

**AN ASSESSMENT OF HUMAN-WILDLIFE CONFLICTS WITHIN
THE KITENGELA WILDLIFE DISPERSAL AREA KAJIADO COUNTY,
KENYA**

BY

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DECLARATION

This project paper is my work and has not been presented for any award in any university.

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This project has been submitted for examination with our approval as the university supervisors.

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DEDICATION

The project is dedicated to my parents for their financial and moral support and to my academic supervisors, Mr. Nicholas Ochanda and Dr. Samuel Owuor and for their great ideas and to the success of this project.

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This project report could have not been successful without my supervisors, Mr. Nicholas Ochanda and Dr. Samuel Owuor. I would also like to recognize the invaluable contributions from Dr. Francis Mwaura who started this academic journey with me.

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ABSTRACT

Conflicts between wildlife and people, and especially those who border with conservation areas are common phenomena. Destruction of natural habitat is associated with human activities by overexploiting the forest cover and encroachment into protected areas. This study sought to assess human-wildlife conflicts within the Kitengela Dispersal Area in Kajiado County, Kenya. The objectives of the study were to 1) examine the types of human-wildlife conflicts around the Kitengela migratory corridor; 2) examine the causes of human-wildlife conflicts within the Kitengela migratory corridor; and 3) evaluate the management practices and strategies for human-wildlife conflict within Kitengela migratory corridor. These objectives were achieved through a sample of 62 households, selected using stratified random sampling procedure. The data was then analyzed by use of descriptive statistics.

The study revealed that there are conflicts that largely emanate from damage of crops by wild animals, restricted movement of the wildlife, emergence of human settlements in the corridor, increased farming activities, increased population, and natural factors such as drought. The management strategies to reduce human-wildlife conflicts include community awareness on the importance of wildlife by the Kenya Wildlife Service, as well as intense vigilance by the Kenya Wildlife Service rangers. The study recommended the involvement of all the stakeholders to protect both the wildlife and humans in the migratory corridor and to advocate for sustainable co-existence practices, including achievable regulatory measures.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study Problem

According to World Conservation Union (2003), conflicts between humans and wildlife happen when the needs of animal meet with those of humans, therefore leading to occurrence of costs in any form. These conflicts happen in urban and rural areas, but always common in and out of the conservation areas, where wildlife population is high and they often break into cultivated or grazing areas. The high and frequent number of conflicts between wildlife and humans is threatening the survival of endangered species in the whole world, particularly the large and rare mammals like the Sumatran tiger and the Asian lion, as well as the less endangered species like the Snow leopard and the Red colobus monkey. In Europe and America, several cases of human-wildlife conflicts have been reported to have caused human injuries and deaths, economic loss, and reduction in numbers and extinction of the wild animals involved (see e.g. Kirby, 2005; USDA, 2004; Musiani *et al.*, 2003; Williams *et al.*, 1995; Therin, 2001; Cardillo *et al.*, 2004).

Various studies in Africa have exposed incidences and consequences of human-wildlife conflicts in the continent (see e.g. Clark, 1977; Mcdonald & Sillero-Zubiri, 2002; O'connell-Rodwell *et al.*, 2000; Rogers *et al.*, 2006; Rwetsiba & Nuwamanya, 2010). Conflicts between human and wildlife have increased in Africa, especially where elephants and lions are still moving around freely in and out of the conservation areas. Furthermore, continuous growth in human population has largely contributed to

encroachment into wildlife habitat, which has led to conversion of lands to settled agriculture.

Kangwana (1993), Conover (2002) and Okello *et al.* (2003) stated that human-wildlife conflict is not only posing conflicts between people, wildlife and other stakeholders responsible for the conservation of wildlife, but it also poses a challenge to sustainable wildlife conservation practice. Increasing human and livestock populations, and land use changes are anthropogenic factors that can directly aggravate this conflict, while climatic factors, abundance and distribution of wild prey, and stochastic events influence it indirectly (Distefano, 2005; Mugisha, 2002; Western, 1995).

The Kenyan wildlife is unique with diverse features in Africa. The conservation areas are known globally, some of them being World Heritage Sites, Ramsar Sites and Man and Biosphere Reserves. As such, Kenya's resources constitute a different heritage which is of a great concern to the world. Wildlife resources contribute to the economy in generating revenue and wealth (Ministry of Tourism and Wildlife, 2007). For example, in 2006, wildlife contributed 70% to the gross tourism earnings, 25% to the Gross Domestic Product and 10% to formal sector employment.

Wildlife resources are important to the Kenyan people since it provides livelihood, ecosystem goods and services and shelter. Wildlife fulfills an important ecological function for a sustainable and life system. Significantly, water reservoirs are in wildlife conservation areas because of its vegetations or forest cover. Furthermore, wildlife has

socio-cultural and aesthetic values. In fact, any alteration on the ecosystem can affect the survival of humans.

The scarcity of biological resources has been a threat to Kenya. The alteration of fields to favor farming and growth of development both (urban and rural) has contributed to dramatic changes in conservation areas, which has threatened the survival of nature and wild species. In addition, Kenyan wildlife reservoirs are under a threat; therefore losing its chances to contribute growth and economic factors. Irandu (2003) stated that communities who resides adjacent to the conservation area are the first people to be affected by wildlife attacks, causing human injuries or even fatalities and destruction of livelihood sources.

Human-wildlife conflicts are a threat to sustainability of wildlife and the people's way of living. These conflicts increases as the number of people increase, development expands, weather varies, and as natural resource base shrinks (Distefano, 2004; Messmer, 2000). Kenya has 22 national parks, 28 national reserves, 5 national sanctuaries, 4 marine national parks and 6 marine national reserves, which are under mandate and protection of Kenya Wildlife Service (KWS, 2008; KWS, 2013). The Nairobi National Park migratory corridor in Kajiado County covers an area of 117.21 square kilometers and centrally located within the main tourist circuits – Mara and Samburu.

1.2 Statement of the Research Problem

When peoples' property and lives are destroyed and the concerned stakeholders neither reduce nor give financial support to help the affected people, the community will not see the importance of conserving the wildlife (Okello & Wishitemi 2006). This will worsen the situation when people living adjacent to the protected areas are segregated and are not entitled to receive any economic benefit from wildlife resources. When the concerned stakeholders put wildlife conservation as a prime factor more than the lives of people who practice conservation, then their sources of daily livelihoods and aspirations are destroyed (KWS, 2011).

The factors driving human-wildlife conflict are rules, regulations and policies. The legal factors that involve land-use planning and wildlife sustainability are the first contributors to human-wildlife conflict. Yet these regulations could prevent or reduce the occurrence of human-wildlife conflicts. Since 1980s, human encroachment for farming activities has shifted to low rangeland an area which is an important ecosystem for wild animals (Sindiga, 1995; Mwale, 2000). This has escalated further conflicts on water resources, natural forest, vegetation, as well as human-wildlife conflicts – and therefore wrong perception towards conservation (Madden, 2006).

There is no contention that areas surrounding the Nairobi National Park have been experiencing human-wildlife conflicts. For example, 269 cases of human-wildlife conflicts around the Nairobi National Park were reported to Kenya Wildlife Service in 2012. These were 7 injuries caused by monkey, hippopotamus, baboon, buffaloes and

snake bites; 27 cases of livestock predation; 110 cases of crop destruction by buffaloes, zebras, hailand and water buck; 95 cases of threats/property damage by buffaloes, leopards, lion and snakes; and 30 wildlife mortality caused by communities retaliating back (KWS, 2012). The study attempts to assess the nature, and extent of human-wildlife conflict within Kitengela wildlife dispersal area.

1.3 Research Questions

The study attempts to answer the following research questions:

1. What are the types of human-wildlife conflicts within Kitengela migratory corridor in Kajiado County?
2. What are the causes of human-wildlife conflicts within the Kitengela migratory corridor in Kajiado County?
3. What are the management practices and strategies for human-wildlife conflict within Kitengela migratory corridor in Kajiado County?

1.4 Research Objectives

The overall objective of the study is to assess the nature and extent of human-wildlife conflict along the Kitengela wildlife dispersal area. The specific objectives are to:

1. Examine the types of human-wildlife conflicts around the Kitengela migratory corridor in Kajiado County.
2. Examine the causes of human-wildlife conflicts within the Kitengela migratory corridor in Kajiado County.

3. Evaluate the management practices and strategies for human-wildlife conflict within Kitengela migratory corridor in Kajiado County.

1.5 Justification of the Study

Nairobi National Park located in the city of Nairobi. As such, there is a high demand from private organizations and the public to use the dispersal area for their own gain in building and developing it to be a commercial area. The major hotspot is from Athi River to Isinya which has traditionally been a wildlife corridor, but has been turned into a human settlement area and has witnessed a number of human-wildlife conflict cases (Muruthi, 2009; Okech, 2010). The study results will benefit the central government, the county governments that border the migratory corridor, the Kenya Wildlife Service, the Nairobi National Park and other stakeholders.

1.6 Scope and Limitations of the Study

The study focusses on the Kitengela wildlife dispersal area in Kajiado County. Particularly, the study focused on five hotspots. These are Athi River with a human population of 137,211 people; Kitengela town with a population of 84,633 people; Kiserian with a population of 18,091 people; Isinya with a population of 12,615 people; and Rongai with a population of 58,459 people (KNBS, 2009; KNBS, 2013). However, the vastness of the wildlife dispersal area at Kitengela and the rugged terrain made it difficult for the researcher and her assistants to reach potential respondents and therefore limiting the researcher to sample only the accessible regions. Furthermore, the study was undertaken within limited time and financial resources.

CHAPTER TWO: LITERATURE REVIEW

The chapter provides relevant information that has informed the framework of this study. The first section presents a review on the extent of wildlife conflicts. Second section gives an overview of management practices and strategies to reduce or control conflicts. This is followed by the gaps emanating from the literature review. Lastly, the conceptual framework is provided.

2.1 Nature and Extent of Human-Wildlife Conflicts

There is a likelihood of occurrence of human-wildlife conflict when humans pursue their daily activities that might negatively affect wildlife, or wildlife affecting human livelihoods during their movement either in or out of the park. Wildlife service administration links human-wildlife conflicts to destruction of assets (crops, houses or buildings), deaths and even injuries in other cases and also retrieval of individual rights attributable to wildlife (KWS, 1995).

Gradual destruction of forest and vegetation cover has continually led to rise of human-wildlife conflict. As wildlife is being pushed to their natural spaces or habitat, rapid conflicts are highly experienced between humans and wildlife (Barnes *et al.*, 2003). Nowadays, the natural habitation can be able to survive inside conservation zones. This statement elaborates why conflicts are experienced more in buffer zones where animals break into human settlements for water and fodder.

Although human deaths and injuries are less experienced than crop destruction, they cannot be tolerated by either people or wildlife management globally. A study of human deaths by animals in Africa in 1970s stated that hippopotamus were responsible for human fatalities (Clark, 1977). In 4 years, from 1999 to 2004, crocodiles were able to kill more than 28 humans and injured 57 in Jukumu Wildlife Management Area, with an area of 500km² and 22 villages living in the northern buffer areas of the Selous Game Reserve in Tanzania (Baldus, 2005).

Kakum conservancy in Ghana, reported 10 human fatalities, while in Caprivi region of Namibia with a dense population of 5,000 elephants were ranked as twice aggressive as a lion in 1990s (O'Connell-Rodwell *et al.*, 2000). Such similar kinds of cases of human fatalities have been experienced in Kenya (WWF, 2007). Fatalities and other injuries can also be linked to road accidents caused by animals (Mouron *et al.*, 1998; Scanlon, 1998). Additional conflict between human and wildlife include human illness and even deaths that are caused by wildlife diseases which include bites, attacks, and bird aircraft accidents.

The continued increase in human population that has contributed to the shrinking of ecosystems has led to isolated, demarcated conservancy (Bissonette & Adair, 2008). This will restrain wildlife populations which can result in increase of a demand towards a certain species (Van Aarde & Jackson, 2007). The gradual loss of forest and vegetation cover brings out the need to use ecosystem sustainably and gives an understanding of

how wildlife is linked to the ecosystem (Douglas-Hamilton *et al.*, 2005). But then, wildlife adapt their ranging character to avoid human problems (Burke *et al.*, 2008).

As such, the emergence of small scale farming, settlements and other physical development in animal habitation or migratory routes are bound to cause conflicts between wildlife and humans. Most natural wildlife buffer zones have led to competition for scarce resources (fodder, water resource and space) hence causing a conflict to survival (Kagiri, 2000). Furthermore, change in farming patterns in other parts of Africa has resulted to increase in conflicts by elephants destroying farmers' crops. This has contributed to a great misunderstanding between farmers and the institution that encourages conservation (Thirgood *et al.*, 2005). Such conflicts need compensation for all the losses caused by wildlife, in terms of economic costs and other benefits attached.

The changes in age bracket and other social characteristics contribute to direct contact with wild animals. This is because as human populations increase, human habitation grows and extends into the conservancy areas as well in rural and town areas. Human population, especially in Africa has rapidly grown and is pushing people to wildlife zones causing a direct competition for space and other resources (Siex & Struhsaker, 1999). Ogada *et al* (2003) also noted that conflicts are experienced highly in places where there is high number of species co-existing with the high number of people. For example, Tsavo National Park buffer zone is about 20,000km square with 250 000 and therefore exceeding the carrying capacity of that space or land.

The rapid growth in human population has led to more people into marginal fields which are a natural habitat for wildlife. Human activities have led to changes in land use and subdivisions of lands to suit farming and other uses that cannot suit wildlife. According to Kangwana (1993), Western (1995), Conover (2002) and Okello *et al.* (2003), human activities in the marginal lands or in fields inhabited by wildlife do not only contribute to conflict between the local communities, wild animals and other concerned stakeholders, but poses a threat to wildlife sustainability.

Crop destructions, conflicts over water and pasture, risks of infections and other challenges of human death in trying to protect their properties and crops from wildlife, are the problems that face Africa's marginal lands (KWS, 1992; Norton-Griffiths, 1996; Campbell *et al.*, 2000; Muruthi, 2005). In addition, the available strategy for wildlife sustainability prevents the local community from using the natural resources. This poses a threat to the people's way of living and the channels of getting their daily food, and the available solutions from the management to cope with these emerging conflicts are not enough therefore killing the morale of the residents in sustainability practices (Mulholland & Eagles, 2002).

Furthermore, fencing of fields from the fear of wildlife attacks have constituted to blocking the migratory routes for wild animals. The animals destroy the barriers (they could be houses, crops, paddocks, fences) since they want to reclaim their usual exit in and out of their territories. Human activities on the marginal fields have fueled conflicts between local communities and wildlife. This is because the open area that was available

for wildlife migration has been sub-divided into small lands to suit farming and other activities. In addition, land fragmentation has caused rapid human contact with wildlife causing conflicts in areas where wildlife is in high population, like in Samburu, Trans-Mara, Taita and Kwale of Kenya (KWS, 1996).

2.2 Management Practices and Strategies for Human-Wildlife Conflicts

McGregor (2005) noted that stakeholders should put in to consideration the negative impacts that could arise among the local residence living in the marginal fields and who also coexist and share the scarce resource with wildlife, including economic, political influences and other external factors that links them. The diversity of the concerned authorities has contributed to changes in management strategies. For instant in some cases, strategies of population control which was once mainstreaming, in now denied or rejected. Concerns for privacy, asset destruction, and safety may occur in other areas close to the use of traditional population control strategies thus exacerbating the conflicts (Messmer *et al.*, 1997).

It is a challenge to manage problems facing wild animals in their own very state of nature. While the concerned authorities' values, views, attributes and beliefs change, the conflicts concerning these views will also change. However, if these conflicts are seen as a reaction of change in the society, then they may give acceptable impact (Schafer & Tait, 1981). When conflicts by humans to wildlife or wildlife to humans are not solved at the right time, they can fuel people's frustration and therefore affecting the credibility of the organization and their long term goals. (Hewitt & Messmer, 1997).

Concerned organizations find it important to employ strategies to combat conflicts that can wisely be used to reduce or manage wildlife administration disagreements (Bingham, 1997). These strategies are ways in which the wildlife management administration seeks to get mutual and important solutions to their different opinions. A third person or party is always involved in these processes to lead the way in establishing a framework in how successful negotiations can be achieved. Components of conflict resolution include: 1) identification of defined goals to be achieved; 2) identification of clearer definitions, before dealing with the problems; 3) encouragement of working together in solving different issues; 4) maintaining progress and discouraging alternatives; 5) promotion and implementation of factors that encourages active listening; and lastly 6) being contented with small successes before addressing bigger issues (Guynn, 1997).

Contemporary information available on the extent of destruction or damage by wild animals is too scanty to draw a concrete conclusion on social and economic losses. The following factors have little or no information on: a) actual versus perceived economic losses for agricultural producers; b) natural forest cover loss; c) disease infections transfer by wildlife to humans; d) the extent and socio-economic influences of accidents caused by animals; e) the influences of bird accidents; f) destruction of rural and urban settlements; and g) social and economic damage associated with wildlife protection measures that restrict personal property rights.(Bingham, 1997; Guynn, 1997).

In addition, there little information on social and economic costs associated with restrictions placed on traditional wildlife management strategies of hunting or trapping or the loss of a registered control technique such as toxicants and repellents; increased wildlife damage associated with limitations or restrictions placed on the use of traditional harvest management strategies to control over abundant and nuisance wildlife populations; the effects of wildlife overpopulation on the other natural resources; and the cost (social, economic) associated with lost chances for the wildlife administration to enjoy benefits that are derived from flora and fauna. This information is important to the concerned stakeholders in establishing proactive programmes to combat human and wildlife conflicts. Systems and frameworks should be developed by the local authorities to successfully allocate financial resource to deal with conflicts of all kinds (Conover & Decker, 1991; Conover *et al.*, 1995).

Wildlife administration should be able to optimize the benefit accrued from wildlife to the local community rather than focusing on maximizing wildlife population. A challenge is felt when benefits accrued is not well distributed to different market segments. Farmers and private land owners have taken the blame, and this will always trigger conflict concerning wildlife population and how they are managed. Wildlife stakeholders have known the magnitude of rapidly growing conflicts between humans and wildlife and also the processes that can be adapted to involve the concerned stakeholders in seeking solution to increasing conflicts. They should also perceive these

raising problems as a chance to improve the existing strategies and gain support from the local and other people to better management (Messmer, 2000).

Wildlife has been recognized as an important resource by the households, but direct contact between humans and wildlife is increasing. And so when wild animal move in and out of their natural habitat and causes human fatalities, destruction of crops, or restriction of movement due to fear of dangerous animals is considered as wildlife damage (Conover, 2001).

Curnow (2001) and Conover (2001) have shed the light on the history of wild animal destruction, processes, changes and maintenance of continuity in wildlife destruction management and the application or establishments of methodologies. More concern have been shown by the state agencies, universities, and private establishments to participate in research internationally, nationally and even in residing country, to clearly identify the sources of conflicts and effective processes to regulate and control human wildlife-conflict. According to Curnow (2001), factors that affect people's developments, settlements and changes on the land need different methodologies and attributes to be able to work efficiently. The new areas of research and attention include: (a) urban-suburban areas; (b) wildlife diseases vectored to livestock and human; (c) over population of wildlife; (d) locals health and safety; and (e) invasive species.

Globally, shortcomings of using tourism activities to offset the costs of wildlife conservation may be the reason for domestic tourism to get revenue (Walpole &

Thouless, 2005). Tourism operations needs a marketable and uniqueness, appeal that must be transmitted effectively to the global target market that are value conscious and beautiful and unforgettable experience.

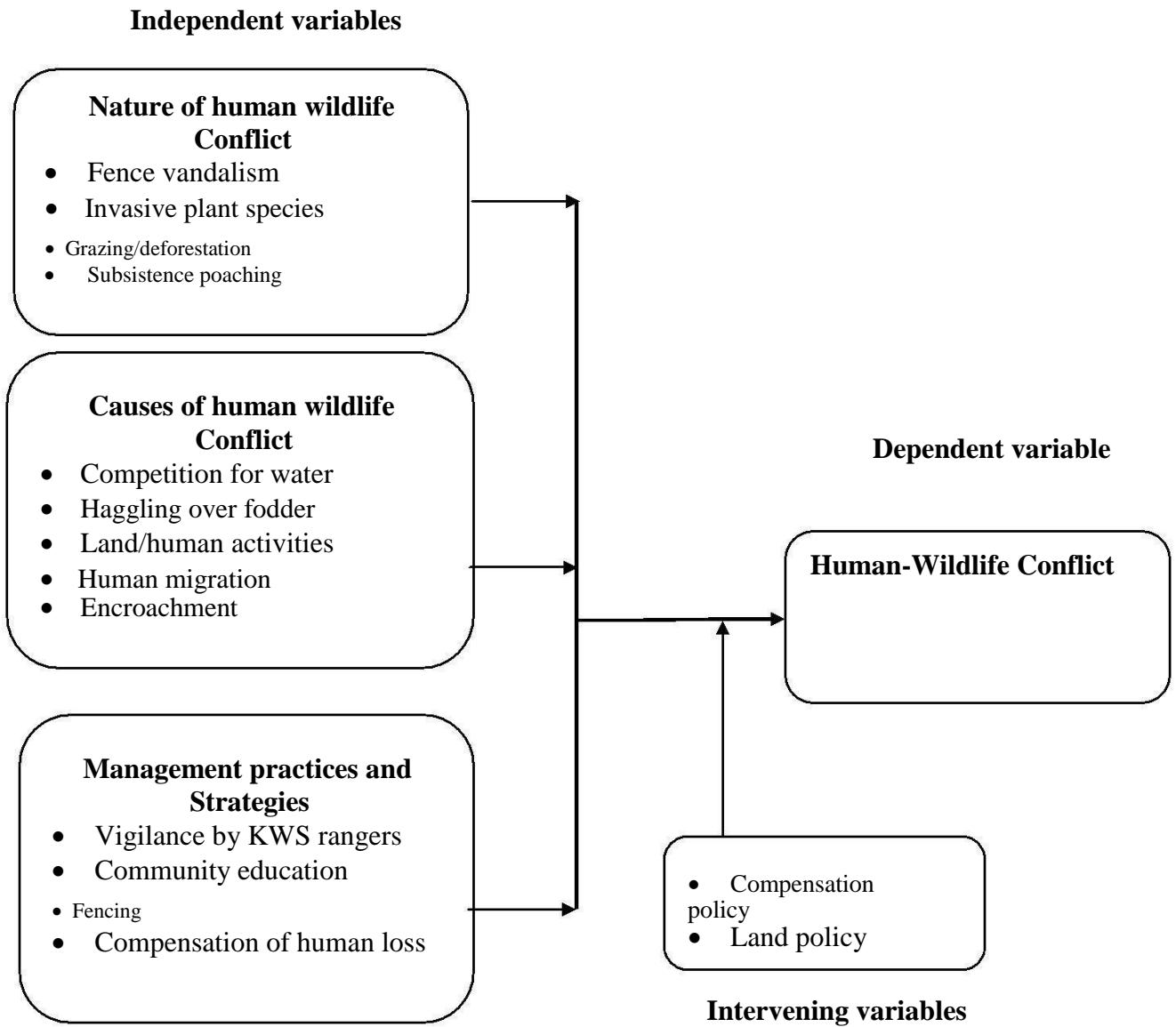
2.3 Gaps in Literature Review

The extent of social and economic influences of destruction to rural and urban settlements, livestock, crops or human injury caused by wild animals or human beings has not been developed. Furthermore, the compensation scheme is not clear on how to give compensation to the injured party and to which extent. This also contributes to rise in conflicts. Because wildlife conservation is not beneficial to the households, the community tends to see park administrators as partial in handling their complaints. In addition, there is little research on wildlife damages linked to restrictions of management processes and the transmission of diseases to humans by wildlife.

2.4 Conceptual Framework

Figure 1 provides the conceptual model of this study. Human-wildlife conflicts can occur through fence vandalism, invasive plant species, grazing/deforestation and subsistence poaching. Fence vandalism has become a great challenge to the households living within Kitengela wildlife dispersal area. There is no boundary to stop or reduce the movement of wildlife to the human settlements. The conflict increases in dry season when water and fodder is a scare resource (World Park Congress, 2003).

Figure 1: Conceptual Framework



Source: Modified from Yatich *et al* (2008)

Invasive plants have the ability to thrive and spread aggressively/widely outside its native range. This kind of plants destroy the natural habitat and therefore triggering human-wildlife conflicts. Most of the vegetation cover has been destroyed in the southern part of the park to pave way for farm lands and human settlements. This

reduces the natural habitat for the livestock and wildlife. Wildlife is also killed for food or they can be sold for an amount to be able to buy food for the households/family. This kind of activity is driven by poverty and hunger and therefore poaching is done for survival.

However, the major causes of human-wildlife conflicts in the area are competition for water, haggling over fodder, land/human activities, human migration and encroachment. There is a high competition of water especially during dry seasons when the riverine in the park dries up, forcing wildlife from the park to break into people's homesteads causing destruction of crops, livestock and their fodder, human injuries and even human fatalities and hence triggering human-wildlife conflicts. Human activities also trigger conflicts. The crops cultivated at the migratory routes attract herbivores such as zebras, buffaloes and giraffes. Human migration into the dispersal areas increases the population and households' settlement. As the human population increase they tend to encroach into the park for more space for farmlands, homesteads/settlements and livestock paddocks. The pressure on the natural resource increases, therefore leading to shrinking of a natural/forest cover and vegetation/fodder triggering human-wildlife conflicts.

As such, the park administration should be able to involve community in team building and decision making. This will enable them to share the vital resources that affect them directly or indirectly and what can be done to mitigate those issues. Co-existence strategy can be adapted by the households on how they can share the scarce resources with the wildlife without causing any conflict. This will only be achieved when training

programmes are initiated/introduced to teach the community the benefits of wildlife conservation. When households are aware of these benefits, the park administration can bring in compensation strategy to compensate for any loss done by the wildlife to the households. The local government needs to employ a mechanism (i.e. insurance and compensation policy) for any crop destruction, livestock injury, human deaths or injuries in order to regulate those incidence and the effects of conflicts between humans and wildlife. Such policies and mechanisms should be adapted and integrated into national regulations.

CHAPTER THREE: RESEARCH METHODOLOGY

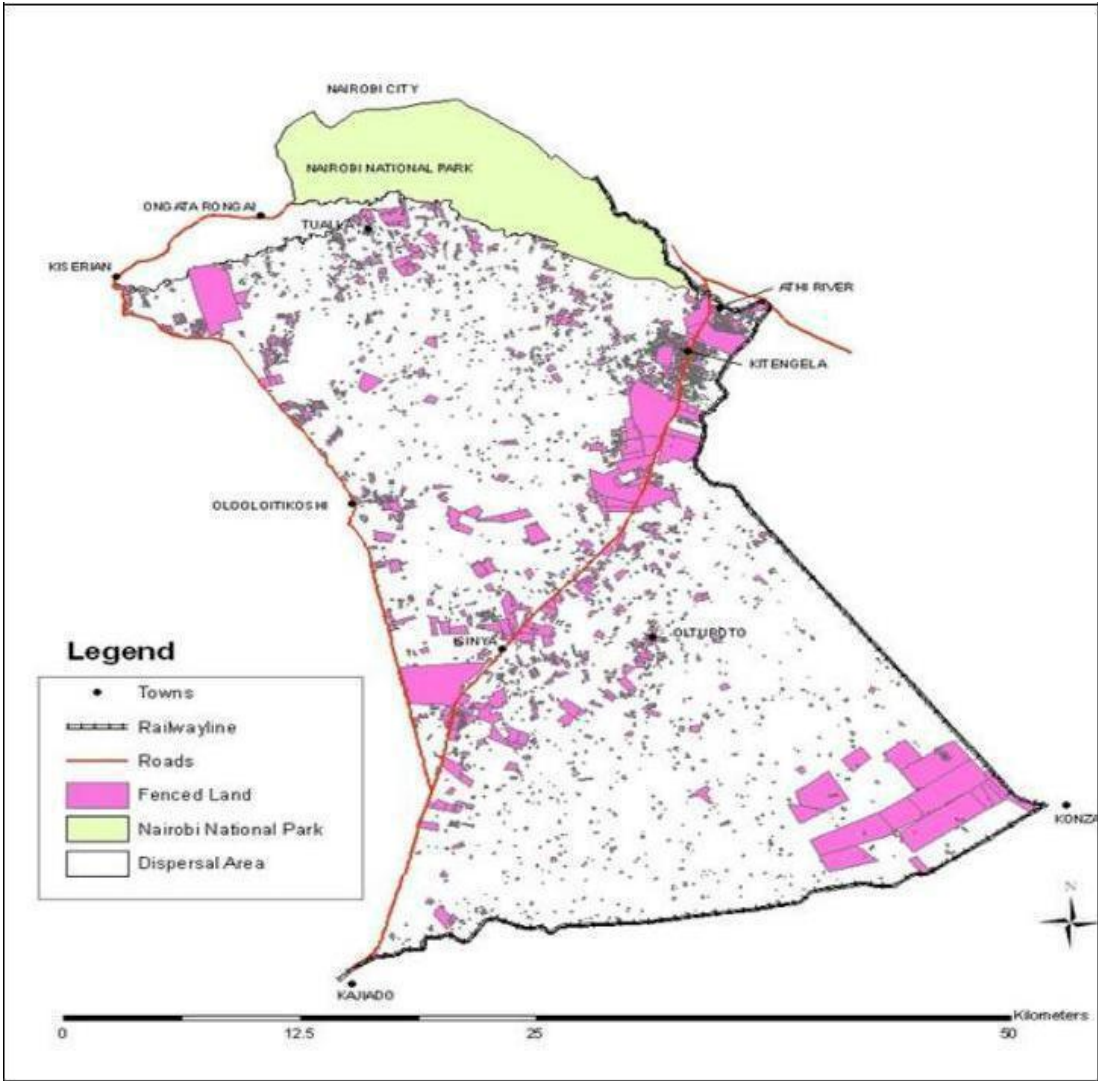
The chapter outlines the research methodology. It presents the research design and methods, data sources, sampling procedure, the data collection methods, as well as data processing and analysis methods. However, the chapter starts by presenting background information on the study area in terms of its geographical and physical characteristics.

3.1 The Study Area

3.1.1 Geographical characteristics

This research was done in Kitengela migratory routes in the southern part of Nairobi National Park in Kajiado County. The dispersal area is the usual exit of wildlife during their migration seasons. This area is now inhabited by human settlements. The area of Nairobi National Park is 114 km^2 , and located 7 km from the city Nairobi. The southern border of the National conservancy is free and therefore allows movement of wildlife to the private fields, forming a dispersal area of around 2500 km^2 (Figure 3.1). In the last 10 years the number of human population has escalated in the wildlife dispersal area. The contributors to the increase are the in-migrants and urbanization around Nairobi.

Figure 3.1: Kitengela Wildlife Dispersal Area



Source: Yatich *et al* (2008)

3.1.2 Physical characteristics

Kitengela wildlife dispersal area is a plain which is suitable for wildlife migration. The Nairobi National Park has a diversity of environments with different kinds of flora, open grass plains with scattered acacia bush. The western side has a highland dry forest and a permanent river with a Riverine forest in the south. There are stretches of broken bush

and deep rocky valleys with shrub and long grass. Man-made dams have also added a further habitat, favorable to certain species of birds and other aquatic biota (life forms). The dams also attract water dependent herbivores during the dry season.

3.2 Research Methodology

3.2.1 Sampling Design

The target population for the study was 200 households in the dispersal area of Kajiado county, as well as KWS officials in Nairobi National Park. The sample size was 62 households. The key informants were a KWS administrator, a KWS Warden and a community leader. The sampled households were determined using stratified random sampling procedure.

3.2.2 Sources and Methods of Data Collection

The study used both primary and secondary data to achieve its specific objectives. The collection of primary data involved the use of (1) personal interviews of randomly selected households using a standardized pre-coded questionnaire; (2) informal interviews with KWS officials and community leaders; and (3) direct field observation by the researcher. The pre-coded questionnaire sought information on household demographic information; types of human and wildlife conflicts; causes of human and wildlife conflicts; and management practices and strategies for human-wildlife conflict within the Kitengela wildlife migratory corridor in Kajiado County.

On the other hand, the collection of secondary data involved reviewing and utilization of existing literature, government publications and maps relevant to the study problem. During the data collection exercise, the researcher paid attention to the following ethical considerations: respondent's consent and willingness to participate in the study; the right to withdraw from participating in the study whenever they found it necessary; confidentiality; and protection from any danger that might occur during the study.

3.2.3 Data Analysis

The questionnaires from the field were checked, verified and edited for inconsistencies and reliability. Thereafter, the responses in the questionnaires were coded and entered into Statistical Package for Social Sciences (SPSS) software. Analysis involved running frequencies distributions which were later presented in tables and graphs. In other words, data analysis largely involved descriptive statistics.

CHAPTER FOUR: RESULTS AND DISCUSSION

The overall objective of the study is assessing the nature and extent of human and wildlife conflict within Kitengela wildlife dispersal area. This chapter presents the study results and discussion based on the three specific research objectives: 1) to examine the types of human-wildlife conflicts around the Kitengela migratory corridor; 2) to examine the causes of human and wildlife conflicts within Kitengela migratory routes; and 3) to evaluate the management practices and strategies for human-wildlife conflict within Kitengela migratory corridor. However, the chapter starts by giving an overview of the social-economic characteristics of the respondents and sample households.

4.1 Characteristics of the Respondents and Sampled Households

4.1.1 Demographic Characteristics

There were more male than female respondents in the sampled households. Two-thirds (67.7%) of the respondents were male compared to 32.3% female respondents (Table 4.1). The Kitengela dispersal area is largely occupied by the pastoralist community and therefore more males were easily available in the fields around the homesteads.

Table 4.1: Gender of Respondents

	Frequency	Percentage
Male	42	67.7
Female	20	32.3
Total	62	100

Source: Fieldwork (2014)

There were more “older” respondents aged above 40 years old than those between 20 and 40 years old (Table 4.2). One-third of the respondents were in 41 to 50 years age group, 29% were over 50 years, 24.2% were between 31 to 40 years and 9.7% were between 20 to 30 years. In terms of marital status, 40.3% were divorced, 22.6% single, 19.4% married and 17.7% were separated (Table 4.3). Generally, divorced respondents comprised the most while the least were those who were separated.

Table 4.2: Age of Respondents

	Frequency	Percentage
20-30	6	9.7
31-40	15	24.2
41-50	23	37.1
Above 50	18	29
Total	62	100

Source: Fieldwork (2014)

Table 4.3: Marital Status of Respondents

	Frequency	Percentage
Married	12	19.4
Single	14	22.6
Divorced	25	40.3
separated	11	17.7
Total	62	100

Source: Fieldwork (2014)

The households had a relatively large household sizes. Half of the households had between 8 and 11 household members, 33.9% had 4 to 7 members, 14.5% had more than eleven members and 1.6% had up to 3 members (Table 4.4). Large household sizes increase the probability of direct involvement with wildlife while the settlements tend to extent to conservation areas (IUCN, 2003). This could lead to human-wildlife conflict.

Table 4.4: Household Size

	Frequency	Percentage
Up to 3 members	1	1.6
4-7 members	21	33.9
8-11 members	31	50
More than 11 members	9	14.5
Total	62	100

Source: Fieldwork (2014)

4.1.2 Economic Characteristics

According to Table 4.5, majority of the respondents (45.2%) had attained secondary level of education, 37.1% had primary level of education, 14.5% were diploma holders and only one had a degree from a university. As such, most of the respondents had adequate knowledge to understand their environment – in relation to the study problem. Two-thirds of the respondents (62.9%) were employed by the government, another half (51.6%) were engaged in business, 48.4% were farmers and another 50% were employed in private organizations (Table 4.6).

Table 4.5: Education Level of Respondents

	Frequency	Percentage
None	1	1.6
Primary	23	37.1
Secondary	28	45.2
Diploma	9	14.5
Degree	1	1.6
Total	62	100

Source: Fieldwork (2014)

Table 4.6: Occupation Status of Respondents

	Frequency	Percentage
Farmers	30	48.4
Business person	32	51.6
Government employee	39	62.9
Employee of a private organization	31	50
Other	30	48.4

Source: Fieldwork (2014)

The household's monthly income varied with the majority of the households (59.7%) having a monthly income of between Kenya Shillings 10,001/= and 15,000/=, while two households recorded a monthly income of below Kenya Shillings 5,000/= (Table 4.7). The rest of the households had a monthly income of between Kenya Shillings 5,001/= and 10,000/= (22.6%) or between 15,001/= and 20,000/= (11.3%). Lastly, slightly more than half of respondents (56.5%) were land owners. The rest did not own any land.

Table 4.7: Households Monthly Income

	Frequency	Percentage
Less than Kshs 5000	2	3.2
Kshs 5001-10000	14	22.6
Kshs 10001-15000	37	59.7
15001-20000	7	11.3
Above Kshs 20000	2	3.2
Total	62	100

Source: Fieldwork (2014)

4.1.3 Migration

The respondents migrated to the study area at different times ranging from 1996 to 2012. However, in (Table 4.8) it is evident that the majority of the respondents had stayed in the area for 10 years or less. The respondents had settled in this area from either the rural areas or the urban areas.

Table 4.8: Year of Settlement

	Frequency	Percentage
1996	2	3.2
1999	7	11.3
2000	7	11.3
2001	6	9.7
2004	12	19.4
2006	5	8.1
2007	7	11.3
2009	2	3.2
2010	4	6.5
2011	2	3.2
2012	8	12.9
Total	62	100

Source: Fieldwork (2014)

4.2 Types of Human-Wildlife Conflicts

This section addresses the first objective of the study. The study sought to find out if the households had experienced any cases of human-wildlife conflicts. Eight out of every ten households had indeed experienced cases of human-wildlife conflicts during the period they had stayed in the area. The nature of conflicts varied from poaching (28.8%), spread of diseases (26.9%), human deaths (21.1%), encroachment to settlements (13.5%), restriction of movement at night (5.8%), and damaging of crops (3.8%) (Table 4.9). These conflicts can be categorized as psychological conflicts such as restriction of movement because of fear of animals; economic conflicts such as damage to crops; and health and safety conflicts such as spread of diseases.

Table 4.9: Nature of Human-Wildlife Conflicts

	Frequency	Percentage
Restriction of movement at night	3	5.8
Damaging of crops	2	3.8
Encroachment to settlements	7	13.5
Human deaths	11	21.1
Poaching	15	28.8
Spread of diseases	14	26.9
Total	62	100

Source: Fieldwork (2014)

Both the human beings and animals suffer from cases of human-wildlife conflicts.

According to one of the residents:

“In most cases there is competition between wildlife and the local communities for food leading to destruction of crops by wild animals bringing about conflict between the wildlife and the residents”

According to another resident:

“The wildlife not only poses a threat to our livelihoods but also to our wellbeing, we face the danger of being killed by animals hence our movement is restricted. At times, we retaliate by killing the animals that have attacked our crops which are a source of livelihood and income”

The above views were also reiterated by another resident:

“There is predation of our livestock by wildlife and frequent visitation of the wild animals to our residential areas. There is damage to crops and fences and wildlife strewing about residential garbage. Moreover, there are vehicle/wildlife collisions which results in fatalities”

Consistent with the findings of the study, loss of habitat by wildlife has resulted into human and wildlife conflict since they often come into contact (Barnes *et al.*, 2003). Besides, the study found out that human-wildlife conflicts result in physical threat to the residents. The implication is that wildlife is a threat to the wellbeing of humans living in reserve buffer zones. Human fatalities and injuries death also can be because of road trafficking by wildlife (Mouronet *et al.*, 1998; Scanlon, 1998). Further support to the study findings is by Conover *et al.* (1995) who noted that about 5000 humans are attacked and get injured, while 415 human fatalities due to other wildlife incidents. Also, the study revealed that there are economic conflicts emanating from damage to crops by wild animals. This is brought about by competition for food, water and habitat. The findings are in tally with that of Kagiri (2000) revealing that most natural wildlife buffer zones have led to competition for food, water, habitats resulting in human and wildlife conflict.

4.3 Causes of Human-Wildlife Conflicts

This section addresses the second study objective. The respondents were requested to contribute or share what they thought could be the causes of human-wildlife conflicts. They were given several statements and asked to strongly disagree, disagree, strongly

agree or agree with each statement (see Table 4.10). Emergence of towns and trading centers next to national park drew different reactions of “agreeing” and “disagreeing”. Most of the respondents “agreed” that the impact of human activities (e.g. increased subsistence agriculture) is a cause of human-wildlife conflicts.

Table 4.10: Causes of Conflicts

	Strongly Disagree (%)	Disagree (%)	Unilateral (%)	Agree (%)	Strongly Agree (%)
Emergence of towns and trading centers next to national park	24.2	17.7	21	35.5	1.6
Impact of human activities (e.g. increased subsistence agriculture)	0	1.6	21	43.5	33.9
Obstruction of water for domestic purposes and no water streaming into protected areas for wildlife	0	1.6	40.3	29	29
Natural factors like drought that push animals to human habitations for pastures and water	0	1.6	16.1	38.7	43.5
Increase in wild animals population	0	4.8	30.6	41.9	22.6
Proximity to natural forest	0	0	46.8	12.9	40.3
Migration of people for reasons of security e.g. post-election violence	0	9.7	24.2	16.1	50
Increase in population leading to encroachment into Protected areas	8.1	21	21	33.9	16.1

Source: Fieldwork (2014)

Obstruction of water for domestic purposes and no water streaming into protected areas for wildlife was also viewed as a cause although 40% of the respondents were

“unilateral” about it. Natural factor like drought that pushes animals to human habitations for pastures and water were also ranked highly as the cause of human and wildlife conflict, also increase in wild animals” population. Although proximity to a natural forest can result in conflicts, a number of respondents were “unilateral” about it. Other reasons include migration of people for reasons of security (e.g. post-election violence) and increase in population leading to encroachment into protected areas.

Based on the study findings, increase in population leading to encroachment into protected areas has resulted into conflict. Cognate to the results, Conover (2002) and Okello *et al.*, (2006) contend that growth in the number of people has contributed to people moving into lands that are inhabited by wildlife resulting in human-wildlife conflict. Furthermore this conflict poses a threat to wildlife sustainability. According to Campbell *et al.*, (2000) and Muruthi (2005), competition for water and grazing, livestock predation and even human fatalities causes human and wild life conflict.

4.4 Management Practices and Strategies for Human-Wildlife Conflicts

This section addresses the third objective. The study deemed it important to establish if KWS has developed some ways by which individuals residing in Kitengela area or KWS themselves can control or minimize human-wildlife conflicts. As such, the respondents were requested to share with the researcher on what they thought about management practices and strategies that can reduce or control human-wildlife conflicts. They were given several statements and asked to strongly disagree, disagree, strongly agree or agree with each statement (see Table 4.11).

The results present a mixture of reactions. But the majority of the respondents generally “disagreed” with the statements that “we attend community awareness meetings on importance of wildlife by KWS”; “KWS has developed compensation scheme for the affected people”; and that “KWS has developed voluntary relocation program to the affected”. On the other hand, the majority of the respondents generally “agreed” with the statements that “there is intense human vigilance by KWS rangers against attack by wild animals”; “KWS has intensified its fencing to bar wild animals from freely moving to human habitat”; “we kill the wild animals whenever we spot them to avoid future damages”; “KWS had developed control programs to kill dangerous animals which stray to human habitation”; and that “KWS has corporate social responsibility/community enterprise for the affected communities”.

Table 4.11: Management Practices and Strategies

	Strongly Disagree	Disagree	Unila teral	Agree	Strongly Agree
We attend community awareness meetings on importance of wildlife by KWS	40.3	27.4	1.6	30.6	0
KWS has developed compensation scheme for the affect people	29	11.3	35.5	24.2	0
KWS has developed voluntary relocation program to the affected	27.4	24.2	12.9	17.7	17.7
There is intense human vigilance by KWS rangers against attack by wild animals	21	12.9	3.2	53.2	9.7
KWS has intensified its fencing to bar wild animals from freely moving to human habitat	14.5	11.3	32.3	41.9	0
We kill the wild animals whenever we spot them to avoid future damages	14.5	21	12.9	25.8	25.8
KWS had developed lethal control programs to kill dangerous animals which stray to human habitation	0	3.2	32.3	12.9	51.6
KWS has corporate social responsibility/community enterprise for the affected communities	0	32.3	0	1.6	66.1

Source: Fieldwork (2014)

There are several management and strategies for human wildlife conflict. For instance, there is community awareness on the importance of wildlife by KWS. Also, there is an intense vigilance by wildlife administrators/rangers from wild attack and intensified fencing to bar wild animals from freely moving to human habitat. Consistently, McGregor (2005) noted the need for much attention to focus on pestilence discourses

that can start among the local communities using the same scarce resource with animals. Curnow (2001) and Conover (2001) posit that it is important for the residents residing near the protected area to be protected against attack by the wild animals. Furthermore, managers dealing with wildlife management must be able to provide an effective integration that can provide a solution to human-wildlife conflicts.

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary of findings, conclusion and recommendations grounded on the three objectives of the research: 1) to examine the types of human-wildlife conflicts around the Kitengela migratory corridor; 2) to examine the causes of human and wildlife conflicts within Kitengela migratory routes; and 3) to evaluate the management practices and strategies for human-wildlife conflict within Kitengela migratory corridor.

5.1 Summary of Findings

5.1.1 Types of human wildlife conflicts

The study revealed that there is human-wildlife conflict in the study area since eight out of every ten households had indeed experienced cases of human-wildlife conflicts during the period they had stayed in the area. The nature of conflicts varied from poaching, spread of diseases, human deaths, encroachment to settlements, restriction of movement at night and damaging of crops. These conflicts can be categorized as psychological conflicts such as restriction of movement because of fear of animals; economic conflicts such as damage to crops; and health and safety conflicts such as spread of diseases.

5.1.2 Causes of human wildlife conflicts

The results reveal that emergence of towns and trading centers next to national park (impact of human activities), obstruction of water sources for domestic purposes,

Drought and increased population are the major causes of human-wildlife conflicts in the migratory corridor

5.1.3 Management practices and Strategies

The majority of the respondents generally “disagreed” that they attend community awareness meetings on importance of wildlife by KWS; that KWS has developed compensation scheme for the affected people; and that KWS has developed voluntary relocation program to the affected. But the majority of the respondents “agreed” that there is intense human vigilance by KWS rangers against attack by wild animals; that KWS has intensified its fencing to bar wild animals from freely moving to human habitat”; that the community kill wild animals whenever they spot them to avoid future damages; that KWS had developed control programs to kill dangerous animals which stray to human habitation; and that KWS has corporate social responsibility/community enterprise for the affected communities.

5.2 Conclusion

Cases of human-wildlife are increasing every year and pose a threat to wildlife sustainability. The conflict can lead to extinction of endangered species if no action is taken to reduce or control human-wildlife conflict. In resolving/reducing these conflicts, the concerned stakeholders should be able to have defined objectives on the subject matter by involving community in team building and decision making. The Kenya Wildlife Service should also be able to implement guidelines and activities that promote active listening to the conflicted parties within Kitengela wildlife dispersal area. Finally,

human-wildlife conflict can be curtailed by employing community awareness on the importance of wildlife which will significantly reduce loss of wild animals due to attacks by humans.

5.3 Recommendations

5.3.1 Policy Makers

It is important for the concerned stakeholders to have concerted efforts towards ensuring that there is no human settlement in wildlife protected zones. Also, Kenya Wildlife Service administration needs to take an initiative to educate the local communities in Kitengela dispersal area on how to peacefully coexist with the wildlife. The Government of Kenya should be able to introduce new regulations to deal with poaching practices either for sustenance or for sale, since it is evident from the study that poaching activities is ranked highly. Poaching directly affects wildlife population and it should be a great concern to the government because wildlife attracts tourism which is a foreign exchange to the country.

5.3.2 Future Researchers

Recommendation for future research includes more emphasis to human-wildlife conflicts that occur in urban and sub-urban areas. Future researchers should also focus on zoonotic diseases which are vectored by wildlife during movement to human settlements and how humans can be protected by the concerned parties from those zoonotic diseases and other human injuries.

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APPENDICES

Appendix I: Research Questionnaire for the local community

Date:

Study Site:

Interviewer:

Respondent code:

INSTRUCTIONS

- Do not write names of participants in this questionnaire.
- Only one response considered as the most correct is circled.
- You may give multiple responses where applicable.

PART I: DEMOGRAPHIC INFORMATION

1. Sex of the participant.

- i) Male ii) Female

2. How old are you?

- i) 20-30 years ii) 31-40 years iii) 41-50 years iv) Above 50 years

3. Marital status

- i) Married
ii) Single
iii) Divorced
iv) Separated

4. What is your current level of education?

- i) Never attended ii) Primary School iii) Secondary school
iv) college, / Tertiary institution v) University

5. What do you do for a living?

- i) Farming
ii) Business
iii) Government employee
iv) Employee of government organization
v) Others (specify)

6. How much do you earn per month?

- i) Less than ksh 5000 ii) 5001-10000 iii) 10001-15000 iv) 15001-20000
v) Above 20000

7. How many family members do you have?

- i) Upto 3 members ii) 4-7 members iii) 8-11 members iv) more than 11 members

8. Do you own a land in this area?

- i) Yes ii) no

9. Which year did you settle in this area? _____

10. Where did you originally come from? _____

PART II: HUMAN WILDLIFE CONFLICT

11. Since you settled in this area have you experienced any conflict?

- i) Yes ii) No

b) if yes which nature of conflict

- i) cannot move during the night ii) crop damage iii) encroachment iv) human killed v) poaching vi) diseases

12. What are the types of HWC?

- i) Psychological conflict ii) Economic conflict iii) Health and safety conflict

13. Who are the aggressors of the conflict?

- i) Human ii) wildlife iii) both

b) Who are the most conflicted?

- i) Human ii) wildlife iii) both

14. According to your experience what are the causes of conflict? (tick where applicable)

	SD	D	U	A	SA
Emergence of towns & trading centers towards migratory corridors					
Human activities					
Obstruction of water for domestic purposes					
Natural factors					
Increase in wild population					
Proximity to natural forest					
Increase in population leading to encroachment					

PART III: MANAGEMENT PRACTICES AND STRATEGIES

15. Have KWS developed some ways in which individuals/KWS rangers can control the movement of wildlife?

- i) Yes ii) no

	SD	D	U	A	SA
Community awareness on importance of wildlife by KWS					
KWS developed compensation scheme					
Voluntary relocation programmes					
Intense vigilance by KWS rangers					
KWS intensify its fencing					
Kill wildlife animal whenever spotted to avoid future damages					
KWS has developed lethal control programmes					
KWS has corporate social responsibility enterprise for the affected community.					

Appendix II: Interview guide for Kenya Wildlife Service administrator

1. Who owns Kitengela area?
2. How have the Kitengela land uses changed over the years, what factors have contributed to these changes and what are the effects to wildlife?
3. Which benefits does the local community derive from wildlife management in Nairobi National Park?
4. Which Problems does the organization experience in attempts to conserve wildlife in Kitengela, a non-park wildlife area?
5. Do you involve the Kitengela local community when making decisions about the Kitengela area?
6. Which criterion is used to compensate them and how much compensation are they given?
7. Which Kitengela habitat conservation approaches is your organizations employing and how effective are they?
8. Has any Environmental Impact Assessment study been done on any proposed new developments being put up in Kitengela? Give specific studies done if any and results.
9. Which human wildlife conflicts are being experienced in the area?