildlife species were protected and maintained (Mariel *et al.*, 2015). Between 1880 and 1902 after Uganda became a British Protectorate, the colonial government set aside major ecosystems and wildlife communities for conservation and sustainable use. This was followed by introduction of sport hunting and ban of traditional hunting methods and tools between 1902 and 1923. This created limitations and difficulties to continued use of wildlife resources by local communities (MoTWA, 2014).

The Game Elephant Control Unit was established in 1923 and turned into the Game Department in 1925 to 1926 under the Game Ordinance of 1926. Its main objective was to guard against potential depletion of large game species including elephants, rhinos, lions and hippos. The colonial government continued with the process of assessing the condition of wildlife resources culminating into identification of areas of great concentration, some of which were later gazetted as Game Reserves (Lake George, Toro, Lake Edward, Bunyoro and Gulu) under the Game (Preservation and Control) Ordinance of July 1926 (Mariel *et al.*, 2015).

The process of identifying areas important for wildlife resources based on population numbers and habitat condition continued, culminating into creation of two National Parks, in a process that combined lake Edward and Lake George Game Reserves to create Queen Elizabeth National Park and combining of Gulu and Bunyoro Game Reserves to create Murchison Falls National Park, under the National Parks Ordinance No. 3 of 1952. The National Parks Ordinance created a new dispensation in wildlife conservation where the management of the new national parks – a highest category of wildlife conservation area, was put under a separate fully autonomous institution called the Uganda National Parks. The process and the new development therefore left the Game Department under the Game Preservation and Control Act to be responsible for management of all wildlife outside National Parks and overall policy development and supervision of the sector (Mariel *et al.*, 2015).

From 1959 to 1962, the national programme on wildlife conservation, now under the two institutions, led by the Game Department, embarked on consolidating gains including identification of additional important areas for (a) protection of wildlife and (b) human-wildlife conflict with special reference to problem elephants. As a result, more conservation areas were created including Controlled Hunting Areas (seasonal) and Wildlife Sanctuaries; leading to the National wildlife conservation Programme that was adopted by the newly independent Uganda of 1962 under the Game (Preservation and Control) Act of 1962. The subsequent process involved the creation of more protected areas including National Parks (Kidepo, 1963), Game Reserves and in particular the establishment of permanent Controlled Hunting Areas under Uganda National Parks Act of 1964 and Game (Preservation and Control) Act of 1964 respectively (MoTWA, 2014).

The wildlife conservation process was historically guided by the existing legislation as shown above and strongly supported by policy positions of the day which were mostly contained in political statements (verbal and written), including Government positions provided for in the Annual Reports of the Game Department, and to some extent the Forestry Department and the Fisheries Department. The first written policies on wildlife conservation were the draft versions of 1994 and 1999. The 1994 Wildlife Policy for Uganda gave recognition to community participation in wildlife management (Mariel *et al.*, 2015). The draft version of 1999 culminated in the Uganda Wildlife Act of 2000 which was reviewed in 2014 following the enactment of the Wildlife Policy of 2014, other new laws such as Oil and Gas Policy related to this sector that could undermine its effectiveness and new conservation challenges that had emerged since its enactment in 2000 (U-PCLG and ACODE, 2014).

## **2.4 Poaching**

Poaching is one of the most severe threats to wildlife (Lindsey *et al.*, 2012). The UNESCO-Encyclopedia of Life Support Systems (EOLSS) defines poaching as all the illegal taking of wildlife species, species being either terrestrial or aquatic, both vertebrates and invertebrates, prompted by reasons that differ across localities, social and political conditions, traditions, and animals themselves that are the objects of poaching. Based on this definition, two forms of poaching emerge, that is subsistence and commercial poaching.

Subsistence poaching involves killing or capture of wildlife mainly for provision of food in form of bushmeat for households of poachers involved. It also involves hunting as rites of passage where young men hunt and kill wildlife to prove their manhood. Commercial

poaching is done mainly for income. The wildlife parts and products are sold to willing buyers in available markets. Depending on need, poachers can either work alone, in groups or under command (Neale and Stiles, 2011). Poaching for bushmeat trade is unsustainable and places significant pressure on wildlife. This practice is recognised as the major threat to wildlife biodiversity in Africa (Wilkie and Carpenter, 1999).

Within protected areas, poaching majorly occurs in areas bordering human settlements and generally reduces as one moves from the borders into the core zones (Wato, Wahungu and Okello, 2006; Marealle, Fossa, Holmern, Stokke and Skaft, 2010). This is because with great distances poachers incur more in terms of effort to find wildlife and costs to transfer the wildlife back to their homesteads or to markets (Hofer, Campbell, East and Huish, 2000). Poachers will mostly target large body sized wildlife species first (Peres 2000; Jerzolimski and Perez, 2003). Large animals supply enormous amounts of meat in addition to valuable horns, antlers, tusks, furs, skins, feathers or other artifacts. Thus, the value returned per unit of time and cost expended by poachers is greatest for large animals. Once these have been removed, medium sized species weighing between 2-50kg are the most targeted (Nasi *et al.*, 2011).

Mammals are the major class of animals poached (Fa *et al.*, 2006; Suarez *et al.*, 2009; Fa, Alberchtsen, Johnson and MacDonald, 2009). A study of bush meat markets in Central Africa showed that mammals represented more than 90% of meat sold (Ntiamoa-Baidu, 1987; Fa *et al.*, 2009). This concurs with a similar study done in bush meat markets in the Amazon (Suarez *et al.*, 2009). Majority of these mammals are ungulates (36–40%), followed by rodents that account for 34-38% and primates accounting for 13-19% (Jerzolimski and Peres, 2003).

Patterns in poaching activity are also common especially in protected areas. Lindsey, Romanach, Tambling, Chartier and Groom, (2011) and Brown (2007) found out that, poaching peaks in the late dry season when wildlife is concentrated around water sources. It is also affected by patterns in agricultural activity and the amount of time people have available for hunting (Lindsey *et al.*, 2011). In a study conducted in Save Valley Conservancy and Mun-ya-wana, Lindsey *et al.* (2011) found out that, poaching peaks during periods of moonlight when hunters are more able to see and on rainy nights in Mun-ya-wana as rain reduces the risk of being apprehended by rangers. Similarly, a study by Haines *et al.*

(2012) in Iowa, USA found out that poachers preferred to be active during the evening in October to December, on days with no precipitation and with high visibility.

Wildlife species that are poached differ from one region to another depending on preferences (USFWS MENTOR Fellowship, 2008; Haines *et al.*, 2012) especially in relation to bush meat trade. However it is important to note that commercially valuable species such as elephants and rhinos are poached throughout their range for their trophies. Majority of wildlife species are poached for meat. Examples include Tiang in South Sudan (USFWS MENTOR Fellowship, 2008) that supplies about 60-70% of bushmeat with the result being dramatic reduction in population numbers. The white eared kob and hippopotamus are also targeted in poaching for bushmeat (USFWS MENTOR Fellowship, 2008).

Several species are indirectly impacted by poaching. These include cheetahs, lions, wild dogs and leopards (USFWS MENTOR Fellowship, 2008). These wildlife species are either directly targeted for poaching or are attracted to carcasses caught in snares and end up being caught themselves or have a wide feeding range ( especially wild dogs) within which they are likely to encounter snares (Lindsey *et al.*, 2012).

Most of the studies done have focused on either poaching of key species for their skins, teeth, horns and tusks or poaching for bushmeat especially in Central and West Africa. Few studies have been done on this phenomenon in Eastern Africa and especially in trans-boundary ecosystems. This study therefore sought to fill this gap to better understand the issue of poaching in this landscape.

## **2.5 Motivations for Poaching**

Muth and Bowe Jr. (1998) classified the motivations for poaching into a typology with ten categories. These are commercial gain, household consumption, recreational satisfactions, trophy poaching, thrill killing, protection of self and property, poaching as rebellion, poaching as a traditional right, disagreement with specific regulations and gamesmanship. A poacher is likely to have multiple motivations for engaging in poaching which are sometimes dependent on long or short term factors. These motivations are equally dynamic. What causes a poacher to engage in poaching in one given year may not be similar to the motivations for another year (Knapp, 2012).

Poaching for commercial gain involves the illegal harvest or sale of wildlife for purposes of gaining economic benefits. Commercial gain can be derived through sale of whole specimens

or sale of parts and products (Leader-Williams and Milner-Gulland, 1993). Poaching for household consumption involves illegal taking of wildlife for provision of meat for consumption within the household or for non-commercial sharing among extended family or friends (Bassett, 2005). Wildlife species targeted for bushmeat are usually those with desirable, high quality meat such as antelopes. Poaching for household consumption provides meat that is obtained inexpensively and cannot be legally obtained in the market. Merwin (1972) observed that anyone can be a meat-poacher. In his study, conservation officers reported that they have arrested carpenters, janitors, religious leaders, college students and community leaders. Poaching to supplement one's family food budget occurs across income levels even when there is no physical, nutritional, or economic dependency on illegally harvested game to supplement the household diet.

Another important motivation is poaching to protect self and property. This motivation involves illegally killing wildlife because the poacher believes they represent a threat to their property or livelihood (Hill, 2004). This act includes trapping of problem animals that destroy crops or threaten domestic livestock. This motivation results from failure of government agencies' reimbursement plans. They usually feel the need to take initiative in controlling these problem animals through illegal harvest. Poaching can also be motivated by a form of rebellion against the state. A person can poach to defy the law of the land in an attempt to wrench from the state what he or she believes is rightfully theirs (Bell, Hampshire and Topalidou, 2007). A study by Kesel (1974) found out that close to 6% of violations occurred as a result of dislike of the Department of Natural Resources.

Poaching as a traditional right of use is motivated by the sense that traditional rights of access, or participation in a traditional activity, have been unjustly prohibited. Most communities around protected areas perceive that they possess traditional rights of land tenure and resource use. They therefore expect a continuation of hunting privileges that have always been available for them. When these rights are denied by change in land use designations, resentment and feelings of injustice arise on the part of these communities who were originally traditional users (McCay, 1984; Daisey and Hall, 1989).

Studies conducted in sub-Saharan Africa have cited commercial gain, household consumption and protection of self and property as the most common motivations for engaging in poaching (Draulans and Krunkelsven 2002; Bowen-Jones *et al.*, 2003; Hill, 2004; Kumpel, Milner-Gulland, Cowlshaw and Rowcliffe, 2010 ; Chaber, Allebone-Webb,

Lignereux, Cunningham and Rowcliffe, 2010 ; Knapp, 2012 ; Sayer *et al.*, 2012; Swamy and Pinedo-Vasquez, 2014). However, a study conducted in Caprivi, Namibia showed more other motivations in addition to these three. These include poaching as a form of entertainment, for firearms training, to acquire medicinal animal products, and as a form of protest of rules or lack of benefits from wildlife conservation (Kahler and Gore, 2012).

Poverty is a major push-factor in each of these drivers. Poor people are more dependent on natural resources as a source of livelihood (Roe *et al.*, 2014). According to TRAFFIC (2008), natural resources can be a regular source of income, a safety net in times of stress and shock or a profitable business for a few. Lack of resources and money with which to buy the resources may force the people to engage in poaching and use the wildlife products either for subsistence or income generation. This is especially the case with bush meat hunting.

Availability of markets and poor governance create enabling conditions for poaching. Poor governance manifests itself through issues such as corruption which is critical in enabling poaching (TI, 2013). Organised crime syndicates involved in poaching (Milliken and Shaw, 2012) thrive through corruption that facilitates their trade from the grassroots to the consumers (Environmental Investigation Agency, 2008). They will pay poor villagers to poach the animals, wildlife protection officers to allow poaching and custom officials to allow passage of the wildlife products through the airports (TI, 2013). Wealthy communities and international middlemen create a demand hence market for wildlife parts and products (Weru, 2016). This demand is satisfied by poor communities that will go to all lengths and engage in poaching of the commercially valuable species.

Understanding poachers' motivations is an important step in crafting appropriate and effective responses and increasing compliance with wildlife rules. Limited studies have been done under this subject especially in the Eastern Africa Region. This study therefore sought to fill this gap by undertaking to understand the motivations for poaching within the Mt. Elgon trans-boundary ecosystem.

## **2.6 Methods used in Poaching**

The method used in poaching will largely depend on the wildlife species being poached. These methods include rifles, muzzle-loaders, shotguns, dogs, fire, gin traps, pitfall traps, poison and snares (Neale and Stiles, 2011; Lindsey *et al.*, 2012).



Snaring is the most common method used in poaching. It is composed of a noose attached to trees and placed in areas where wildlife are likely to pass. Wildlife gets caught when they put their leg or head into the snare and pull it tight as they keep moving (Hofer, Campbell, East and Huish, 1996; Noss, 1998). Materials used to make snares include natural fibre or nylon when making snares for small mammals or birds and wire when making snares for larger mammals (Lindsey *et al.*, 2012). Snares result in the death of non-target species because they are not easy to detect and carnivores attracted to the wildlife caught up in the snares could end up being snared also (Hofer *et al.*, 1996).

Dogs are used in the poaching process to chase wildlife into holes or bay them. Once wildlife are gotten into these positions, they are killed with either spears or bow and arrows (Jachmann, 2008; Lindsey *et al.*, 2011). Lindsey *et al.* (2012), reports that fire is used to flush out wildlife which is then caught by the poachers. Rifles and shotguns are typically used for larger animals and arboreal species (Van Vliet, 2008).

There exist similarities in the methods used in poaching across regions especially in tropical Africa. This study sought to establish the on ground methods employed in poaching in the Mt. Elgon trans-boundary ecosystem consequently building on the available knowledge base.

## **2.7 Impacts of Poaching on Ecosystems and Communities**

Poaching is a disruptive process that not only affects biodiversity but also communities and countries (Mariel *et al.*, 2015). Communities can benefit positively and negatively from poaching. Communities engaged in poaching of specific wildlife species such as elephants and rhinos for their valuable parts get a significant amount of money given the high market price for this commodity. They also benefit from bush meat hunting either as a source of protein or income (Mariel *et al.*, 2015). These activities provide immediate benefits and should be carried out at a level that is sustainable. However, this is not always the case, which has led to poaching having much broader and long-term negative impacts on communities and countries.

Unsustainable poaching affects biodiversity. Poaching is now attributed as the key factor contributing to decreasing wildlife populations in many African landscapes (Okello and Kiringe, 2004; Scholte, 2011). Predators are indirectly affected by poaching as they end up being caught in snares that have carcasses. Target species of poaching have had their populations dramatically reduced with various species facing local extirpations (Lindsey *et al.*, 2012).

Poachers focus initially on large animals (Jerozolinski and Perez, 2003), and continue to poach them even when their numbers become low. Large species reproduce slowly making them vulnerable to overhunting and limiting their capacity to recover from population declines (Nasi *et al.*, 2011). Such species comprise the majority of the mammalian biomass in undisturbed forests, and play keystone ecological roles. Most ecosystem processes are driven by the combined activities of many species. Plant regeneration affected by pollinators, seed dispersers and predators and plant diversity affected by a change in herbivory patterns or pest increase are often dependent upon the presence of specific species or groups of species (Wright *et al.*, 2007, Terborgh *et al.*, 2008, Vanthomme, Belle and Forget, 2010). Reduction or loss of such species through poaching will have wider impacts on the forest community especially in tropical forests. The loss of animals from forest ecosystems and the resultant disruption of ecological and ultimately evolutionary processes, changes in species composition and probable reduction in biological diversity are collectively known as the “empty forest syndrome” (Emmons, 1989; Redford, 1992).

With declining wildlife resources, the people living in and around forests are the ones who suffer most. These people include hunter-gatherers, swidden cultivators and the urban poor who are mostly the poorest and marginalized in their countries lacking skills to secure employment, access to credit and markets and ultimately unable to switch to alternative livelihoods or food sources. The poor are more dependent on bush meat as a source of food and income (De Mérode, Homewood and Cowlshaw, 2003 and Nasi *et al.*, 2008). Declining wildlife resources reduce the availability of food and income to these people (Swamy and Pinedo-Vasquez, 2014).

Local people, law enforcement officials and park rangers are usually disadvantaged in the fight against poaching. They may be threatened, killed or their property destroyed because of their involvement in anti-poaching campaigns (Lichtenstein, 2015; Jenes and Lotter, 2015). Communities lose out also on the gains that accrue from tourist activities. Tourists will not come because of lack of wildlife to view and the insecurity associated with organised criminal syndicates involved in poaching. This will also mean losses in foreign exchange earnings for the particular country (Duffy and St John , 2013).

This study sought to build on other works done across Africa on the impacts of poaching on game populations, ecosystems and the local communities. This study focused on obtaining

views from the community on their perception of impacts of poaching on wildlife and the local people.

## **2.8 Anti-poaching Strategies**

Anti-poaching strategies are programs at different levels, from the source of wildlife populations to the end-point where wildlife products are sold or consumed, designed to manage wildlife poaching and unsustainable off take of wildlife resources. They can be grouped into two: - precautionary and reactionary. Precautionary strategies stop the killing or capture of wildlife resources while reactionary strategies are those that deal with stopping of the illegal wildlife trade. Different strategies have been employed in different areas and have shown to be successful as they have greatly reduced the poaching trends in these areas with a direct benefit on the wildlife populations.

Anti-poaching strategies include controlling poaching through enforcement and patrols (Steinhart, 1994), turning poachers into gamekeepers (Steinhart, 1994), involvement of local communities in wildlife management (Songorwa, Buhrs and Hughey, 2000), involvement of the private sector, regulating demand for wild meat (Nasi *et al.*, 2008), poacher education, alternative income generation, and subsidies to encourage domestic meat production (Swamy and Pinedo-Vasquez, 2014). These have been applied successfully in various conservation areas around the world.

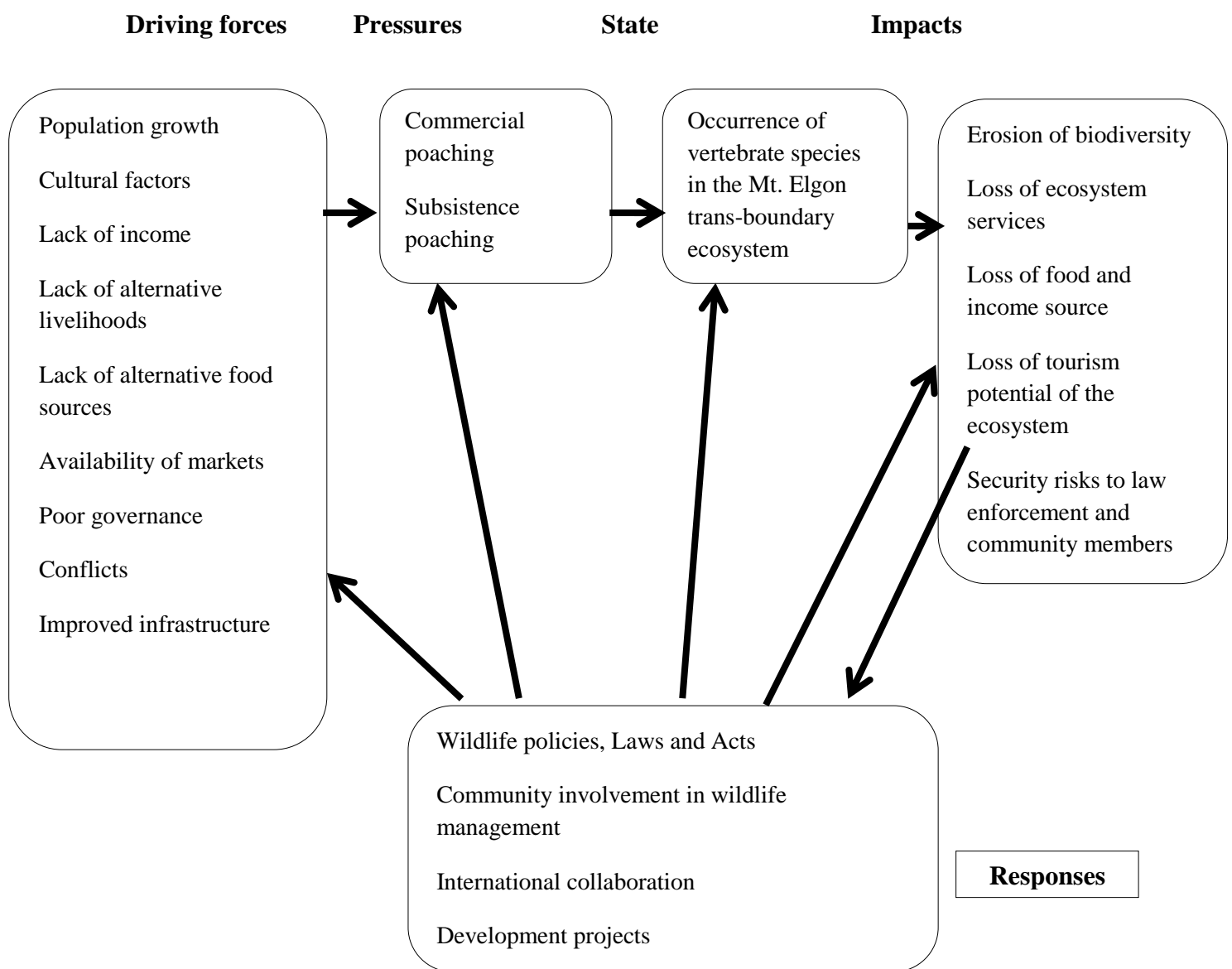
The anti-poaching strategies that have been employed in South Africa for specific species such as Rhino are dehorning, poisoning of the horn using a mixture of poison and indelible ink which renders the horn useless, use of drones and anti-poaching heat sensing planes to detect poaching activities, community based conservation, policy formulation and shoot to kill policy (Mukwazvure and Magadza, 2014; Cheteni, 2014).

This study sought to build on the existing knowledge on anti-poaching strategies and their factors of success and failure in the Mt. Elgon trans-boundary ecosystem.

## **2.9 Theoretical Framework**

This study was premised on the Driving forces, Pressures, States, Impacts and Responses (DPSIR) framework developed by the European Environment Agency {EEA} (Tapio and Willamo, 2008). According to this framework, there is a chain of casual links starting with driving forces through pressures to states and impacts which lead to responses.

Driving forces are needs and wants that spur human activities to achieve them. These human activities exert pressure on the environment. This pressure results in the state of the environment being affected. State of the environment is the combination of physical, chemical and biological conditions. Changes in the state of the environment lead to impacts on the functioning of ecosystems, their life-supporting abilities, human health and economic and social performance of society. These undesired impacts lead to responses by the society or policy makers. These responses attempt to prevent, eliminate, compensate or reduce consequences of impacts. This framework was useful in determining relationships between various components of the study and establishing a theory of change as shown in Figure 2.1.

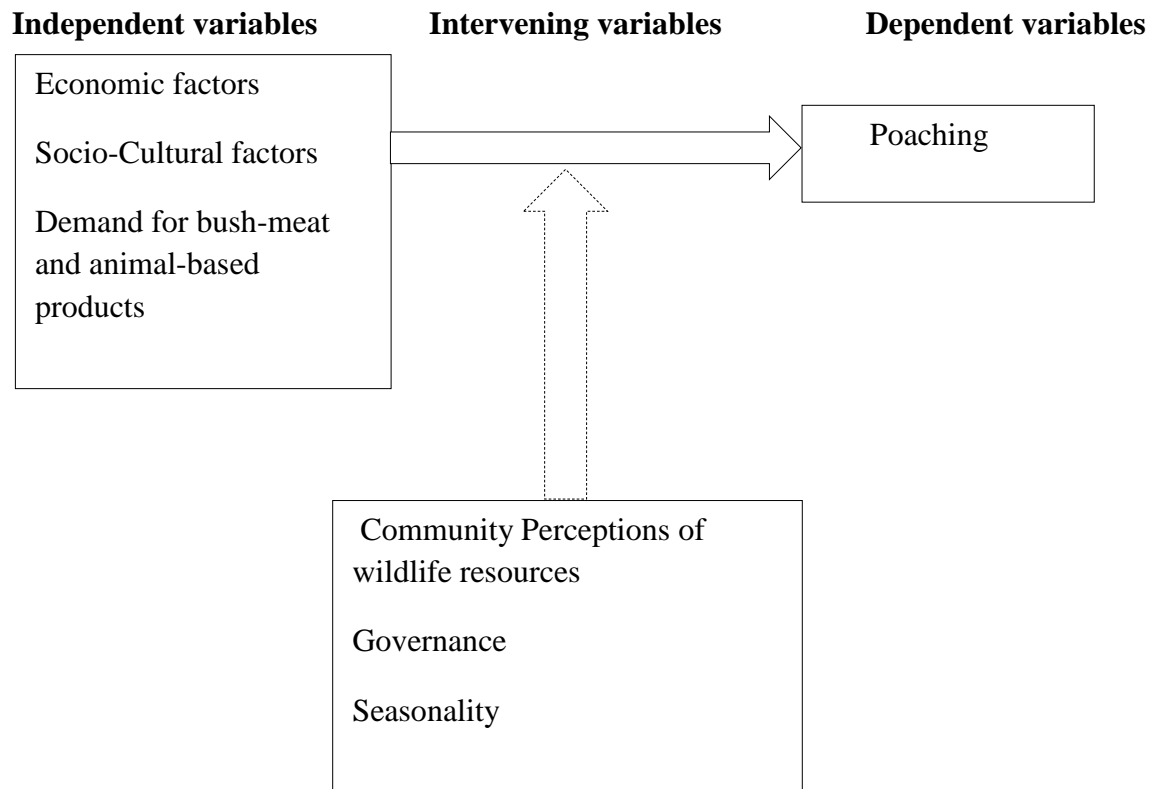


**Figure 2.1: The DPSIR Model for Mount Elgon trans-boundary ecosystem**

## **2.10 Conceptual Framework**

Execution of this study was based on the conceptual framework as shown in Figure 2.2. Poaching impacts biodiversity and communities found within and around conservation areas. This constitutes the dependent variable.

Economic factors such as poverty, lack of income and alternative livelihoods, cultural factors such as people's food habit and cultural requirements in traditional ceremonies, social factors such as increasing populations around conservation areas and availability of market all influence poaching. The need for animal protein and income motivates people to poach. Some traditions require killing of wildlife for specific ceremonies and for men to be recognised. People will only poach for commercial trade if there is a market for the wildlife parts and products. These constitute the independent variables. The intervening variables were community perceptions of wildlife resources, governance in terms of poor enforcement of policies, conflicts and corrupt officials and seasonality i.e. wet and dry seasons. Community members perceive wildlife resources differently. Some perceive them as a nuisance since they destroy crops in their farms which equal their livelihoods. This will in turn motivate poaching so as to protect their livelihoods. Community perceptions of wildlife also influence socio-cultural factors which in turn influence poaching. Seasonality also influences poaching as well as economic factors. People are more likely to poach during certain seasons when they have need for more money.



**Figure 2.2: Conceptual Framework**

## CHAPTER THREE

### 3.0 RESEARCH METHODOLOGY

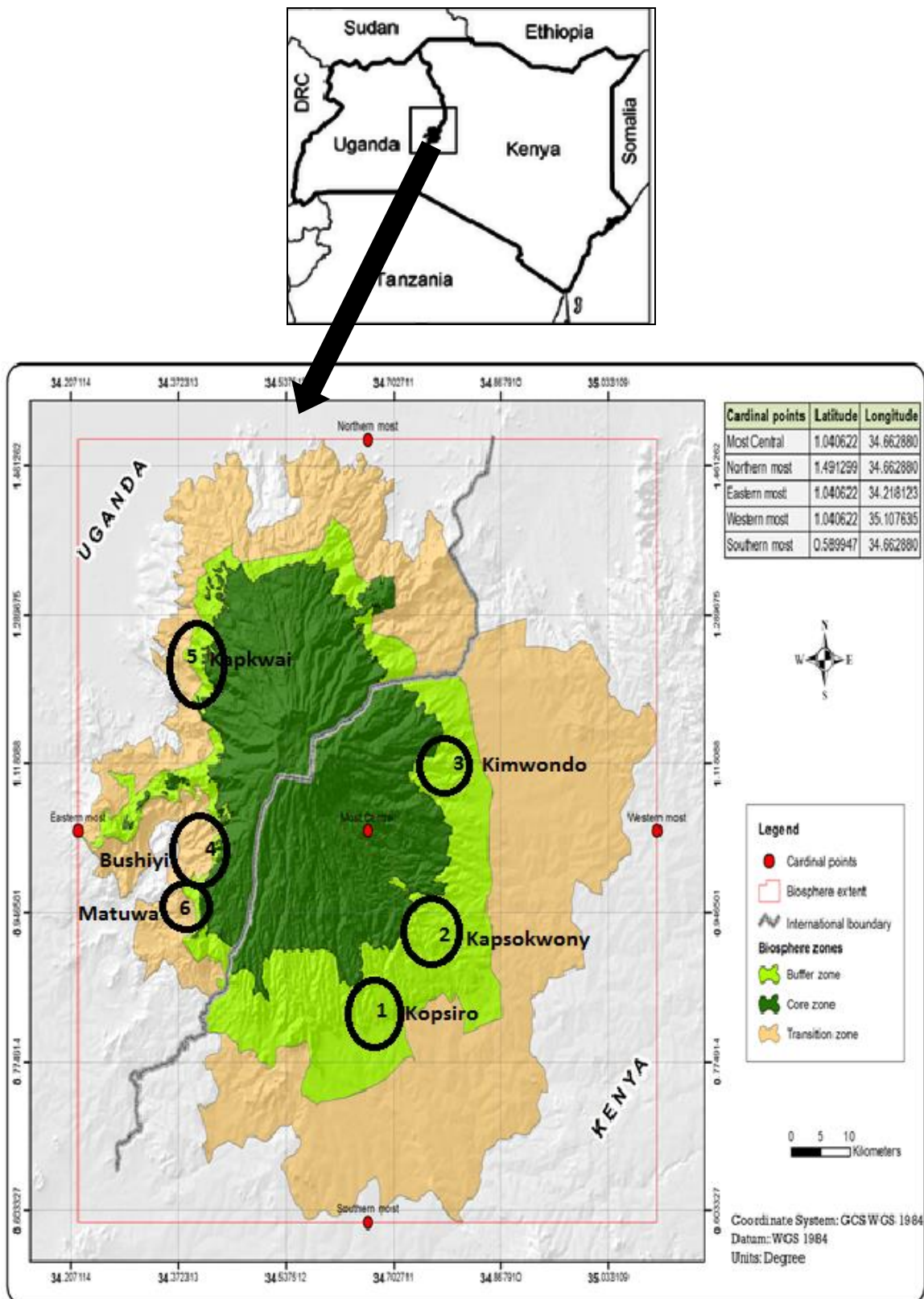
#### 3.1 Study Area

Mount Elgon is an extinct volcano that rises to 4,321 m above sea level. The mountain range lies on the Kenya - Uganda border occupying an area of approximately 4,000 km<sup>2</sup> within the Lake Victoria Basin in Western Kenya and Eastern Uganda along latitude 1°07'60.00''N and longitude 34°32'59.99''E (Mwaura, 2011).

The Mount Elgon trans-boundary ecosystem is the physical landscape transcending the international border between Kenya and Uganda that includes two biosphere reserves- Mt Elgon Biosphere Reserves in Kenya and Uganda (Figure 3.1). The Mt. Elgon ecosystem on the Kenyan side was declared a Biosphere Reserve by UNESCO in 2003 (Mwaura, 2011) while the Biosphere Reserve on the Ugandan side was nominated in 2005 (Makenzi, 2013). The BRs comprise three zones which are the core zone, buffer zone and transition zone.

Within the BRs are five protected areas namely Mount Elgon National Park (MENPU) managed by Uganda Wildlife Authority (UWA), Namatale Central Forest Reserve managed by the National Forestry Authority (NFA) in Uganda and Mt. Elgon National Park (MENPK) managed by Kenya Wildlife Service, Mt. Elgon Forest Reserve managed by Kenya Forest Service (KFS) and Chepkitale National Reserve managed by Mt. Elgon County Council (now under Bungoma County) and KWS (Mwaura, 2011) in Kenya.

The administrative boundaries of Mt. Elgon Ecosystem include areas under two Counties of Bungoma and Trans Nzoia in Kenya. In Uganda it covers eight districts, namely Kapchorwa, Kween, Sironko, Bulambuli, Mbale, Manafwa, Bududa and Bukwo (Mwaura, 2011;Makenzi *et al.*, 2014)



**Figure 3.1: Location Map of the Study Area showing sample areas**

(Source: Extracted by the author from Lutalo *et al.*, 2014. Circles indicate the general locations where household interviews were conducted in the buffer zone.)



## **3.2 The Mt Elgon Ecosystem**

### **3.2.1 Climate**

Rainfall on the mountain ranges from 1,500 –2,500 mm per year (Nakakaawa, Moll, Vedeld, Sjaastad, and Cavanagh, 2015; Lutalo *et al.*, 2014). Mid slope locations tend to receive more rainfall than the lower slopes or the summit. The climate is moist to moderate dry. The dry season runs from June to August, and December to March. The rainfall pattern is bimodal with the wetter months falling between March and October (KWS, 2010; Nakakaawa *et al.*, 2015). The mean maximum and minimum temperatures are 23° and 15° C respectively.

### **3.2.2 Physical Features**

Mt. Elgon is a solitary extinct volcano. It is believed to have been formed during the lower Miocene period, approximately 20-24 million years ago (Lutalo *et al.*, 2014). With its highest point at Wagagai at an altitude of 4,321m asl. (Mwaura, 2011), the mountain top is occupied by an 8-km long caldera at 3,500m asl, making it one of the largest examples of this type of feature in the world.

The mountain is a typical shield volcano with gentle slopes whose lower parts are made of a series of benches separated by prominent cliffs (Scott, 1998).

There are numerous caves on Mt. Elgon some measuring up to 300 m in length as a result of differential weathering of the various volcanic materials, small-scale salt mining before the arrival of the Europeans and animal activity mainly elephant, buffalo, bushbuck, waterbuck and giant forest hog to gain access to salts (Lutalo *et al.*, 2014).

The rocks of Mt Elgon are volcanic in origin and include tuffs, coarse agglomerates, basalts and mudflow materials. The geology of the Mt. Elgon ecosystem generates a fertile soil associated with volcanic action which supports the livelihoods of inhabitants who are largely farmers (Scott, 1998; Nakakaawa *et al.*, 2015).

The Mt. Elgon ecosystem is an important water catchment for both Kenya and Uganda and the region (Mwaura, 2011). Mt Elgon is recognised as one of the five main “water towers” of Kenya, in addition to Aberdare’s Range, Mau Complex, Cherangani Hills and Mt. Kenya (Makenzi *et al.*, 2014). Mt. Elgon is the head catchment area for two major rivers: Nzoia and Turkwel (Mwaura, 2011). The Nzoia River is a critical watercourse for the Western Province where it provides most of the much needed water to highly populated areas before flowing into Lake Victoria. The Turkwel River is one of the three major rivers that feed Lake Turkana. Its course provides water to the Turkwel Gorge Dam and the accompanying

hydropower plant. Turkwel is the main river that crosses the semi-arid and arid areas of the region on the southwest side of Lake Turkana (Mwaura, 2011).

The Ugandan side major rivers are Malakisi River, which originates from Kenya side and flows through Uganda into Lake Victoria; Manafwa River, which traverses through Bududa, Manafwa and Mbale Districts and flows into Lake Kyoga; and River Sipi which traverses the district of Kapchorwa and drains into Lake Bisin (Myhren, 2007).

### **3.2.3 Biological Factors**

The vegetation of Mt. Elgon is stratified altitudinally (Van Heist, 1994) in belts commonly associated with large mountain massifs. Four broad vegetation communities have been recognised (Mwaura, 2011):

- a. Zone I: mixed montane forest up to 2,500 m asl;
- b. Zone II: bamboo and low canopy forest, from 2,500 to 3,000 m asl;
- c. Zone III: high montane heath, from 3,000 to 3,500 m asl; and
- d. Zone IV: moorland and alpine zone, areas above 3,500 m asl.

The moorland and alpine zone is thought to cover an area of about 17,000 ha; while bamboo forest, montane forest, lowland forest and wooded grassland together account for 31,000 ha (Makenzi *et al.*, 2014). The high montane heath and moorland belts are rich in shrub and herbaceous species that are endemic to higher East African mountains e.g. *Lobelia elgonensis*, *Senecio elgonensis*, the dwarf shrub *Alchemilla elgonensis* and the umbrellifer *Heracleum elgonensis*. The mixed montane forest is made up of tall dense forest dominated by *Podocarpus mailanjanus*, *Afrocrania volkensii*, *Hagenia abssynica*, *Olea africana* among others (Makenzi *et al.*, 2014).

This rich flora is important in providing habitat for biodiversity, acting as a tourist attraction, as well as providing plant resources that support people's livelihoods and generate forest produce.

Mount Elgon supports many fauna species of extreme conservation importance by virtue of their rarity and/or limited distributions. Mt. Elgon ecosystem is a habitat for 37 "globally threatened" species (22 mammal, 2 insect and 13 bird species). The Mt Elgon ecosystem is also home to 9 endemics, making the area a priority for species conservation (Mwaura, 2011).

The key species of conservation concern include elephant (*Loxodonta africana*), leopard (*Panthera pardus*), giant forest hog (*Hylochoerus meinertzhageni*), waterbuck (*Kobus ellipsiprymnus*), bushbuck (*Tragelaphus scriptus*), duiker (*Sylvicapra grimmia*), black and white colobus monkey (*Colobus guereza*), blue monkey (*Cercopithecus mitis*), the spotted red tailed monkey (*Cercopithecus ascanius*) and de Brazza's monkey (*Cercopithecus neglectus schlegel*). There are many colonies of bats in the caves of the Mt. Elgon ecosystem, including the Rousette or Egyptian fruit bat (*Rousettus aegyptiacus*) and the mountain fruit bat. A number of insectivorous bats are also present and it is likely that at least some of the species are highly dependent upon the forest as roosting and hunting habitat (Makenzi *et al.*, 2014; Lutalo *et al.*, 2014).

Bird surveys conducted on the mountain (KWS, 2010; UWA, 2013a) show that avifauna of Mount Elgon is diverse and includes a number of rare and threatened bird species that are restricted to Mount Elgon and a few other East African mountains such as African crowned eagle, Ross' turaco and red-fronted parrot. There are over two hundred and forty species of birds.

A total of 67 reptiles and amphibians are documented from Mt Elgon region. This comprises of 3 tortoises and fresh water terrapins, 25 lizards, 28 snakes and 11 amphibians (Makenzi *et al.*, 2014; Lutalo *et al.*, 2014).

There is a total of 179 species of butterflies, comprising of 18 *papilionidae*, 26 *Pieridae*, 25 *Lycaenidae*, 89 *Nymphalidae* and 21 *Hesperiidae* in the Mt Elgon ecosystem. Among the moths, 9 *noctuids*, 38 *crambids*, 37 *sphingid* and 30 *saturniid* species are known from Mount Elgon Ecosystem (Makenzi *et al.*, 2014; Lutalo *et al.*, 2014).

### **3.2.4 Cultural and Political Factors**

There is a very rich religious and cultural attachment to the Mt Elgon ecosystem. The religious and cultural significance of the forest continues to be enjoyed by the local communities, who use the forest for circumcision ceremonies, spiritual gatherings and collecting of medicinal plants on a regular basis. Other cultural values include having several areas within the mountain ecosystem regarded as sacred, and hosting a variety of traditional ceremonies and events (Makenzi *et al.*, 2014; Lutalo *et al.*, 2014).

The majority of the peoples of Mt Elgon share the same ethnicity, languages, religion, tradition and culture. The Bagisu and Sebei are the major inhabitants of the lands around MENP. The Sebei community were predominantly pastoral (they now also practise

agriculture) who grazed their livestock within the forest and on the high moorlands while the Bagisu are agriculturalists (Scott, 1998). In Uganda, the Sebei of the Nilo-Cushitic origin live on the northern slopes of Mt Elgon in Kapchorwa, Kween and Bukwo Districts. The Bagisu of Bantu origins are found in the districts of Mbale, Sironko, Manafwa, Bulambuli and Bududa. In Kenya, the main groups include the Ogiek, Saboti, Luhyas and Iteso (Makenzi *et al.*, 2014; Lutalo *et al.*, 2014).

The political administration in Uganda and Kenya is similar, with some minor differences. Whilst both countries are run on republican Constitutions, Uganda's political administration has been decentralized since early 1990s, while Kenya's decentralization process began in 2010. Decision making processes in Kenya and Uganda that influence local action within the Mt. Elgon ecosystem favour community or stakeholders participation in natural resources management, albeit at varying degrees (Makenzi *et al.*, 2014; Lutalo *et al.*, 2014).

The Mount Elgon BR in Kenya is under the management of Bungoma County, KWS and KFS while the BR on the Ugandan side is under UWA.

### 3.2.5 Socio-economic Issues and Factors

The Mt Elgon ecosystem comprises a large area, with an estimated population close to 2 million people. Based on the table below, the population of the study area is 1,786,831.

**Table 3.1: Population of Mt. Elgon trans-boundary ecosystem**

Country	District/County Authority	Population	Total area (km <sup>2</sup> )	Population density (Persons/km <sup>2</sup> )
Uganda	Mbale	332,571	559.9	594
	Sironko	242,421	989.8	286
	Manafwa	262,566	532.6	493
	Bududa	210,173	273.6	450
	Bukwo	48,952	604.3	81
	Kapchorwa	141,366	1,273.6	111
Kenya	Trans Nzoia West	282,622	1,000	287
	Kwanza	150,208	500	300
	Mt. Elgon	172,377	944.5	172
	<b>TOTAL</b>	<b>1786831</b>		

(Source: KNBS, 2009; UBOS, 2014)

Note: Data for new districts in Uganda is not segregated.

In Uganda, Mbale has the highest population density (594 persons/km<sup>2</sup>) while in Kenya; Kwanza registers the highest population density (300 persons/km<sup>2</sup>). The least densely populated district in the region is Bukwo in Uganda which has 81 persons per km<sup>2</sup>.

Eighty one point nine percent and seventy six point two percent of the household economic activities in Uganda and Kenya portions of Mt. Elgon respectively are comprised of crop production (Makenzi *et al.*, 2014). The agricultural activities carried out are supported by the availability of fertile alluvial soils as well as water streams, which have their sources from the Mt. Elgon. Maize production accounts for over 50% of the total crop production in Trans-Nzoia and Bungoma counties. Other crops grown in this area include onions, irish potatoes, coffee, wheat and sunflower. Coffee, cotton and banana are some of the major crops that were identified as dominant in Mbale, Sironko and Kapchorwa (Scott, 1998).

Small scale livestock farming is practised (2.5% for Uganda and 1.5% for Kenya) with most households practicing zero grazing. This is attributed to limited access and ownership of land to carry out both crop production as well as large scale free range animal rearing. As a consequence, people drive their livestock into the forests for more pasture, which becomes a source of conflict with management objectives of the protected areas.

The tourism potential of Mount Elgon ecosystem is enormous because of the area's beautiful scenery and diverse flora and fauna. Key attractions include large mammals (elephant, buffalo, Defassa waterbuck, oribi, red duicker and impala, black and white colobus monkeys, De Brazza monkey, olive baboon, leopard, spotted hyena, civet and genet cats), birds and forest insects, among others. Other attractions include the Caldera, caves and mountain climbing (KWS, 2010; UWA, 2013a). The caves are quite unusual in their number, variety, formation and use by humans and other animals such as the salt mining elephants, and are therefore particularly valuable from aesthetic and tourism perspectives (UWA, 2013a).

Tourism potentials outside the protected areas include cultural and traditional practices, landscape scenery and the cross-border mountain trekking.

### **3.3 Research Design**

This study employed a social survey research design. Social survey research design involves collecting data from respondents through a series of questions either in the form of a questionnaire or an interview (Nassiuma, 2000). In this study, questionnaires (Appendix 1)

and interview schedules (Appendix 2, 3, 4) were used. Both qualitative and quantitative data were collected to meet the research objectives.

Rapid Rural Appraisal techniques such as semi-structured interviews, consultations, focused group discussions and observations were adopted to achieve the objectives of the study. The BR manager, staff, opinion leaders and traditional leaders were consulted and gave useful suggestions on the areas to be included in the sample.

### **3.4 Sampling**

#### **3.4.1 Sample Size**

The formula by Nassiuma, (2000) was used to get the sample size:

$$n = \frac{NC^2}{C^2 + (N - 1)e^2}$$

Where n = sample size

N = population (1786831)

e= Error margin (3%)

C= coefficient of variation (30%)

The sample size will therefore be:

$$n=1786831 \times 30^2 \div [30^2 + (1786831-1)3^2] = 99.99 \approx 100 \text{ respondents}$$

#### **3.4.2 Study Sample and Sampling Procedure**

The sample unit for the study was a respondent from a household. The respondents included in the sample were those who lived within the core zone and buffer zone of the trans-boundary ecosystem. These respondents were chosen using multi-stage sampling. Each zone was treated as a stratum. The wards (parishes in Uganda) in each stratum were treated as clusters and some chosen randomly for inclusion in the study. Some villages from these wards were randomly selected using a table of random numbers and households within these villages were chosen using systematic sampling for inclusion in the sample. Kapsokwony, Kopsiro, Kimwondo (Kenya), Kapkwai, Bushiyi and Matuwa (Uganda) were selected for inclusion in the study.

Fifty respondents were chosen from each Biosphere Reserve. The 50 respondents were apportioned proportionately in each of the two zones based on their population. One respondent from the core zone and 49 respondents from the buffer zone were chosen for inclusion in the study. There were no respondents living within the core zone in the BR in Uganda hence all the respondents were chosen from the buffer zone. The area of interest in both BRs was the villages up to 5 km from the protected area boundaries. The study was accomplished with the help of field assistants who were mainly community members chosen by the wildlife department or key informers.

### **3.5 Data Collection**

Primary data was collected from respondents and key informants. The key informants included the biosphere reserve manager/park manager, forest manager and chiefs (administrative) found within the core and buffer zones. They were chosen purposively for inclusion in the study. Interview schedules were designed for the key informant interviews. They were analysed and incorporated into the findings.

Secondary data mainly patrol reports and Occurrence Book records (OB) was acquired from the Kenya Wildlife Service and Uganda Wildlife Authority for a period of five years (2012-2017). Occurrence books are used for recording incidences in government offices. Other sources used to extract secondary data include journals and research papers.

### **3.6 Validity and Reliability**

At the end of each interview session in a given household, the questionnaire was re-checked for any missing data or under response. If any was found, the respondent was again asked to answer the question. All questionnaires filled during the day were checked at the end of the day to ascertain that all questions were consistently answered. Any errors found were verified and any missing information was filled

The questionnaire was pre-tested within a group of 40 respondents living around the Cherangany'i ecosystem. This group was chosen using simple random sampling and not included in the study sample size. This helped in identifying the problems with the data collection instruments and the necessary changes were made.

### **3.7 Data Analysis**

Statistical Package for the Social Sciences (SPSS) software version 20.2 was used to enter the data from the questionnaires and interview schedules. Descriptive statistics was used to

analyse and present results on wildlife species targeted in poaching, the spatial and temporal extent of poaching, the methods used, motivations and community perceptions of the impacts of poaching on wildlife and people.



**Table 3.2: Summary of data analysis**

<b>Research Questions</b>	<b>Variables</b>	<b>Statistical Tool</b>
Which wildlife species are poached in the core and buffer zones?	Type of wildlife species poached in the core zone and buffer zone	Descriptive statistics
What is the spatial-temporal extent of poaching in the Mt Elgon trans-boundary ecosystem?	Total count of poaching incidences in the core zone and buffer zone  Total Count of poaching incidences in the core zone and buffer zone during the wet season and dry season	Descriptive statistics
What are the motivations for poaching in Mount Elgon trans-boundary ecosystem?	Economic drivers such as income, lack of alternative livelihood options  Socio-cultural drivers such as cultural requirements, human wildlife conflicts	Descriptive statistics
What methods are employed in poaching?	Poaching tools confiscated	Descriptive Statistics
What are the community perceptions of impacts of poaching on wildlife and people?	Perceptions of impacts of poaching on species diversity and community	Descriptive statistics
Which anti-poaching strategies are employed in Mount Elgon trans-boundary ecosystem and what factors have led to their success and failure?	Type of anti-poaching strategy employed  Factors of success, Factors of failure	-

### **3.8 Ethical Considerations**

In line with government requirements in Kenya and Uganda, research permits (Appendix 5 and 6) were obtained after paying the prescribed fees. Other ethical considerations include respondents not being required to say their names or exact location as poaching is an illegal activity and they were fearful of being apprehended by authorities. Informed consent of the respondent was sought before any question was asked and the researcher maintained confidentiality of the information given by the participants.

## CHAPTER FOUR

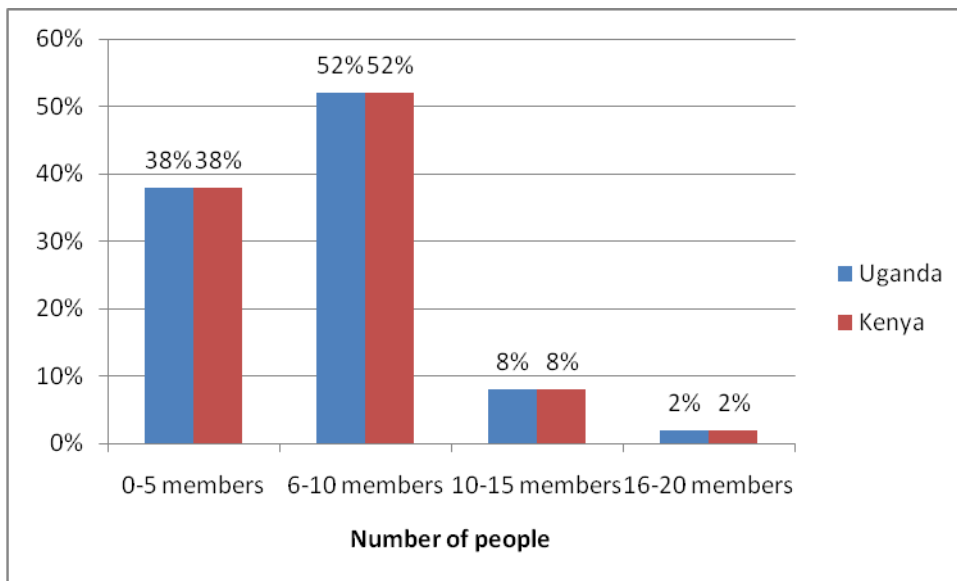
### 4.0 RESULTS AND DISCUSSION

#### 4.1 Household Characteristics

##### 4.1.1 Household Size

Of the 50 households sampled in Kenya, 52% of these households comprised 6-10 members, 38% comprised 0-5 members while 8% and 2% comprised 10-15 members and 16-20 members respectively (Figure 4.1).

Majority of the fifty households (52%) sampled in Uganda comprised 6-10 members with only 2% having 16-20 members. 38% and 8% of these households had 0-5 members and 10-15 members respectively (Figure 4). Household size is likely to affect how resources are used within an ecosystem. Households with many members are more likely to extract more resources from an ecosystem compared to households with a small number of members.



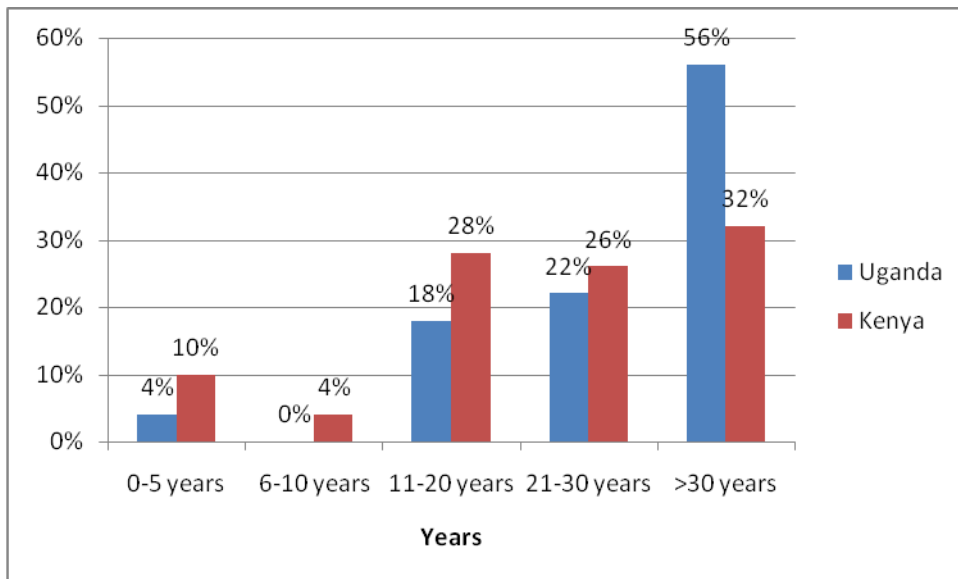
**Figure 4.1: Household size in study area of Mt. Elgon trans-boundary ecosystem**

##### 4.1.2 Number of Years a Household has lived within the Biosphere Reserve

In this regard, 56% of the households sampled in Uganda had lived within the BR for over 30 years. No household had lived within the BR for a period of 6-10 years while 18% and 22% had lived within the BR for 11-20 years and 21-30 years respectively.

On the other hand, 32% of the households had lived within the biosphere reserve for over thirty years, 26% for 21-30 years and 28% for 11-20 years (Figure 4.2). A household that has

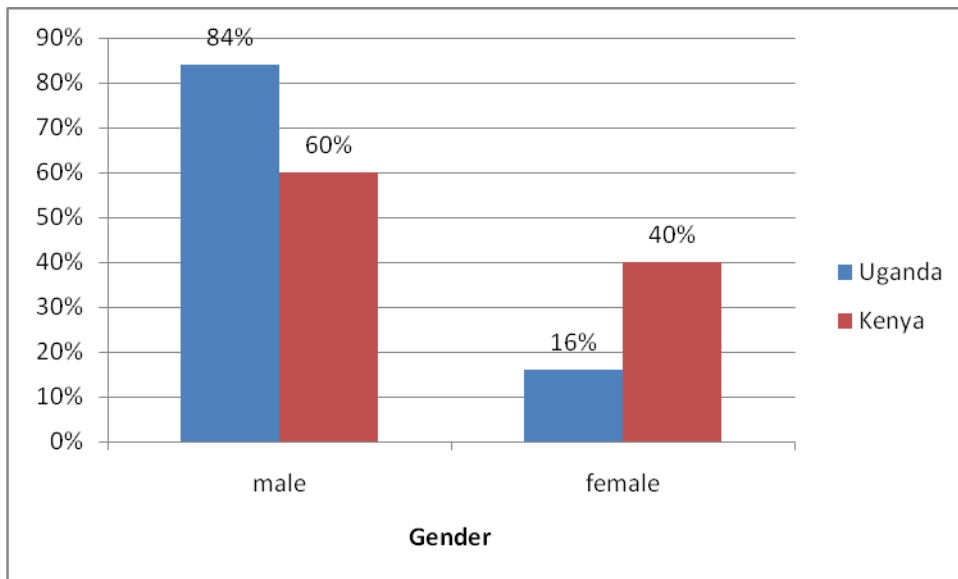
lived within the ecosystem for a longer period of time is likely to be more knowledgeable about the ecosystem (Myhren, 2007).



**Figure 4.2: Number of years a household has lived within the biosphere reserve**

#### **4.1.3 Gender of Respondents**

With regards to gender, 60% of the respondents from the households sampled in Kenya were male compared to 40% who were female. In Uganda, eighty four percent of the respondents from the households were male compared to 16% who were female (Figure 4.3). The views of both male and female respondents were important in this study. This is because men and women have different knowledge on various systems.

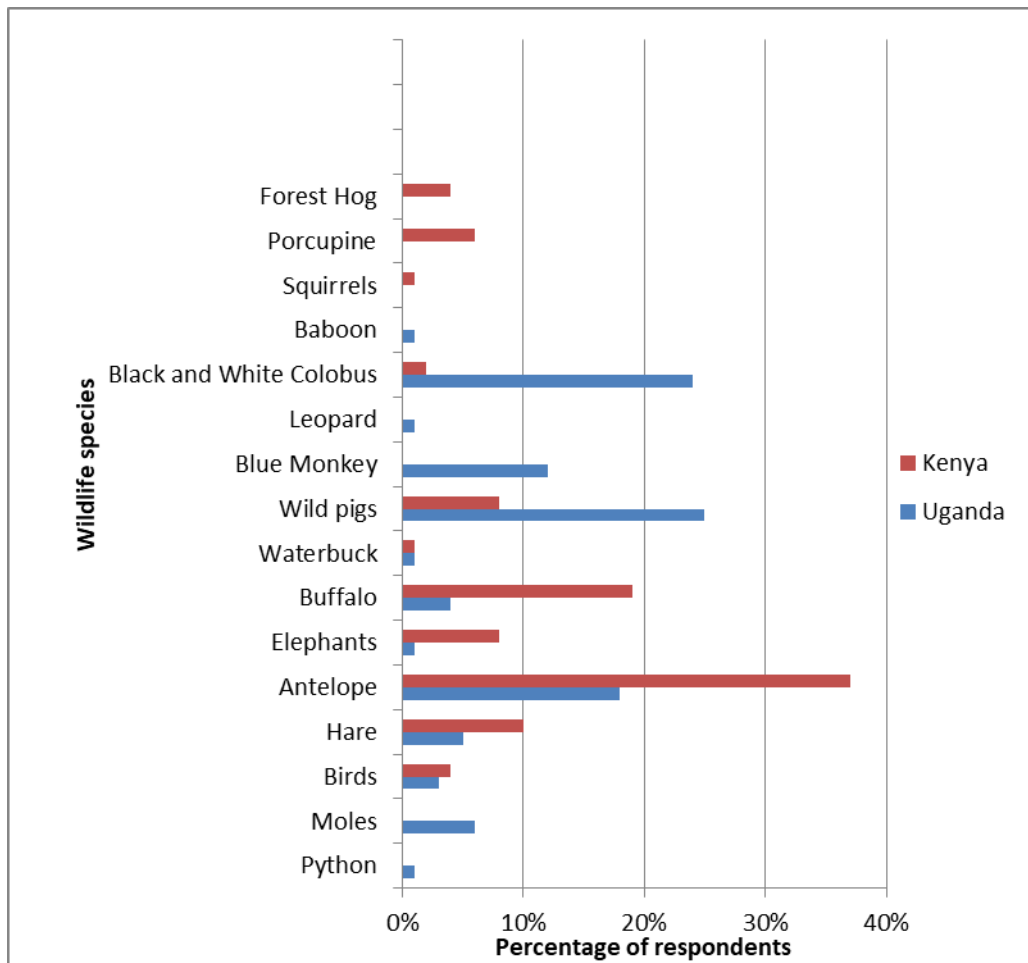


**Figure 4.3: Gender of respondents**

#### **4.2 Wildlife Species Subject to Poaching**

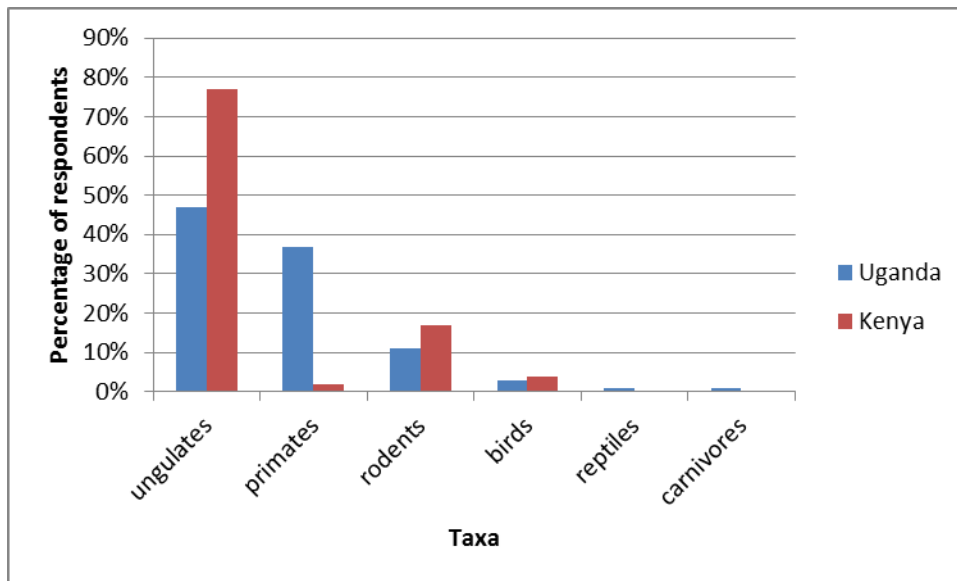
According to the respondents in the study area, different wildlife species were targeted in poaching (Figure 4.4). In Kenya, antelopes (37%) and buffaloes (19%) were the two wildlife species mostly targeted in poaching. Elephants (8%) were targeted mainly for ivory.

Respondents from the households in Uganda mentioned a number of wildlife species. The most frequently mentioned wildlife species were black and white colobus (24%), wild pigs (25%) and antelopes (18%). Majority of the wildlife species targeted by poachers are mammals.



**Figure 4.4: Wildlife species subject to poaching in the Mt. Elgon trans-boundary ecosystem**

Further classification of the wildlife based on their taxa showed that ungulates accounted for the most poached wildlife according to respondents (77% in Kenya and 47% in Uganda). The other two most important taxa were primates and rodents with primates accounting for 37% in Uganda and rodents 17% in Kenya (Figure 4.5).



**Figure 4.5: Wildlife taxa subject to poaching in the Mt. Elgon trans-boundary ecosystem**

Available secondary data from KWS and UWA showed that fewer species are poached compared to what was given by respondents. These include buffalo, black and white colobus monkey, bush duiker and vervet monkey in Uganda and elephant, antelopes, buffalo and wild pigs in Kenya. This showed that respondents were more knowledgeable on wildlife targeted in poaching because they either were poachers themselves or interacted with poachers in the community. On the other hand KWS and UWA are only concerned with reports on wildlife found snared or trapped from their rangers, whereas most of the wildlife may already be removed from the snares or traps by the poachers or captured using other methods that do not leave any evidence of poaching.

Antelope (Duicker, Dik-Dik, and Gazelle) meat is preferred because it tastes like goat meat. This was also reported by Basset (2005) in his study undertaken in Cote d'Ivoire. Antelopes also enter into farms and are captured by traps or get stuck in the mud as they are being chased corresponding to what Hill (2004) reported in his study undertaken at wildlife-agriculture boundaries. Buffaloes are targeted because of the large amount of meat that can be obtained and for their tails. The tail is a cultural requirement for elderly Bukusu men as a sign of prestige. Buffaloes are also a problem animal in the farms. They are dangerous hence when they stay in the farms up to day-time, they are shot down by rangers to avoid the risk of injuring community members (Bowen-Jones *et al.*, 2003; Hill, 2004; Knapp, 2012). Buffaloes are also the main species targeted by poachers from the Ugandan side. Buffaloes are

locally extinct on the Ugandan side hence poachers come to the Kenyan side mainly during the dry season that occurs from October to February introducing the aspect of seasonality as reported by Brown (2007) and Lindsey *et al.* (2011). Other wildlife species targeted include porcupines and wild pigs that were mentioned as problematic animals which destroy growing crops. Elephants which occur only on the Kenyan side of the ecosystem were subject to trophy poaching. Black and white colobus were targeted for their skins albeit to a small extent. The reason for this was assumed to be a departure from culture as most households preferred circumcising their male children in hospitals where the Colobus skin is not a requirement.

In Mount Elgon BR, Uganda black and white colobus (24%), wild pigs (25%) and antelopes (15%) were the main species targeted. Black and white colobus were targeted for their skin and meat. The skin is a cultural requirement for prestige in the traditional circumcision ceremony of mainly the Bagisu. A candidate undergoing the circumcision rituals must have this skin. Wild pigs were the most encountered wildlife species. This was attributed to their high reproduction rates. They are also an aggressive species when they encounter human beings and are a problematic animal. Antelopes are targeted because of their meat which tastes like goat meat (similar to Kenya). Species like the blue monkey are targeted as a substitute for the reducing population of the black and white colobus. Their skin and meat are useful. Rodents are common just like the wild pigs.

The findings of this study were similar to others like Fa *et al.*, (2006) who in their study in the Cross- Sanaga region in Nigeria and Cameroon, calculated that of over a million carcasses traded in 100 sites, 99% were mammals of which 40% were ungulates, 30% rodents and about 15% were primates. These are the three most important taxa for human consumption. Other studies with similar findings include Starkey (2004), East *et al.* (2005) and Crookes *et al.* (2006).

### **4.3 Spatial- temporal extent of poaching**

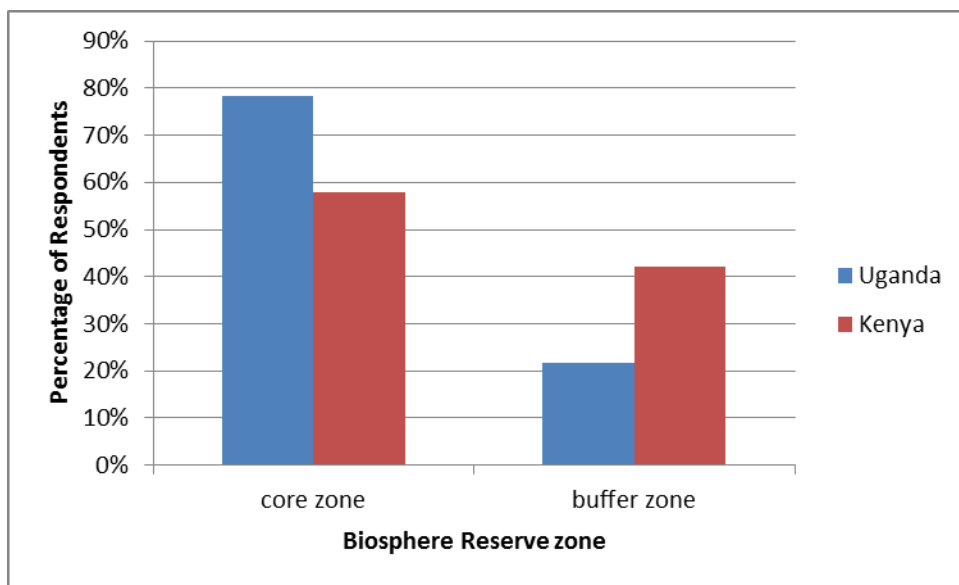
#### **4.3.1 Spatial extent of poaching**

Poaching in the BRs occurs in both the core and buffer zones (Figure 4.6). In Kenya, poaching in the core zone accounted for 58% and the buffer zone 42%. The buffer zone mainly consists of farms where agriculture is practised and wildlife is poached when they enter the farms to eat the crops (Hill, 2004). Within the core zone are Plantation Establishment for Livelihood Improvement Scheme (PELIS) plots where farmers set up traps



to capture wildlife that come to destroy their crops. If the wildlife captured is edible, it is used as bush meat. If it is not edible, it is killed. The community also gets an opportunity to poach when they are working in their PELIS plots.

Poaching in Mount Elgon BR, Uganda takes places mostly in the core zone (78%) with the buffer zone accounting for 22%. The buffer zone comprises of privately held farms where agricultural activities take place. Wildlife is poached when they leave the forest and enter farms to destroy crops.



**Figure 4.6: Spatial extent of poaching in the Mt Elgon trans-boundary ecosystem**

These wildlife species include baboons, leopard, hyena, wild pigs (bush pigs), rodents, porcupines and black and white colobus. They damage crops at different times of the year from the planting to harvesting season. Livestock are prone to attacks all year round. Human-wildlife conflict thus motivates poaching for communities within the BRs (Hill, 2004). A study by Barnett (2000) also showed that increased demand for land for agriculture has led to conflict such that problem animals are poached and killed.

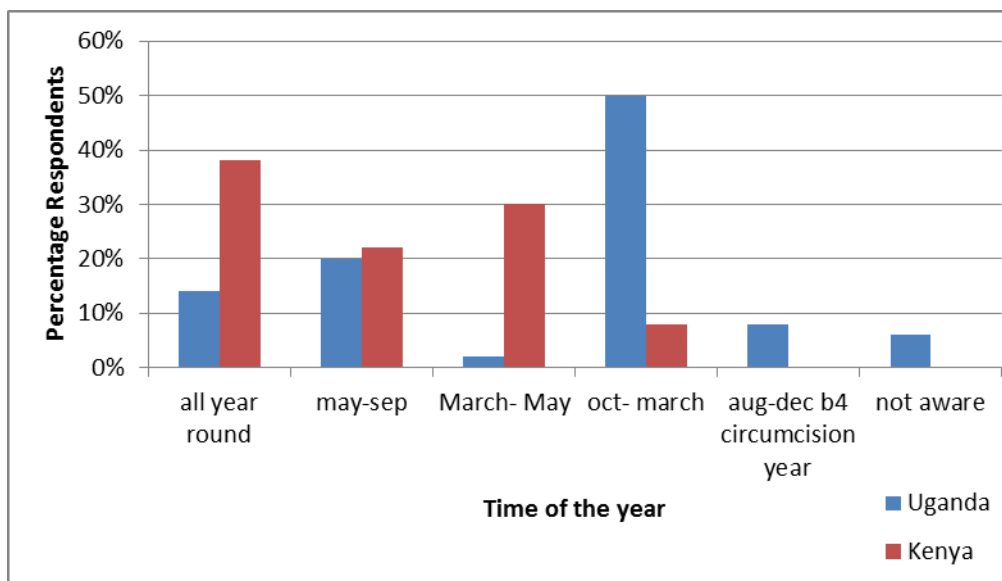
#### **4.3.2 Temporal extent of poaching**

With regards to temporal extent of poaching, 38% of respondents from the households sampled in Kenya mentioned that it is an activity that takes place all year round. This is because the poachers are fully dependent on the activity for their livelihood. The planting season (March- May) was also popular (30%) because this is the time when plants are

growing in the farms and wildlife come into the farms to eat the crops. The wildlife is killed if captured by the farmers. The rainy season (May- September) accounted for 22%. Poaching in the rainy season occurs mainly in the buffer zone as during this time wildlife come into the farms to destroy maturing crops and end up being captured by the community members (Figure 4.7).

In Uganda, the most popular time was during the dry season (50%) that occurs from October to March. During this time there is no food and people go into the core zone to hunt. Christmas festivities also occur during this time and bush meat is an important delicacy for this season.

Other seasons mentioned are every August to December (8%) before every circumcision year (even year) when people are actively looking for the black and white colobus monkey whose skin is used to make ceremonial garments and May to September (20%) during the rainy season when crops are in the farms (Figure 4.7). The animals that come to destroy the crops are caught in the traps laid by farmers to protect their crops and are ultimately used as bush meat if they are edible.



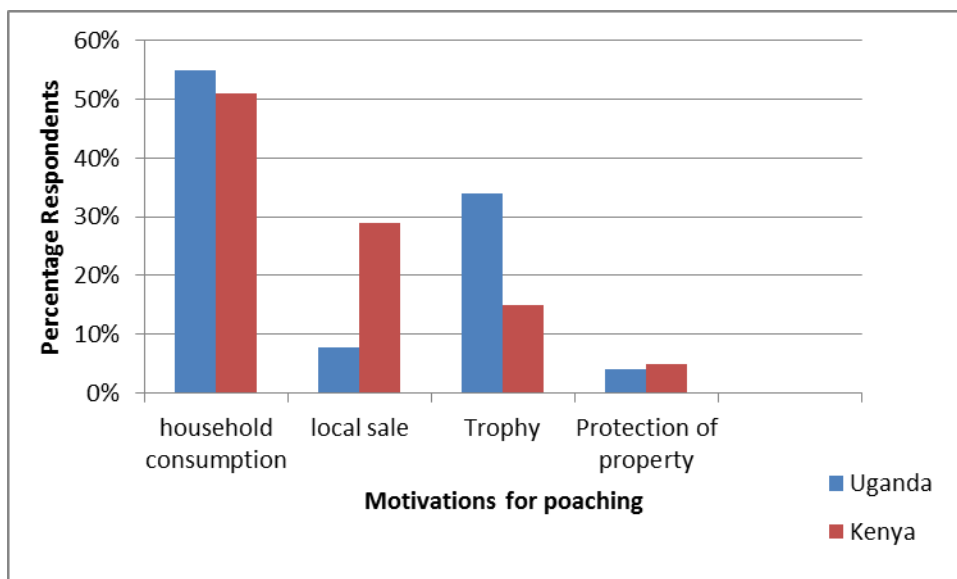
**Figure 4.7: Temporal extent of poaching in the Mt. Elgon trans-boundary ecosystem**

Seasonality/ temporal pattern of poaching is a known occurrence. In the Mount Elgon BR, Uganda, hunting was common during the dry season while in Kenya it was common during the wet season (figure 4.7). In addition to food being scarce during the dry season, most people are idle as most of the crops have been harvested from the farms. It is also important

to note that the end-of-year festivities occur within the dry season, important days when delicacies such as bush meat are eaten. During the wet season that is from the time crops are sown to the time they mature and are ready for harvest, most wildlife species come into the farms in the buffer zones (and core zone in Kenya) looking for food. This is a loss to the farmers who lay traps, capture the wildlife and kill them to reduce the losses. Studies with similar findings include Bennett and Deutsch (2003) who reported peaking of poaching during the rainy season and around end-of-year celebrations at the Mbam Djerem National Park in Cameroon and Owusu *et al.*, (2006) who reported seasonal peaks in the Afadjato and Agumatsa Conservation Area in Ghana. A study by Olupot *et al.* (2009) in four sites in Uganda reported that hunting was common during the wet season and the dry season with off-take increasing at the end of the year during the end-of-year festivities.

#### 4.4 Motivations for poaching

The four motivations of poaching in the study area include household consumption, local sale, trophies and protection of property (Figure 4.8).



**Figure 4.8: Motivations for poaching in the Mt. Elgon trans-boundary ecosystem**

Poaching for food was the main reason given for poaching (55% in Uganda and 51% in Kenya). Bush meat is a protein source that is believed to be more nutritionally superior when compared to livestock meat (Hoffman, 2008). Furthermore, it is considered a free and limitless resource that is just captured and cannot get finished (Eves, 1996). This was

followed by trophy poaching (34% in Uganda and 15% in Kenya). Wildlife parts play significant roles in culture especially in circumcision ceremonies. Black and white colobus and buffaloes were mainly targeted under this reason for their skin and tails. The skin of the monkey is used to make mantels that are used in performing circumcision dances while the tail of the buffalo is a prestigious ornament with which high ranking men of the Bukusu tribe are buried with. This is as reported by Olupot *et al.* (2009) who identified cultural beliefs and attachment as one of the root causes of bushmeat use in Uganda. Poaching for income was also identified as a reason for poaching. Local sale occurs when the poachers catch is large (either a large animal or an assortment of small animals). The meat was sold undercover to community members, especially in drinking dens (Kenya) or to specific households known by the poacher. In Kenya, the meat had been given names that were understood between the poachers and their customers. This naming reduces the risk of the poacher and community members being arrested. Protection of property (5% in Kenya and 4% in Uganda) also motivated poaching in the study area. Wildlife usually invades farms to eat crops which lead to losses for the farmers. The farmers are therefore sometimes forced to trap and kill the wildlife especially when the relevant authorities take long before responding to the wildlife attacks (Hill, 2004) or when they are not compensated for damages caused by wildlife (Knapp, 2012). Nasi *et al.*, (2011) also report household consumption, need for income/local sale and trophies as the main reasons for obtaining bushmeat in the Congo and Amazon Basins.

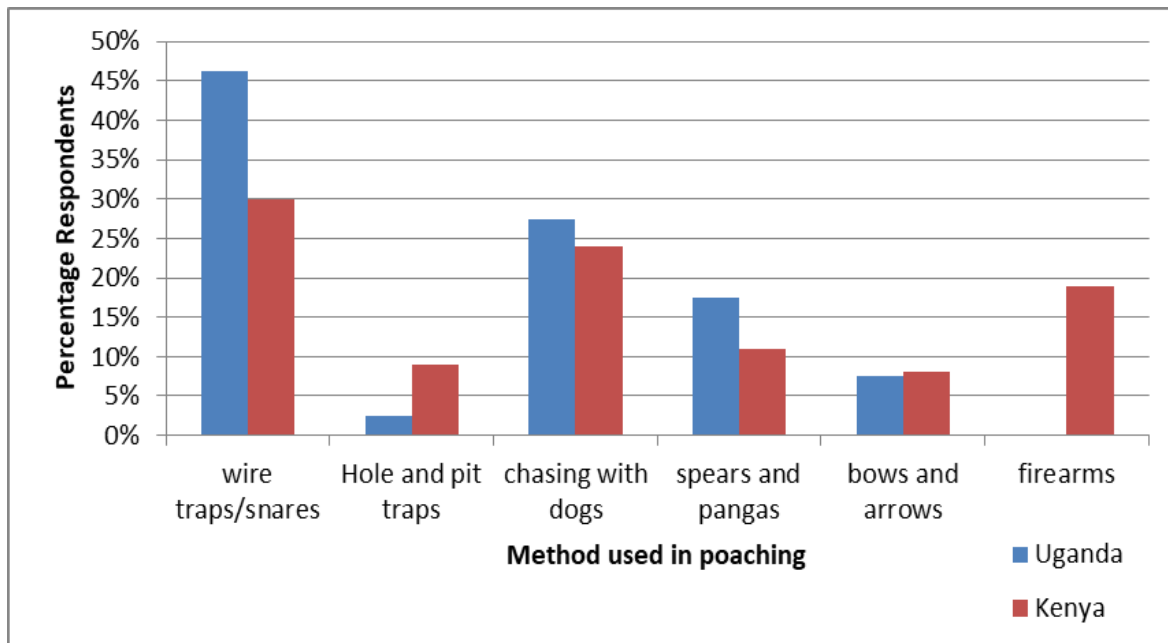
#### **4.5 Methods used in poaching**

This study found out snares (plate 4.1), spears, bow and arrows and chasing with dogs were the main hunting methods employed (figure 4.9). Snares were the most common method (46% in Uganda and 30% in Kenya). They were made from wires and ropes though wires were mostly preferred because they were longer lasting. Snares targeted all animals from the large ones such as elephants and buffaloes to the small ones such as antelopes and were laid on the paths used by these animals. Firearms were used but to a smaller extent (19%) especially where the target was large animals such as buffaloes and elephants. No respondent mentioned the use of firearms in Uganda given that most of the wildlife targeted was small to medium sized.

Chasing with dogs (28% in Uganda and 24% in Kenya), bows and arrow, spears and pangas was most commonly used when poaching small body sized animals like the black and white colobus, wild pigs and hare. Spears and machetes were also reported as the method used for

animals as big as elephants and buffaloes. Hole and pit traps targeted all wildlife. They are dug and covered to disguise them. The poacher frequently checks them to see the wildlife that has been captured. If an animal was captured and is edible, it was speared to death.

Use of snares was the most common method as is concluded in a study by Wato *et al.*, (2006) in the Tsavo National Park, Kenya and Nielsen (2006) in Udzungwa Mountains, Tanzania. The popularity of snares can be attributed to easy availability, durability and low cost (Fa and Brown, 2009; Lindsey *et al.*, 2011). These two studies and others such as Jachmann (2008), Grey-Ross *et al.* (2010), Lindsey *et al.* (2011) found out that snares in addition to chasing with dogs, spears, pangas, hole traps, bow and arrows were methods used when poaching wildlife.



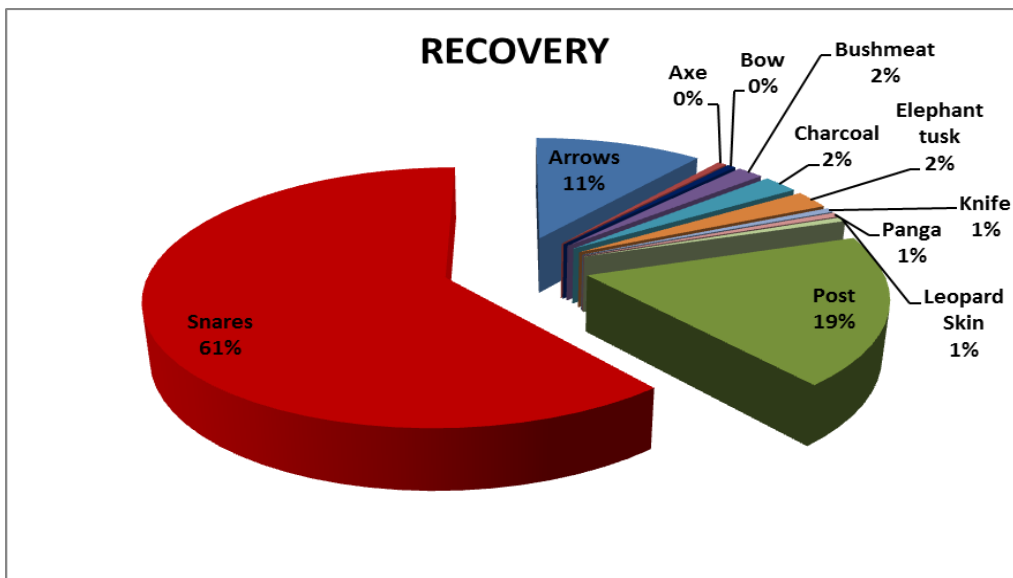
**Figure 4.9: Methods used in poaching in the Mt. Elgon trans-boundary ecosystem**



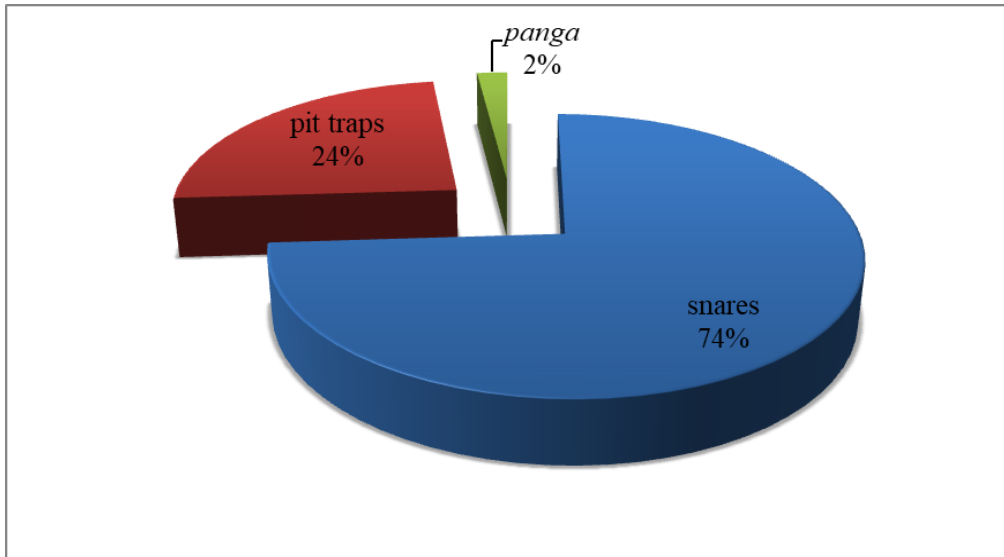
**Plate 4.1: Wire snares seen in the Mt. Elgon National Park, Kenya**

**4.5.1 Indicators of illegal activity in the trans-boundary ecosystem**

There are numerous indicators of illegal activities within the ecosystem as shown in figure 4.10 and 4.11. Wire snares constituted the greatest indicators (74% in Uganda and 61% in Kenya) in line with what respondents mentioned as the most common method used in poaching.



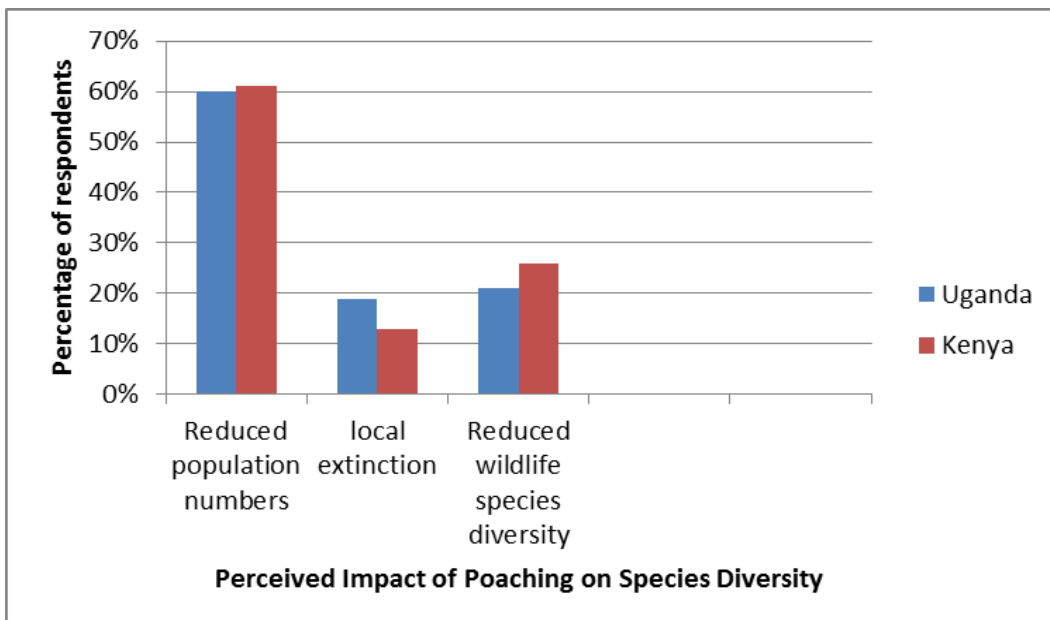
**Figure 4.10: Items recovered in Mt. Elgon National Park Kenya, May 2017- April 2018**



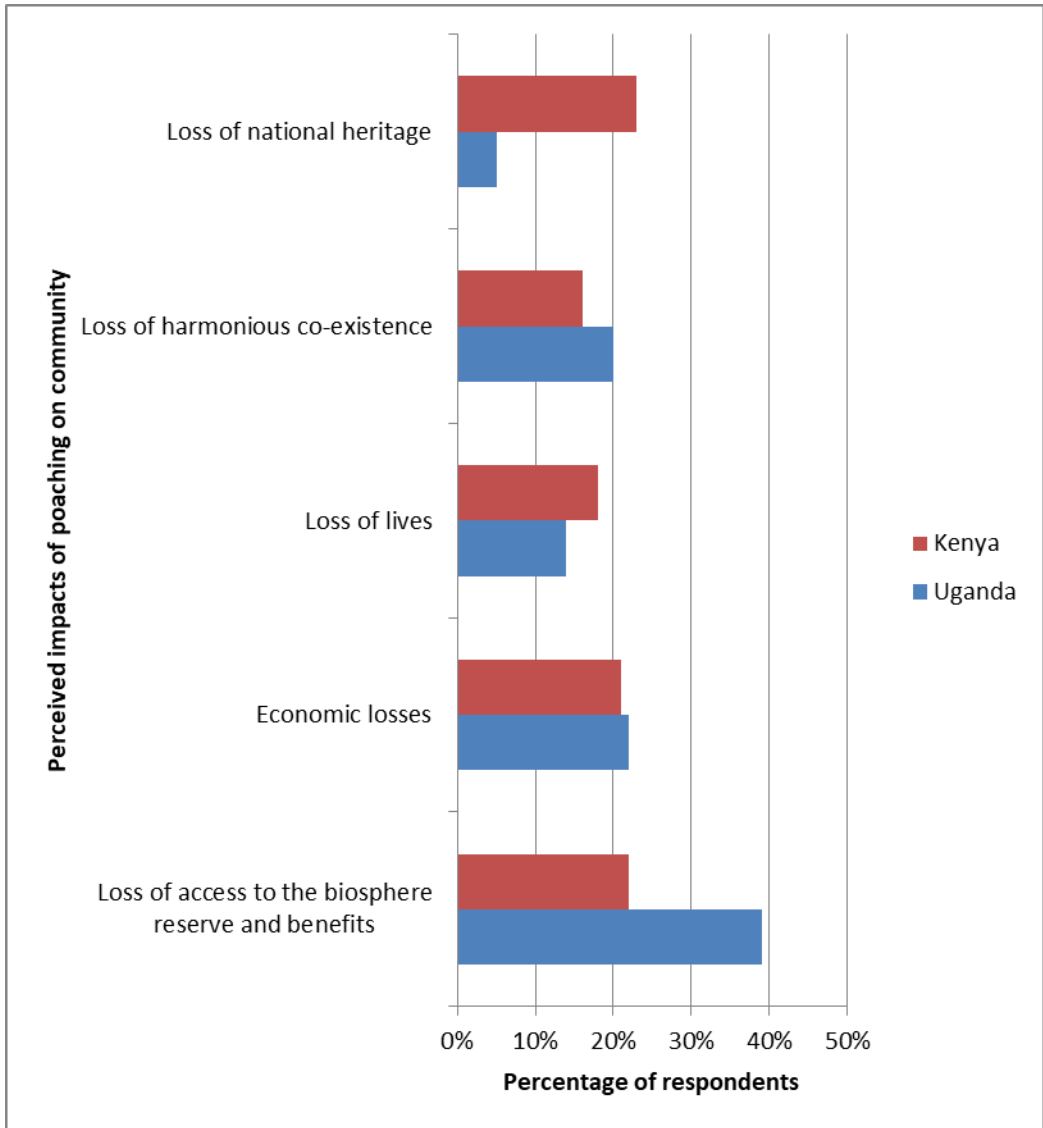
**Figure 4.11: Weapons and illegal gear confiscated in Mt. Elgon Uganda for the year 2017**

#### 4.6 Perceived Impacts of Poaching

The study results showed that all respondents from the households were aware of the impacts of poaching on species diversity and community. This awareness can be attributed to environmental education initiatives carried out by the governance bodies managing the trans-boundary ecosystem (Figure 4.12 and Figure 4.13).



**Figure 4.12: Perceived impacts of poaching on species diversity**



**Figure 4.13: Perceived impacts of poaching on community**

Depending on scale, poaching is a disruptive process that impacts the hunted populations, ecosystems and communities living near and around wildlife areas. Respondents mentioned reduced wildlife populations, local extinction and reduced diversity as what they perceived to be impacts of poaching on species diversity. They mentioned that the population of wildlife such as black and white colobus, forest hogs and birds like guinea fowl had greatly reduced. This was attributed to the reduced number of encounters. It was not easy to spot them now as it was a few years ago. Elephants and buffaloes had become locally extinct in Uganda. This was perceived to be as a result of poaching which either led to all of them being killed or moving deeper into the forest where it was not easy for human beings to reach them. Local extinction has also led to reduced diversity. The species abundance has reduced because some species have been so much poached for example antelope.



The perceived impacts of poaching on the community include loss of access to the biosphere reserve and its benefits, economic losses, loss of lives, loss of harmonious co-existence and loss of national heritage. The biosphere reserve offers many important benefits to the communities living within. These include forest timber products and non-timber forest products. Some years ago, the community members were allowed to access the core zone and extract products for their use but with the advent of conservation in this ecosystem, access was restricted. The respondents attributed this restriction to too much poaching that was taking place. Restriction of access reduced the amount of resources that could be obtained from the ecosystem. This led to a loss of source of livelihood for those who depended on the sale of biosphere reserve resources for their daily income. They also lost a protein source as poaching of wildlife was no longer allowed.

Economic losses occur due to insecurity caused by poachers which hampers tourism. Tourism is a way through which the community and country earns money. Poachers also steal livestock and household goods from the community living near the poaching areas. This is a loss to the households as most of the times these are the only things they own. Arrest and imprisonment also causes economic losses for the family because their contribution to family income is lost.

Another perceived impact of poaching is loss of lives. The poachers who are usually community members can lose their lives in the event of poaching. They can be killed by wildlife or rangers on patrol. During the course of the study, there were reports of about ten community members killed on the Kenyan side as they were trying to remove tusks from dead elephants. Another was ambushed by buffaloes and trampled to death. The poachers are also usually very aggressive and can kill community members and rangers they encounter. One respondent narrated an incident where he was about to be killed by poachers when he was extracting resources from the core zone.

Other perceived impacts are loss of harmonious co-existence and national heritage. Rangers working within the ecosystem live with the community around. However whenever a poaching incidence occurs, these rangers come into the community to look for evidence. In the process they harass and beat them which causes bad blood between the rangers and the community and disrupts harmonious co-existence. On the issue of national heritage, most of the respondents were for their children having the opportunity to see the wildlife. They felt

that poaching will cause some of them to go extinct hence their children will not know how the wildlife look like.

Similarly, a study carried out in Madagascar to determine how culture influences attitudes about causes and consequences of wildlife poaching reported that 73% of the participants agreed that poaching posed a threat to the environment while 63% agreed that it was a threat to the lives of the local people (Rizzolo, Gore, Ratsimbazafy and Rajaonson, 2016). The specific threats were however not mentioned.

#### **4.7 The anti-poaching strategies applied**

##### **4.7.1 Mount Elgon Biosphere Reserve, Kenya**

Results from the key informant interviews in Kenya showed that the anti-poaching strategies applied are: Ranger Patrols on foot, vehicles, motorbikes and aircrafts, Community involvement (community scouts, anti-poaching workshops, community informants and de-snaring exercises), Developments in the community such as road maintenance and corporate social responsibility (CSR) projects, Camera traps in caves to monitor how elephants use caves, and GPS used in mapping incidences of elephant deaths

These strategies have been successful in combating poaching because:- The community involved were classified as poachers. They did not see any benefits of the park as they felt it curtailed their activities. To counter their resistance to the park, KWS started CSR initiatives and developments such as schools, cattle dips, dispensary and roads within the community. The school provided an opportunity for the community children to learn because there was no school nearby. The poachers who surrendered were also offered employment as casuals within the park and so able to draw a legal source of income for their households. According to KWS officers this reduced poaching to some extent.

Community scouts and informants have been very useful in reporting any illegal activity within the core zone. The Ogiek who live inside the forest have been helpful in reducing poaching activities carried out by poachers from Uganda who come to Kenya to poach the big wildlife especially buffaloes. They also report any gun shots heard within the core zone. The community scouts are involved in monitoring and tracking of wildlife.

Ranger patrols take place on the ground hence one on one interaction with the ecosystem. The rangers are able to monitor wildlife, illegal activities and respond rapidly to any

intelligence information given. They shoot to kill/ scare off any poacher they encounter which makes the community be fearful of undertaking illegal activities. There are also the cross border coordinated patrols that take place especially in the moorland where the large mammals occur.

Reasons why they have not been fully successful in combating poaching within the biosphere reserve are: - Some respondents alleged that KWS does not have a good working relationship with the KFS mainly because of overlapping mandates, therefore when a community member encounters a KFS ranger he/she bribes them and is allowed access into the forest where he/she can do whatever they want. Lindsey *et al.* (2011) also report that scouts are sometimes bribed by illegal hunters to turn a blind eye. The issue of working relationship was confirmed by the senior warden in a personal communication with him. He mentioned that KFS were interfering with wildlife habitats especially through plantation forest clearing under their PELIS program and that some community members involved in PELIS were likely poachers.

There is only one community involved in wildlife management out of the two communities that live around the park. This is the community that lives near the park where CSR initiatives and developments have been undertaken by KWS. The other communities feel left out which makes them see wildlife as a nuisance/pest that should be immediately killed when spotted. A study by Suich, Child and Spenceley, (2009) in Botswana, Tanzania, Zambia and Zimbabwe also established that the incentive for conservation is weak where communities feel disadvantaged or left out of benefits from natural resources.

The KWS rangers do not have a good relationship with the community. They have been accused of falsely accusing community members of poaching and even beating them. Because of this strained relationship, it is highly unlikely that the community will report any poaching activity to them. Similar findings are reported by Holmes (2007).

Large working area- Mount Elgon is large and the rangers are few. There are areas where there is totally no KWS presence yet there is wildlife such as elephants and buffaloes. The last outpost for KFS is at Kopsiro while for KWS, it is at Kapsokwony. This lack of enforcement in some areas has led to poaching going on unabated in these areas. A study by Lindsey *et al.* (2012) also established that poachers operated with impunity in areas where the density of rangers was small compared to the protected area they were to oversee.

#### **4.7.2 Mount Elgon Biosphere Reserve, Uganda**

The anti-poaching strategies employed in the Mt. Elgon BR, Uganda include: Ranger Patrols and deployment on foot, vehicles and motorbikes, Use of GPS/smartphones to map incidences of illegal activities, Creation of awareness and community sensitization on the benefits of the ecosystem, Arrests of people engaging in poaching, Engagement of surrendered poachers through employment as casual labourers and Community involvement through MoU on minor resource access, community scouts and community informants

Ranger patrols and community sensitization have been the most successful strategies. Patrols ensure one on one interaction with the ecosystem hence more likely to encounter any illegal activity within the core zone and stop it. The patrols are mostly concentrated in areas where many illegal activities have been mapped using GPS. Community sensitization is important as the community get to learn how the ecosystem benefits them. They will therefore be less likely to undertake illegal activities once they know the benefits. The main challenge facing ranger patrols is less manpower with large operational area. A similar challenge was reported Lindsey *et al.* (2012) in their study on bushmeat trade in the Savannah.

MoU on minor resource access has been useful in guiding the community on resources that can be obtained from the forest on specific days of the week. These MoUs are between village user groups (for Non Timber Forest Products {NTFPs}) and UWA. The user groups ensure that resources obtained are those that are allowed. A community member undertaking illegal activities is reported to the user group that acts as a village court. This has been helpful in reducing poaching incidences.

Community involvement has however not led to complete elimination of poaching because of the grievances of the community against UWA and strong adherence to culture. Before the gazzettment of Mt. Elgon as a national park the community used to farm in the core zone. After UWA came to Mt. Elgon, everyone was evicted from the core zone leading to people losing their farms and bad blood between the community and UWA. There are also instances where the community members are harassed and beaten by UWA rangers which create bad blood. This harassment occurs when community members are found in the core zone on days when they are not supposed to be there. These strained relationships lead to wildlife being killed to avenge what community members believe are actions against them in line with what is reported by Holmes (2007).

Adherence to culture is also a factor in continued poaching incidences. The Bagisu require the black and white colobus monkey skin for prestige in their traditional circumcision ceremony that takes place in December of every even year. One respondent openly stated that it is a must for them to get that skin for their son, no matter the circumstances. In this case, it does not matter whether they are or are not involved in management of the ecosystem hence poaching continues. Similar findings are also reported by Haule, Johnsen and Maganga, (2002) and Lindsey (2010).

Arrests have equally not been successful because sometimes there is no evidence. This leads to the people arrested being acquitted even when it is known that they are poachers. Additionally the penalties are usually small and do not serve as a deterrent against continued engagement in poaching (Lindsey *et al.*, 2012). Engagement of former poachers has also been useful with the main challenge being that not all of them can be employed at once. Some may therefore opt to go back to poaching because of redundancy (Basset, 2005).

## CHAPTER FIVE

### 5.0 SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Summary of Findings

This study established that the wildlife taxa mostly targeted in poaching in both BRs is mammals. In Uganda, Black and White colobus and wild pigs were the two wildlife species mostly targeted while buffaloes and antelopes (Dik-dik, duicker, gazelle) were the species targeted mostly in Kenya. Majority of the wildlife species mentioned were ungulates (77% in Kenya and 47% in Uganda).

Regarding methods used, the study established that traditional weapons such as snares, bows, arrows and dogs were the dominant methods used in poaching. Firearms were used when the target animal was large.

The study also identified that poaching was mainly motivated by the need for animal protein source/ household consumption, need for income/ local sale, protection of property and need for trophies in both BRs.

Regarding extent of poaching, it was identified that both spatial and temporal patterns of poaching exist. Poaching took place in both the core zone and buffer zone of the BRs. The buffer zones in both BRs comprised of privately held farms where agriculture was practised. Wildlife was captured and killed whenever they raided the farms. Human-wildlife conflict is thus a motivation for poaching. Poaching peaked during the wet season in the Kenyan side and the dry season in the Ugandan side.

Anti-poaching strategies are employed in both biosphere reserves. They include ranger patrols, community involvement and sensitization, arrests, engagement of ex-poachers and creation of awareness.

Finally, the study showed that the community were aware of the impacts of poaching. These impacts include reduced wildlife population numbers, reduced species diversity and loss of access to the core zone of the ecosystem.

#### 5.2 Conclusions

Based on the findings of this study, it was concluded that:

- i. Wildlife in the mammalian taxa is the main target in poaching. They include ungulates, primates, and rodents.

- ii. Traditional methods such as snares, *pangas*, bows, arrows, and chasing with dogs are the dominant methods used when poaching.
- iii. Motivations that encourage poaching exist. These motivations include need for animal protein for consumption at the household, need for income, need for trophies and protection of self and property.
- iv. There are spatial and temporal patterns in poaching activities.
- v. The community has perceptions of how poaching impacts wildlife and the local people found around wildlife areas.
- vi. Anti-poaching strategies to counter poaching are applied.

### **5.3 Recommendations**

#### **5.3.1 Recommendations to policy makers and stakeholders**

- i. There is need for collaboration between Uganda and Kenya in the management of this trans-boundary ecosystem
- ii. There is need to improve outreach and education of the community members regarding the importance of Mount Elgon ecosystem in the provision of ecosystem services and goods. It was noted that the community members did not cite the importance of ecosystem services
- iii. Improve household income through initiation of wildlife based enterprises e.g. silk-worm production, butterfly farming, bee-keeping, fish farming etc.
- iv. Even as strong law enforcement continues in a bid to reduce poaching, alternative sources of protein that are inexpensive to rear should be introduced.
- v. Enhance species monitoring programs that will be useful in determining what threats they face and hence develop appropriate interventions
- vi. The study found out that currently KWS CSR projects are only undertaken in one community out of the two bordering the park. These CSR projects include developments such as schools and roads. The other communities therefore feel that the park has no benefits. They are therefore more likely to engage in illegal activities as a form of protest to the lack of benefits from wildlife conservation. Kenya Wildlife Service CSR projects should therefore also be implemented in areas where the other community inhabits.

- vii. Policy makers should ensure that the mandates of all environmental agencies involved in conservation of the environment in Kenya are harmonized.
- viii. The relationship between law enforcement officers and communities should be addressed/ improved.
- ix. There is also the need for biosphere reserves to be legally recognised under the national laws of both countries. This should include a legal framework for sustainable utilization of the natural resources. Currently, both biosphere reserves comprise national parks as the core zones. The national parks are legally recognised which ensures they are protected. Legal recognition of biosphere reserves will ensure that all the three zones are in line with what biosphere reserves stand for.
- x. Anti-poaching efforts are currently being hampered by inadequate funding. Governments should therefore provide more resources to biosphere reserves for anti-poaching and also encourage donor support towards the same.

### **5.3.2 Recommendations for further studies**

Further research should be done in the following areas to reduce poaching and improve management of Mount Elgon ecosystem:

- i. Wildlife conservation laws such as Wildlife Conservation and Management Act (2013) and Uganda Wildlife Act (2014) have been amended in both countries yet poaching still continues. There is therefore the need to understand the constraints to implementation and enforcement of existing wildlife laws and identification of policy gaps in the two countries
- ii. There is need to understand the dynamics of resource utilization especially bushmeat for communities within the ecosystem. Therefore a study on the socio-economics of bushmeat hunting within the ecosystem would be worthwhile.
- iii. Ecosystem engineering is a combined function of different wildlife species. Absence of ecosystem engineers leads to the empty forest syndrome. A research should therefore be carried out on impacts on ecosystem processes as a result of local extinction and reducing population of some wildlife species in some areas of the ecosystem.
- iv. A study that would aid in better understanding of the factors and circumstances that would encourage co-existence between wildlife and people in the trans-boundary ecosystem should be undertaken.



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## APPENDICES

### APPENDIX 1: Household Questionnaire for Community Members

I am Ruth Kwata, an MSc student at Egerton University, department of Environmental Science. I am also a research fellow for the Biosphere Reserves as Model Regions for Anti-Poaching in Africa (BRAPA), in their research on the status of poaching in Biosphere Reserves in Africa. I am undertaking a research on ‘**Status and Perceived Impacts of Poaching on Biosphere Reserve management in the Mount Elgon Trans-boundary Ecosystem**’. I would therefore like to request you to spare some of your time and answer these questions. You are kindly requested to provide honest answers regarding the above issues. Your responses will be held in confidence and will be used only to enhance the conservation of Mt. Elgon Trans-Boundary ecosystem. If you have any questions about this survey, you may ask me or contact Dr. Paul Makenzi, Department of Environmental Science, Egerton University, P.O. BOX 536 Egerton, Kenya. Thank you in advance for your cooperation.

#### PART A: PERSONAL INFORMATION

Name: (Optional) ..... Age: .....

Location: .....

Gender:  Male  Female

Education level

- None
- Primary
- Secondary
- Tertiary

Number of years you have lived near or within the BR

- 0 -5 years
- 6-10 years
- 11-20 years
- 21-30 years
- > 30 years

Household size: .....

**PART B: Problems**

1. Which problems do you experience because of living within/ around the ecosystem?

.....  
.....

2. Which animals cause you problems?

.....  
.....

3. How do you solve these problems?

.....  
.....

4. Which method do you use frequently in solving the problems?

.....  
.....

5. How many times do you experience these problems in a typical month?

.....  
.....

6. At what times of the year do you experience these problems?

.....  
.....

7. Have you received any assistance from the management in solving these problems?

.....  
.....

8. If yes which type of assistance have you received?

.....  
.....

9. How long did they take before responding?

.....  
.....

**PART B: Ecosystem Benefits**

1. Which benefits do you derive from Mt. Elgon ecosystem?

.....  
.....

2. Which wildlife species from the ecosystem are captured?

.....  
.....

3. From those mentioned above, which can be eaten/ whose parts are valuable?

.....  
.....

4. Which methods do you use to capture the wildlife?

.....  
.....

5. Where do you get the bush meat/ wildlife parts?

.....  
.....

6. How many times in a typical month is the wildlife captured from the biosphere reserve?

.....  
.....

7. At what time of the year is the wildlife captured from the biosphere reserve?

.....  
.....

8. How do you use the bush meat/ wildlife parts obtained from the wildlife?

.....  
.....

**PART D: Involvement in Biosphere Reserve Management**

1. Are you involved in management of the wildlife found in the ecosystem?

.....  
.....



2. If yes please mention how you are involved.

.....  
.....

3. What benefits have you gotten out of being involved in the management?

.....  
.....

4. If no, have you heard about community involvement in management of the wildlife?

.....  
.....

5. How are they involved?

.....  
.....

**PART E: Awareness and Perceptions**

1. Are you aware of any wildlife management and conservation policies?

.....  
.....

2. If yes please mention them

.....  
.....

3. How have they shaped how you interact with wildlife?

.....  
.....

4. What is your perception of wildlife found in the area?

.....  
.....

**PART F: Poaching**

1. Have you ever heard of poachers in this area?

.....  
.....

2. If yes, when did you hear about them?

.....  
.....

3. Which wildlife species do they target?

.....  
.....

4. In your opinion, how have the poachers affected the community?

.....  
.....

**PART G: Perceived impacts of poaching**

1. In your opinion, in what ways has poaching impacted on the wildlife?

.....  
.....

2. In your opinion, in what ways has poaching impacted on the community?

.....  
.....

## **APPENDIX 2: Interview Schedule for Biosphere Reserve/Park Managers**

I am Ruth Kwata, an MSc student at Egerton University, department of Environmental Science. I am also a research fellow for the Biosphere Reserves as Model Regions for Anti-Poaching in Africa (BRAPA), in their research on the status of poaching in Biosphere Reserves in Africa. I am undertaking a research on ‘**Status and Perceived Impacts of Poaching on Biosphere Reserve management in the Mount Elgon Trans-boundary Ecosystem**’. I would therefore like to request you to spare some of your time and answer these questions. You are kindly requested to provide honest answers regarding the above issues. Your responses will be held in confidence and will be used only to enhance the conservation of Mt. Elgon Trans-Boundary ecosystem. If you have any questions about this survey, you may ask me or contact Dr. Paul Makenzi, Department of Environmental Science, Egerton University, P.O. BOX 536 Egerton, Kenya. Thank you in advance for your cooperation.

Name:

Contacts:

1. In which zone of the Biosphere does poaching currently dominate?
2. Is hunting allowed within the Biosphere Reserve? In which zone of the Biosphere does hunting currently dominate?
3. Which wildlife species are either poached or hunted? If you have records on the same, could you please provide
4. What are the main drivers of poaching within the Biosphere?
5. How has hunting/poaching impacted wildlife populations and the community within the Biosphere?
6. Which methods are used in poaching/hunting? (provide the frequency of encountering the method)
7. Have there been any arrests of poachers/hunters? Where do they come from?
8. Do you apply anti-poaching strategies? If yes which ones do you apply?
9. What have you achieved as a result of applying the anti-poaching strategies?
10. What factors have led to the success or failure of the anti-poaching strategies?

### **APPENDIX 3: Interview Schedule for Forest Managers**

I am Ruth Kwata, an MSc student at Egerton University, department of Environmental Science. I am also a research fellow for the Biosphere Reserves as Model Regions for Anti-Poaching in Africa (BRAPA), in their research on the status of poaching in Biosphere Reserves in Africa. I am undertaking a research on ‘**Status and Perceived Impacts of Poaching on Biosphere Reserve management in the Mount Elgon Trans-boundary Ecosystem**’. I would therefore like to request you to spare some of your time and answer these questions. You are kindly requested to provide honest answers regarding the above issues. Your responses will be held in confidence and will be used only to enhance the conservation of Mt. Elgon Trans-Boundary ecosystem. If you have any questions about this survey, you may ask me or contact Dr. Paul Makenzi, Department of Environmental Science, Egerton University, P.O. BOX 536 Egerton, Kenya. Thank you in advance for your cooperation.

Name:

Contacts:

1. During forest patrols do you encounter wildlife that is either dead or trapped?
2. What methods were used in killing or trapping the wildlife?
3. Which wildlife species are mainly targeted?
4. How has hunting/poaching impacted the ecosystem?
5. Has your department ever arrested wildlife poachers?

#### **APPENDIX 4: Interview Schedule for Chiefs (administrative)/ Community Representative**

I am Ruth Kwata, an MSc student at Egerton University, department of Environmental Science. I am also a research fellow for the Biosphere Reserves as Model Regions for Anti-Poaching in Africa (BRAPA), in their research on the status of poaching in Biosphere Reserves in Africa. I am undertaking a research on '**Status and Perceived Impacts of Poaching on Biosphere Reserve management in the Mount Elgon Trans-boundary Ecosystem**'. I would therefore like to request you to spare some of your time and answer these questions. You are kindly requested to provide honest answers regarding the above issues. Your responses will be held in confidence and will be used only to enhance the conservation of Mt. Elgon Trans-Boundary ecosystem. If you have any questions about this survey, you may ask me or contact Dr. Paul Makenzi, Department of Environmental Science, Egerton University, P.O. BOX 536 Egerton, Kenya. Thank you in advance for your cooperation.

Name:

Contacts:

1. Have you received any complaints from the people on issues concerning wildlife? If yes what are the issues
2. How is the community involved in conservation and management of the biosphere reserve?
3. What benefits does the community get from the biosphere reserve?
4. Concerning bush meat, which wildlife species are mainly targeted?
5. What methods are used when hunting the bush meat?
6. Has poaching ever been of concern in the biosphere reserve?
7. Have there been arrests of commercial poachers? If yes how many and what was their target species?
8. Which methods were the commercial poachers using?

## APPENDIX 5: Research Authorization Letter- Kenya



### NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone 020 400 7000,  
0713 788787,0735404245  
Fax: +254-20-318245,318249  
Email: dg@nacosti.go.ke  
Website: www.nacosti.go.ke  
When replying please quote

NACOSTI, Upper Kubete  
Off Waiyaki Way  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref: No **NACOSTI/P/17/21134/19188**

Date: **18<sup>th</sup> December, 2017**

Ruth Kwata Shikuku  
Egerton University  
P.O. Box 536-20115  
**EGERTON.**

#### **RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on "*Assessment of the status and perceived impacts of poaching in the Mount Elgon Trans-Boundary Ecosystem, Kenya and Uganda*" I am pleased to inform you that you have been authorized to undertake research in **selected Counties** for the period ending **18<sup>th</sup> December, 2018.**

You are advised to report to **the County Commissioners and the County Directors of Education, selected Counties** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit a **copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

  
**GODFREY P. KALERWA MSc., MBA, MKIM**  
**FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The County Commissioners  
Selected Counties.

The County Directors of Education  
Selected Counties.

## APPENDIX 6: Research Application Approval Letter- Uganda



### UGANDA WILDLIFE AUTHORITY

OFFICE OF THE EXECUTIVE DIRECTOR  
PLOT 7 KIRA ROAD KAMWOKYA  
P. O. Box 3530, Kampala, Uganda

Our Ref: UWA/COD/96/05

7<sup>th</sup> September, 2017

**Shikuku Kwata Ruth**  
Egerton Department of Environmental Science  
Nakuru  
KENYA

#### RESEARCH APPLICATION APPROVAL

I refer to your application dated 7<sup>th</sup> September, 2017 seeking to undertake a study addressing; ***“Assessment of the status and perceived impacts of poaching on species diversity and Community in the Mt. Elgon Transboundary Ecosystem, Kenya and Uganda”***.

I wish to inform you that your research application has been approved for you and your co-investigator **Simon Moru** with effect from 15<sup>th</sup> to 30<sup>th</sup> September 2017. You will be expected to submit a progress report by December 2017 and a final report of your findings by April 2018 to the Ecological Monitoring and Research Unit of Uganda Wildlife Authority(UWA). In case you are unable to work within these dates, please notify UWA in writing.

You will be required to pay an application fee of **US\$ 50** and a monthly research fee of **US\$ 100**. Your co-investigator **Simon moru** will pay a monthly research fee of **US\$ 100**. As a lead researcher you will pay a Refundable Report/Security deposit fee of **US\$ 300** to Uganda Wildlife Authority. Note that monthly research fees are paid per calendar month.

You are also required by law to seek approval from the Uganda National Council for Science and Technology (UNCST). By copy of this letter, UNCST is duly informed that your research has been approved by UWA.

Please report to the Chief Warden of Mt.Elgon Conservation Area on arrival for registration, payment of fees and further guidance.

**Conserving for Generations**

Yours sincerely,

Dr. Andrew G. Seguya  
**EXECUTIVE DIRECTOR**

CC: Executive Secretary, UNCST  
CC: Chief Warden, Mt.Elgon Conservation Area