# FACTORS INFLUENCING HUMAN WILDLIFE CONFLICT IN COMMUNITIES SURROUNDING PROTECTED AREAS: A CASE OF KENYA WILDLIFE SERVICE FOCUSING ON MAASAI MARA NATIONAL RESERVE, NAROK COUNTY, KENYA

**BY**

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## DECLARATION

This research project report is my original word and has not been submitted for an award of a degree in any other university.

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

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## DEDICATION

This work is dedicated to my husband Widah Nasta for his continuous motivation, encouragement and financial support towards the study of this degree and to my sons Wesley and Weylan Nasta for understanding that their mother also needed time to study and the moral support they gave me towards my study. If it was not for my sons constant nagging and telling me I need to finish and graduate soon, this project would have taken longer. I owe it to them.

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| | |
|---|---|
| **HWC** | Human Wildlife Conflict |
| **IUCN** | International Union for Conservation of Nature |
| **KWS** | Kenya Wildlife Service |
| **MMNR** | Maasai Mara National Reserve |
| **SPSS** | Statistical Package for Social Science |

## ABSTRACT

Human-wildlife conflicts poses a great challenge to wildlife conservation and the sources of income of people globally and is increasing as human migration settlement from rural to urban areas increases, development expands, global climate changes and other human and environmental factors put people and wildlife in greater direct competition for a shrinking resource base. The purpose of this study was to find out the factors influencing human wildlife conflict in communities surrounding protected areas; a case of Kenya Wildlife Service. Objectives of the study were to determine the influence of; resources competition, human migration settlement, human invasion to protected areas as well assessing how Kenya Wildlife Service conservation measures influence human wildlife conflict in communities living around Maasai Mara National Reserve. The study was influenced by the fact that human wildlife conflict cases are still rampant in Maasai Mara National Reserve despite measures taken up by Kenya Wildlife Service to reduce human wildlife conflict. The study might be significant to interested stake holders in developing programs that will ensure sustainability of the wildlife and human, assist Kenya Wildlife Service in reviewing and amending appropriately existing policies governing natural resources and land issues and local community and future researchers interested in related topics. The study was based on Social Conflict and stakeholder Theories. The study used a descriptive survey research design where the target population comprised of 1200 households from five villages surrounding Maasai Mara National Reserve and all the 30 Kenya Wildlife Service officers at Maasai Mara National Reserve station. Stratified sampling was adopted to select 118 households. Questionnaires and interview guides were used to collect data. A pilot test was carried out to test instrument validity, the researcher used the split-half technique. Quantitative data was analyzed using descriptive statistics such as percentages frequency and mean while data was presented using tables. Respondents were assured of confidentiality of the information provided and privacy of the source of data as the questionnaire did not call for disclosure of identity. From the study it was established that; sharing of resources with wildlife had significant effect $p=0.007$ on Human Wildlife Conflict, human migration settlement had significant effect $p=0.002$ on Human Wildlife Conflict, human invasion to protected areas had significant effect $p=0.003$ on Human Wildlife Conflict and Kenya Wildlife Service conservation measures had significant effect $p=0.003$ on Human Wildlife Conflict. From the study, it was concluded that when there is drought the pastoralists graze their livestock in the protected areas and some residents also block water for domestic and agricultural use, people migration due to various reasons have led to an increase in human population, that invasion to protected area for agricultural and economic activities are also on the rise and Kenya Wildlife Service has come up with measures to curb human wildlife conflict. This study recommends that: the government of Kenya should establish coherent policies that will protect the environment and sustainable use of natural resource, government should resettle squatters and post- election violence evictees away from the protected area, Kenya Wildlife Service should review its policy through enforcement of regulations and legislation on the safe distance on which people should build their houses away from protected areas and community education and awareness by Kenya Wildlife Service should be implemented in the areas where Human Wildlife Conflict is experienced.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background of the Study

Wildlife and local people in different parts of the globe have lived together for a long time with very few cases of conflict (Goodland 1992). Human wildlife conflict is not new. But is there a feasible solution? Incidents of conflict have become more in recent years, particularly in areas that are highly populated with wild animals, this has been mainly because of increase in human and livestock population and the change of socio-economic and patterns of land use. Wildlife-human conflicts poses a great challenge to wildlife conservation and sources of income of people globally and is increasing as human population becomes more, establishment of infrastructure, climate modifications and other human and environmental issues expose people and wildlife in more direct struggle for limited resources. Furthermore, the continued conservation measures have contributed to wildlife extending to where people live.

In America Bears raided garbage cans in the national parks and near towns in north USA hence disturbing people henc causing mayhem in streets. Deer crashed with motor vehicles injuring approximately 29,000 people per year and caused over US$ 1 billion in compensation (USDA, 2008). In Alberta, Canada, for more than 10 years (1998-2008) wolves instigated 2,806 deaths of domesticated animals, especially cattle and to a moderate extent dogs, chickens, goats and turkeys. In Idaho and Montana (USA), at the same period, (1998-2008) wolves killed 728 livestock (Musiani *et al*., 2003). Australian

farmers have continuously considered kangaroos as pests, destroying crops and competing with sheep. Annually, the Government permits selected number of kangaroos to be reduced without considering the animals killed by people (Therin, 2001). People deaths and injuries, despite the fact that they don't occur frequently as compared to destruction of crops are the most severe results of HWC and are globally considered as unbearable. A research on the level of human deaths as a result of wild animals in Africa in late 70s, established that hippopotamus was the main cause of death as compared to the big five animals (Musiani *et al*., 2003). However, from the year 2000 carnivores especially lions, cheetahs, hyenas and leopards have been the main cause of death to human due to conflict between the people and wildlife.

Maasai Mara National Reserve is commonly known for its Africa's Greatest Wildlife Reserve. In Maasai Mara the conflict has become rampant and a strategic plan needs to be in place before it gets out of hand and the National Reserve has no wildlife left. This papers' focus is on the Maasai Mara community surrounding the protected areas and the conflict caused by wildlife. There are several cases from countries around the globe exhibiting the relentlessness of human-wildlife conflict and proposes a detailed scrutiny to know the challenges and to back the conservation scenarios of vulnerable and possibly threatened species. World Conservation Union (2003) reported that conflict take place when wildlife necessities overlay with the human inhabitants, causing losses to people and wild animals. Interaction with wildlife happens mutually in rural and urban areas, but it occurs very frequently in protected areas, where there are more wildlife prompting the animals to stray into near fields in search of food and or grazing areas.

Over the years, about 30 to be precise, substantial changes have happened in the Maasai Mara area. In the past, like many part of Kenya's arid and semi-arid areas, the region was less populated; the main land uses were nomadic pastoralism and land belonged to the community (Beaumont 1999). The human population is also on the rise and permanent human settlements, agriculture, and livestock production are expanding (Douglas 1998). Resulting in reduction of land that was previously occupied by wildlife and or used for pastoralists. Encroachment on the Maasai Mara national reserve by people living the surrounding areas is increasing (Douglas 1998).

As the contact increases, wildlife despoliation of livestock and crops, injuries or death of humans, causing infections to domesticated animals and completion of grazing areas and drinking water increases. Wildlife has often been seen by the local people as belonging to the government; they see the government alone as being responsible for its care (Berger 1995). The land profile in Maasai Mara area is very unique. The low agricultural potential lands are found in the lowland region, while with high potential are in the upland zone. The difference in land potential (a consequence of high rainfall and good soils) have influenced use of land, livestock, human and wildlife population densities, and in turn these influences the types, spatial pattern and the degree of human-wildlife conflict in this region. It considers how these conflicts vary seasonally factoring in the distance from the protected area, what attitudes and opinions the local community holds towards government and conservation wildlife programs, and how these attitudes are influenced by their socio-economic experiences and backgrounds.

Kenya's gross domestic product (GDP) is mostly pegged on tourism and in turn national parks and reserves are crucial resources from which the country has realized a good sum of foreign exchange for the last few decades (Okello et al., 2001). Despite the decline in tourism due to a number of reasons, Kenya is still experiencing numerous wildlife conservation challenges (Johansson, 2002). According to (Kameri, 2002), protected areas conservation continues to be the most important general responnsibility of the Government of Kenya. Since KWS inception in 1989, one of its core mandate is to provide wildlife education and extension services informing the community on their role in wildlife conservation support. Overall contributing to the mandate of KWS in terms of wildlife conservation enhancement, management, and protection, improving KWS's associations, relationship and recognition with stake holders. KWS so far have established education centers across eight conservation regions, offering diversified educational programs to different target groups in the community.

### 1.2 Statement of the Problem

Occurrences of human wildlife conflict have been rising where reports have been made on wildlife invading homes of locals, destruction of crops, livestock attack and even killing of people. Kenya's protected areas contribute to 70-80% of all tourists who come for vacation in Kenya. However, plant life has been ruined, wildlife activities interrupted, toxic waste has increased, and resources in general have been over exploited (Ikiara and Okech, 2002). Narok County is currently among the human-wildlife conflict area in the country where elephants are the most knotty wildlife species. However, Kenya Wildlife Service (KWS) has implemented a comprehensive strategy with an aim of reducing HWC

by reinforcing the law, improving wildlife business governance and retaining ecological veracity. KWS has also associated with other organisations interested in conservation for instance the Rhino Ark, private companies, governments and individuals to cordon off the protected areas through fencing.

Areas surrounding MMNR have been experiencing human wildlife conflict year after year to show this; 152 cases of human wildlife conflict was reported in the year 2015 the cases reported to Kenya wildlife service community department, Narok, were as follows; 5 (five injuries) caused by hippopotamus, Buffaloes and Snake bites,57 cases of livestock predation of which 90 (ninety) livestock were predated upon, 58 cases of crop destruction by buffaloes, Zebras, and water buck, 112 cases of threats/property damage by buffaloes, leopards, Lion and snake (specifically python) and Wildlife mortality of 26 (thirty) this mortalities were caused by communities retaliating back by killing wildlife whenever they get to their farms, (KWS Narok 2015). With the above stated problem in communities surrounding the National Reserve and the efforts put by KWS in combating the issue with no full success of eradicating the problem, this study therefore focuses on the factors that influence human-wildlife conflict in communities living around Maasai Mara National Reserve.

### 1.3 Purpose of the Study

The aim of the study was to find out the factors influencing human wildlife conflict in communities surrounding protected areas, a case of Kenya Wildlife Service.

## 1.4 Objectives of the Study

The study objectives were;

i) To assess resources competition influence on human wildlife conflict in communities living around Maasai Mara National Reserve.

ii) To determine human migration settlement influence on human wildlife conflict in communities living around Maasai Mara National Reserve.

iii) To establish extent to which human invasion to protected areas influence human wildlife conflict in communities living around Maasai Mara National Reserve.

iv) To determine how Kenya Wildlife Service conservation measures influence human wildlife conflict in communities living around Maasai Mara National Reserve.

## 1.5 Research Questions

This was guided by the following research questions;

i) How does competition of resources influence human wildlife conflict in communities living around Maasai Mara National Reserve?

ii) How does human migration settlement influence human wildlife conflict in communities living around Maasai Mara National Reserve?

iii) How does human invasion to protected areas influence human wildlife conflict in communities living around Maasai Mara National Reserve?

iv) To what extent has Kenya Wildlife Service conservation measures influenced human wildlife conflict in communities living around Maasai Mara National Reserve?

## 1.6 Significance of the Study

This study aimed at providing a better understanding of human wildlife conflict and therefore aiding the interested stake holders in developing programs that will ensure sustainability of the wildlife and human. KWS might use the findings from this study to design and implement policies that will be of benefit to the community and the wildlife. The government and stakeholders might use the findings from this study to assist KWS in reviewing and amending appropriately any existing policies governing natural resources and land issues especially those that affect wildlife. Future researchers interested in related topics might find and use some of the material from this study. Local community who is the largest stakeholder might use the findings in this study to understand human wildlife conflict, factors contributing to it and accept recommendations that might help prevent the conflict.

## 1.7 Limitations of the Study

The respondents who had not taken part in an academic study at first concealed crucial data fearing that they might be probed. However, the researcher assured the residents that the data collected was used for research only. Language barrier with some of the respondents made it difficult to fill in the questionnaires but the researcher sought the services translators for each village being interviewed.

## 1.8 Delimitation of the Study

The study only concentrated on influence of resource competition, human migration settlement, human intrusion into protected areas and KWS conservation measures as factors that influence HWC in communities. Sekenani, Muroti, Talek and Ololaimutiek villages in Narok County were the location of study. The research target population was drawn from communities surrounding MMNR and KWS officers at MMNR station.

## 1.9 Basic Assumptions of the Study

The researcher assumes the local community and KWS officers, would corporate and willing to give relevant information that would be used in giving valid recommendation and conclusions of study.

## 1.10 Definition of significant terms used in the study

**Conservation measures -** refer to actions taken by stakeholders to curb conflict between wild animals and communities living around national parks.

**Human Migration Settlement -** refers to growth in the number of people drifting from rural and other areas and settling around National parks.

**Human Wildlife Conflict -** refers to conflict that occurs between human beings and wildlife for instance wildlife killing or injuring people/property/livestock becomes a conflict.

**Intrusion to Protected areas** refers to an act of intruding or trespassing into the protected areas designated for conservation and no human activity is permitted.

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

**Resource Competition -** refers to a situation where wildlife and people compete or struggle for limited resources for instance Land, water and pasture.

### 1.11 Organization of the Study

The study is presented in five chapters. Chapter one's focus is on the background of the study, problem statement, purpose of the study, research objectives, research questions, significance of the study, limitations of the study, delimitations of the study, assumptions of the study, definitions of main terms and organization of the study. Chapter two focus on the literature review that includes concept of human wildlife conflict, influence of KWS conservation measures, resources competition, human migration settlement and influence of human encroachment. The chapter two also consists of theoretical framework and conceptual framework of the study.

Chapter three focuses on research methodology which entails the research design, target population, sampling techniques and sample size, research instruments, their validity and reliability, data collection procedures, and the data analysis techniques. Chapter four covers data analysis techniques and interpretation while chapter five focuses on summary of the findings, discussions, conclusions, recommendations, and also provided suggestions for further studies.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

This chapter focuses on past literature form other scholars on factors influencing human wildlife conflict. It covers concept of human wildlife conflict, influence of KWS conservation measures, resources competition, human migration settlement and influence of human encroachment. It also covers summary, theoretical and conceptual framework.

## 2.2 Human Wildlife Conflict

Human-wildlife conflict is a recognized occurrence as a result of the relationship of wild animals and people. It negatively affects people and their property or wild animals and their habitation and been in existence from the time people and wild animals started sharing same natural resources (Lamarque *et al*., 2009). Conflict more often happens when wild animals invade peoples home and when people encroach the wild animals' habitat (Johansson, 2002). A number of wildlife conflicts with farmers in search of pasture hence causing crop damage and death of the animals (Madden, 2008). Wildlife death caused by people contribute to a reduction in wildlife population and has a bigger ecological effect on ecosystem stability and conservation (Conover, 2002).

Wild animals has co-existed with the indigenous people in the various parts of the world with very little conflict in many years (Goodland 1992). However, conflict between the two has increased in present years mostly in developing countries, which is attributed to increasing human and livestock populations, the changing land use patterns and socio-

economic status. HWC occurs when wildlife or human have an adverse impact upon one another. This conflict is becoming a menace and especially in areas that are near national parks. Wildlife refers to wild animals, native fauna and sometimes flora of an area. Wildlife plays an important economic role by providing revenue either locally, regionally and to other parts of the world. Socially, they bring locals together for leisure and recreation providing a good ambiance for interaction. Many animals are considered symbolic by many cultures enhancing the culture of the different communities and nation.

World Park progress (2003) report showed that HWC happens when the necessities of the wildlife correspond with human population increase, contributing to competition amongst wild animals and locals. In Africa many communities bear the coexisting costs between human and wild animals (Rodwell et al. 2003). As intensity of contact between wildlife and human increases, wildlife depredation of livestock and crops, human injuries and deaths, transmission of diseases to domesticated species and struggle for water and pasture also increase (Darkoh and Njoka 1990). It will be important to note that the impact of the damage caused by the wildlife on crops and family revenue differs to a large extent and this is with reference to the size of land possessed and the community's dependency on rural activities (Messmer, 2000). The people who are most affected are those who rely solely on revenue from their farms and they are the people with a low standard of living, those that practice farming or agri-business, and pastoralists. Human Wildlife Conflict have social and economic costs, they undermine the human wellbeing.

### 2.3 Influence of Resources Competition on Human Wildlife Conflict

The major source of HWC globally is struggle amongst increasing people populations and wildlife for the similar scarce natural resources (Madden, 2008). The change of forests, grassland and other ecologies into agricultural fields or towns due to high ultimatum for land, food and raw materials, has contributed to an intense reduction in wildlife habitatation (Lamarque *et al* .,2009). Struggle for land, resources and continuous decrease of habitation are the main factors contributing to reduction of wildlife. HWC might be on the rise if protected areas are transformed into farms or grazing land by the communities surrounding protecting areas (Hill, 2000).

The Maasai communities have lived with wildlife in the same environment peacefully for a very long time. Therefore, it is not a coincident majority of the protected areas in Kenya are within Maasai land for instance Nairobi National Park, Amboseli National Park and MMNR. Nevertheless, as the people became more active and changed their lifestyle and as human population increased, there is unavoidable HWC increase as people and animals try to access the limited resources. When wildlife and people live together, they will always compete giving rise to conflict and there are challenges in managing it with an aim of reducing it.

The pastoral communities experience intimidations from wildebeest migration. For instance the Koyake Maasai community refers to the wildebeest migration as “yearly famine” since the animals struggle with cattle for fodder and also spread diseases to animals at home like the dogs and cats (Lamprey and Reid 2004). However the

competition also affects the animals as well whereby the livestock consume pasture that could be reserved for the migratory species.

In spite of the measures to establish other water sources, majority of residents in rural Africa still fetch water from natural sources like rivers, lakes and springs. The residents rely on the water sources for their household activities like laundry, cleaning utensils and taking bath. Patterson (2004) asserted that during famine, pastoralists take their livestock to the limited water sources where their livestock are simply preyed on by wild animals but when rain fills the predators disperse back into their habitat and prey on easier targets. Majority of the water bodies are habited by crocodiles thus increasing people-crocodile conflict (Fergusson, 2002).

According to Bissonette and Adair (2008), the current reduction and fragmenting of the environment caused by the ever increasing population in most cases contribute to shrinking, secluded and restricted ecosystems. The ongoing reduction of habitat highlights the significance of environment conservation and understanding how wildlife makes use of their habitation. (Hamilton et al., 2005). Various scholars indicated that animals adjust to varying and hunting activities, or their day-to-day movement schedules to keep off from disturbances caused by people (Burke 2008). According to KWS, erecting barriers on wildlife conservation zones have led to struggle for food, water and habitats for both people and wildlife thus resulting in a conflict for survival (Kagiri, 2000). In order to understand the conflicts, there is need to consider the economic costs (for example crop damages) and gains (tourism) of land management, both in relation to the degree to which these gains and costs affect the affected parties. The area surrounding

the protected areas is very important to wildlife because they since animals disperse to these areas in search of pasture and water. These areas are endangered due to continuous division of land division and failure to plan establishment of tourist lodges hence contributing to HWC (Sindiga 2002). The researcher investigates whether resources competition influence human wildlife conflict in communities living around MMNR.

### 2.4 Influence of Human Migration Settlement on Human Wildlife Conflict

The increasing development of agricultural activities has many effects on the ecosystem and biodiversity. For instance, establishment of towns in Africa comprises of fast-tracked conversion of natural habitats hence reducing the habitat of wildlife contributing to HWC (Madden, 2008). Expanding agricultural activities destroys wild animals habitation, changes the landscape and also contribute to HWC since the frequency that wild animals invade the agricultural fields is higher compared to injuring livestock. Changing patterns of agricultural land use in Kenya has contributed to escalation of conflict amongst farmers and wildlife over agricultural fields invasion (Thirgood et al., 2005). There is an increase in crop raiding by wild animals especially in areas surrounding national parks and people are competing with wildlife for resources. The establishment of subsistence farming and investment in the protected areas disturb the habitation of wild animals forcing them to interact with people resulting in human wildlife conflict. More than 40 percent of ranchers' agricultural fields are attacked ever year by wildlife in comparison to merely 21 percent who loss livestock (Hadas 2000).

According to IUCN (2005), demographic and social modifications has played a part to escalation in the number of people forcing them to shift to other urban and semi-urban areas while others settle around protected areas which puts majority of them in direct contact with wildlife. The establishment of settlement schemes along national parks in Africa is highly attributed to movement of people displaced by famine and by political instability (McGregor, 2005). In Kenya, population increase has contributed to invasion into wildlife habitation, restriction of species into the edge of the habitation and direct struggle with indigenous people (Siex et al., 1999). Rapid migration cause compression on land, decrease habitation of wild animals and eradicate passageways for migration thus increasing chances of contacts which creates HWC (Quirin, 2005).

In Ghana, human population living near Kakum Conservation Area has been on the rise in the past 30 years. Throughout 1970s, many farmers moved from other parts of the country so as to benefit from the favorable cocoa-growing climatic conditions near the forest. This has caused a significant escalation of human wildlife conflict in the area especially between elephants. In Zimbabwe, people inhabiting camps alongside Lake Kariba increasing in 1991–1992 famine and consequently rise once more as human were evacuated by land reforms and economic downfall. As a result, people risked being attacked by crocodiles since the residents fetched water directly from the lake, and they were also involved in subsistence and commercial fishing. Majority of migrants most often settle near natural resources in protected areas and are predominantly at risk of experiencing human-wildlife conflict. Long dry seasons, overflows, political instability or ethnic war interrupt the usual farming and supply of food, which results to food shortage.

These causes have contributed to people migrating into peaceful and habitable places that are more often habited by wild animals.

According to Ogra (2008), conflict is more prone in areas where they are different species of wild animals and densely populated. A good example is the Aberdare National Park (149,822.03 hectares) in Kenya, which supports almost 500 000 people. However, according to Madhusudan (2003), where substitute land and enticements are accessible, resettlement of people to areas that are near to water sources and arable land might be enough resolution to HWC. The researcher seeks to investigate whether human settlement has led to increase of HWC in communities living around MMNR.

### 2.5 Influence of Human Invasion to Protected Areas on Human Wildlife Conflict

Yaro et al (2015) asserted that increasing income generating activities increase pressure on protected areas. Human invasion to protected areas can be done by people, groups of individuals or organization that practice deforestation to utilize the land for other developments. Kenya Wildlife Service (KWS) indicated six major reasons of the MMNR human invasion: illegal logging, charcoal production, illegal cultivation, poaching, settlement as well as grazing of livestock. According to KWS report (2017), poaching took place occurred in 96% of the parks. Threat to ecosystem resulting to HWC (for instance injury to humans and their assets and vengeful killing of wild animals) happened in 82% of parks. Elephant and rhino poaching happened in 80% of the parks. Human invasion around parks and national reserves happened in 72% of the parks and reserves.

As humans continue to live near protected areas, landscape transformation increase the probability of conflict amongst people and wild animals. Human invasion to protected areas has contributed to destruction of assets, loss of money as a result of attack on agricultural fields and provocation (Hoffman and O'Riain, 2010). Human activities like livestock keeping, farming, fishing, the establishment of roads and building, tourism or conservation measures, can radically alter wildlife habitation (Kate, 2012). Migrating species such as zebras and wildebeest destroy barriers erected by people in an effort to trace the paths that they had previously used during migration. In South African and Zimbambwe, baboons have been eradicated from some areas especially where they interfered with commercial agriculture. The baboons were relocated to places that do not practice large scale agriculture which have resulted to the baboons moving to places that practice small-scale farming where they destroy crops thus causing conflict (Lamarque 2009).

According to KWS, land-use division which results from establishment of subsistence farming has increased HWC in areas where wild animals are many as compared to people. The extermination of the tsetse fly and establishment of anti-Tryponosomiasis managements have given rise to many fresh grazing fields for pastoralists in areas that were previously habitations for wildlife in Namibia resulting to conflicts (Damm, 2008). The expansion of human activities especially livestock keeping has resulted to livestock and wild animals sharing grazing fields. The only significant factor is attributed to the spread of diseases related to wildlife which is most likely to infect vulnerable domestic animals, i.e. where mixing has occurred when sharing resources like water (Bengis, Kock

and Fischer, 2002). Large and small scale fishing is usually takes place in most large water sources Africa. Fishing was initially intense in areas where the payments according to the number of fish caught were highest and where crocodiles were few. This has resulted to crocodiles inhabiting areas that are not fished frequently and where chances of being disturbed are very few. However, the ever increasing demand for fish has consequently resulted to fishing in areas inhabited by crocodiles resulting to conflict between humans and crocodiles.

Although it may be suitable to clear thick natural vegetation in areas near livestock fields, minimising the vegetation near parks would neutralize the gains of natural inheritance. Alternatives for minimizing predation damages in homes are more probable to depend on undertakings wich thwart carnivores from gaining entry into farms effectively (Woodroffe and Frank, 2005). The study sought to find out how human invasion to protected areas influence human wildlife conflict in communities living around MMNR.

### 2.6 Influence of KWS Conservation Measures on Human Wildlife Conflict

Hill (2002) asserted that conflict resolving measures could result to a reduction on the crop damages by wildlife, changing peoples' opinions on wildlife, aiding farmers to increase their farm produce and decreasing cases of poaching. Changing the attitude of people who experience injuries and crop destruction so as to increase their enthusiasm to put up with destruction also helps to cope with human wildlife conflict (Treves, 2007). This can be achieved by augmenting personal appreciation for wild animals and their economic advantages. For instance, some farmers are already interested with the idea of

welcoming harmless animals in their fields to improve their lenience for wildlife destruction (Messmer, 2009). Land owners should also be advised and trained on how to implement other conservation measures like lethal nor non-lethal methods as means of curbing human wildlife conflict.

Establishment of strong wildlife policies, regulations and strategies offer the podium which the country can best conserve its wildlife for current and future generations. The lawbreakers of conservation laws ought to be ruthlessly punished to discourage them and others from breaking them (Jimoh, 2003). Enacting laws aimed at enforcing regulations of a country's various conservancy laws might inspire the officers to be more hostile in sustaining them. This law ought to specify methods of making corporations answerable for abandonment of their obligations (Czarnezki and Yu, 2013). In China safeguarding of natural habitation has benefited from Wildlife Conservation laws. This has resulted to formation of more than 2000 natural reserves which protect approximately 15 percent of the country (Czarnezki & Yu, 2013). Chapter five section 62 (1) (g) of the Kenyan constitution recognizes water sources and protected area as public land lest rightfully gained or used by people for grazing or prayers, section 4 indicate that public land ought to be utilized on conditions as outlined by an Act of Parliament (GoK, 2010). The government therefore is mandated to supervise viable utilization, management and conservation of natural resources.

Barriers are meant to avoid overlying between wild animals and indigenous people; they are normally made by people, although natural barricades like rivers or mountains ranges might form near park boarder. Longitudinal split-up has been demonstrated to be a fruitful approach when physical barricades surround a wide reserve (Nyphus and Tilson 2004). An alternative measure is the erection of physical barricades in residents to safeguard agricultural fields, livestock, and assets. Erecting barriers in homestead instead of the whole reserve boundary is not only cost conscious, but permits wildlife dispersal. Households living around Ol Moran village in Nyeri and Laikipia Counties, fencing is effectively utilized to isolate wildlife from the villages and farms (KWS, 2006).

In Namibia, electric fencing is a successful approach in minimizing the human-elephant conflict on to a great extent. KWS also encourages communities living around national parks to closely monitor their herds to prevent them from attacks by wild animals (KWS 2016). Observing livestock and vigorous defense are crucial features of livestock keeping in Kenya whereby herders are active and courageous in keeping off predators. Herders also scare away predators with modest armaments (Patterson *et al*., 2004). In Laikipia County, guards and dogs were linked with reduced cases of livestock predation by wild animals (Ogada 2013). KWS has continued to use harmonized and participatory methodology to wildlife conservation and management that guarantees cooperation of all stakeholders while respecting the rights of communities and private landowners. To attain this, KWS partners with a number of like-minded organisations, corporate bodies and governments to undertake conservation efforts.

## 2.7 Theoretical Framework

This study was based on Social Conflict theory and Stakeholder Theory

### 2.7.1 The Social Conflict theory

The Social Conflict theory was developed by Karl Marx (1971). Marx argued that individual and groups in a community based on conflict and not unity. Groups gain varying resources through many types of conflicts. He argued that society is in a form of continuous conflict due to struggle of scarce resources. Karl Marx believes that social conflict was necessary for society to exist. He showed people not to be afraid of conflict but to accept it as a lifestyle. This assumes that conflict happens as a result of variations between aims. This theory does not take consider community as immobile. Woodroffe (2005) used the phrase human wildlife conflict to explain a situation where a conflicting state amongst people and wildlife occurs through agricultural field raids, livestock predation, predation on protected wild animal species or killing of people.

Conflicts might take place when groups are same players, struggling for the similar prize like power, authority, territory or materials or differences about the laws of the game. Basic necessities of people are both physical and psychological. Food, shelter and other needs are required for physical survival. Lack of these physical and psychological needs of people are accountable for occurrence of conflicts Karl Marx (1971). In communities living around Maasai Mara National Park, the major source of conflict is wildlife invasion to the lands and homes destroying plants, properties and in some extreme cases causing death of people and livestock. The theory can be applied to carry out a truthful

research of the community. The theory has been advocated to alter and develop far from the constant concept.

### 2.7.2 Stakeholder Theory

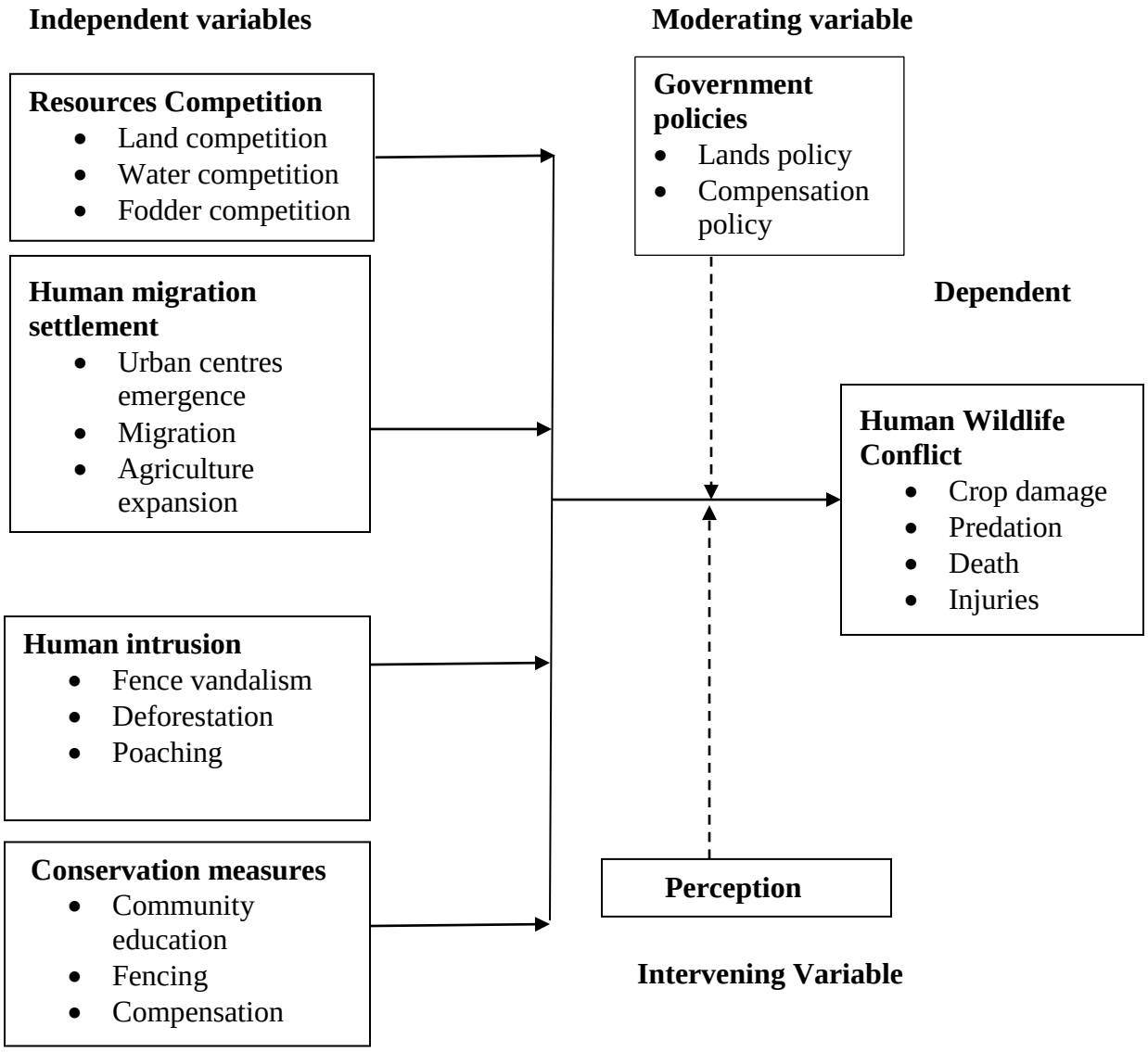
Stakeholder Theory was proposed by Freeman in 1984 who suggested that an occurrence is described by its relationships with a number of groups and individuals who are affected by its activities. A legal stakeholder is one who has the right and capability to take part in the process; a stakeholder who is affected by the choices of other stakeholders has a right to take part in order to lessen those impacts, the stakeholder also ought to have the resources and expertise (capacity) so as to participate (Easterling, 2004). As key stakeholders in human wildlife conflict management, communities living around the parks/reserves ought to be identified, taken into consideration and consequently fulfilled. Bryson *et al*. (2002) asserted that main stakeholders should be satisfied at least minimally, otherwise policies, organizations, communities and even nations will fail.

Therefore, successful approaches are those that incorporate the welfares of all stakeholders, instead of maximizing the rank of one group within restrictions outlined by the others. In order for this balance to be achieved and therefore, human wildlife conflict management to be successful a range of stakeholders must be involved in the process (Phillips & Freeman, 2003). However, stakeholders are people and as such hold values which drive their behavior as both individuals and organizations adhere to values.

## 2.8 Conceptual framework

The conceptual framework in figure 2.1 summarizes factors that influence human wildlife conflict.

**Figure 1: Conceptual Framework**



The conceptual framework diagram shows the relationship between independent and dependent variables. These variables are assumed to be directly related such that a change in the independent variables which are resources competition, human migration settlement, human invasion, and KWS conservation measures causes a change in the dependent variable which is human wildlife conflict. The government policies on land and compensation which is the intervening variable also influence human wildlife conflict.

### 2.9 Summary and Knowledge gap

Studies done by Kagiri (2000) show that erecting barriers on wildlife conservation zones have led to struggle for food, water and habitats for both humans and wildlife thus resulting in a conflict for survival. Siex et al., (1999) asserted that population increase has contributed to invasion into wildlife habitation, restriction of species into the edge of the habitation and direct competition with local communities. Another study by Yaro et al (2016) established that increasing income generating activities increase pressure on protected areas. and Hill (2002) found out that fruitful conservation measures result to; a reduction on the crop damages by wildlife, changing peoples' opinions on wildlife, aiding farmers to increase their farm produce and decreasing cases of poaching.

The animal migrations between MMNR and Serengeti show that the protected areas in the habitat are inadequate for their requirements. The establishment of human settlements indicate that what takes place in the nearby group ranches have significant impact on wildlife in the reserve. Although a few studies relating to factors influencing human

wildlife conflict have been conducted, very little has been done to wildlife migration and its association with people living around the Maasai Mara reserve. In addition, most of these have focused on qualitative data without taking into account the contributing factors and hence do not give enough perceptions into the spatial changing aspects of these factors.

**Table 2.1: Knowledge Gap**

| **Author &Year** | **Study Title** | **Variable Investigated** | **Findings** | **Knowledge Gap** |
|---|---|---|---|---|
| Amaja, G., 2014 | Evaluation of human wild animals conflict management in Gera district, south western Ethiopia. | Causes of human-wild animals conflicts<br>The degree of farms and livestock loss caused by wild animals<br>Main human wild conflict management measures in Gera district | Causes of human wild conflict were wild animals' territory disturbance, Baboons was the most frequent crop destroyer and domestic animal predation. | The study only focused on loss caused by wild animals to human but it overlooked the effects of human migration settlement and human intrusion. |
| Abudulghafur, F., 2013 | The Influence of Kenya wildlife conservation on reducing human wildlife conflict with focus to Kenya Wildlife Service. | Influence of wildlife conservation strategy<br>the influence of extension services<br>the influence of community participation<br>the influence of conservation awareness. | KWS conservation education program help in reducing human wildlife conflict in Kenya to great extent. | The study only focused on impact of Community wildlife strategies in reducing Human wildlife Conflict in Kenya leaving out other factors that influence human wildlife conflict. |
| Machogu, G., 2014 | Evaluating the economic effects tourism in Kenya's protected areas: a study of Maasai Mara National Reserve. | Benefits that accrues from wildlife<br>Role of stakeholders<br>Effects of status changes in National Reserve. | The status of MMNR has tremendously changed; the forest/shrub land has decreased while cropland has increased especially around the protected area. | The study discusses the economic benefits of wildlife leaving out the damages/losses caused by wildlife. |

# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.1 Introduction

In this section, the researcher focuses on methodology that was employed in the study. This section covers the research design, target population, sample size and sampling procedures, instrumentation (validity and reliability of instruments), data collection procedures, data analysis techniques and ethical considerations.

## 3.2 Research design

According to Kothari (2008) a research design refers to the plan of research so as to get answers to research questions. The researcher employed descriptive research design. Descriptive research designs are normally structured and precisely intended to gauge the features outlined in a research question. Mugenda and Mugenda (2006) asserted that descriptive statistics allow significant explanation of measurements by use of minimal statistics. Descriptive research aims to show a precise summary of individuals, occurrences or conditions. Descriptive design was chosen since it focusses on data instead of theory. In this study, it was easy to give out questionnaires to the residents in their home steads and work station easily which contributed to escalating the response rate.

## 3.3 Target population of the study

Population is defined as all individuals and organizations that make up study universes (Kothari & Garg, 2014). Target population defines the complete collection of populace,

proceedings, or matters that are of interest to the in which the researcher desires to probe; the populace shapes a foundation in which the sample amount or the study will be selected from (Mugenda and Mugenda (2008).The study target population was 1200 households from four villages surrounding MMNR and all the 30 KWS officers at MMNR station as presented in table 3.1. According to KWS (2017), the villages experiences high cases of human wildlife conflict thus making them suitable for the study.

**Table 3.1: Target population**

| **Target Villages** | **Target population** |
|---|---|
| Sekanani | 505 |
| Muroti | 314 |
| Talek | 246 |
| Ololaimutiek | 135 |
| KWS officers | 30 |
| **Total** | **1230** |

### 3.4 Sampling technique and sample size

Ngechu (2004) emphasizes the significance of choosing a demonstrative sample through making a sampling frame.

#### 3.4.1 Sampling technique

There are two standard categories of sampling methods that exist: probabilistic and; non-probabilistic sampling techniques (Saunders et *al.,* 2009). Stratified sampling, a

probabilistic sampling design that first divides the target population into meaningful, non-overlying subcategories known as strata were used to select the sample size. Stratification is chosen because it reduces the standard error. The 4 villages served as stratum.

### 3.4.2 Sample Size

A sample is a miniature proportion of target population selected for analysis. Any declaration made regarding the sample ought to be factual about the populace (Orodho, 2012). Sampling is carried out to save money, fasten data collection procedure, better correctness of findings and accessibility of population basics (Cooper & Schindler, 2012). Mugenda and Mugenda (2003) asserted that 10 to 30 % of population is enough thus the researcher sampled 10% of households in each stratum. The study in total consisted of a sample of 148 respondents.

**Table 3.2: Sample Size**

| **Target Villages** | **Target population** | **Sample size** | **Percentage** |
|---|---|---|---|
| Sekanani | 505 | 50 | 10% |
| Muroti | 314 | 31 | 10% |
| Talek | 246 | 24 | 10% |
| Ololaimutiek | 135 | 13 | 10% |
| KWS officers | 30 | 30 | 100% |
| **Total** | **1230** | **148** | **-** |

### 3.5 Research instrument

A researcher is required to design instruments for data collection. Orodho, (2012) asserted that instrumentation discusses the instruments used for data collection from respondents. The study used questionnaires and interview guide as the tool for data collection. A questionnaire entails of questions which are either close-ended or open-ended. Mugenda and Mugenda (2008) asserted that structured items denotes questions with a list of all likely substitutes where respondents select the answer that describes their circumstances.

Alternatively, open-ended questions refer to questions which grant respondents a comprehensive freedom of response where they responds in their own words. A questionnaire enables the researcher to obtain a large quantity of data inexpensively from a wide range of participants sometimes spread extensively in a geographic space. The respondents will have enough time to think about the questions and will give well thought answers (Kothari, 2008).

Residents' questionnaire were used in this study. The questionnaire was divided into five parts. Section A covered background information, section B covered the respondents' perceptions on influence of competition of resources, section C covered the respondents' perceptions on influence of human population increase, section D covered the respondents' perceptions on influence of human invasion and section E covered the respondents' perceptions on influence of conservation measures section F will cover the Indicators of Human Wildlife Conflict.. The personal interview collected information on

background information, the influence of competition for resources, human population increase, human invasion and conservation measures on human wildlife conflict.

### 3.5.1 Pilot Testing

A pilot study is a primary test carried out before the final study to make sure that questionnaires are working properly (Polit, Beck & Hunger, 2001). The pilot study responds to various matters; (i) offers the researcher the chance to measure importance of the data by testing the reliability and validity of the questionnaires; (ii) making sure that enumerators are adequately trained in the process; (iii) checking the presentation of questionnaire, precision and significance;(iv) checking that guidelines are understandable and; (v) making sure that statistics and analysis process is correct; (Simon, 2011).

According to Mugenda and Mugenda (2008), a pilot test comprises of between 1 to 10 percent of the target population. Therefore a pilot study was carried out on 12 households who did not play a part in the final data collection (Researcher 2017). Pilot test was done to check whether the data collected could be processed and analyzed with ease. After the pilot test, changes were made in the questionnaire to minimize the chances of vagueness of some of the questions before giving them to the respondents. At piloting, the items in the questionnaires were deliberated to be acceptable in terms of both wording and format. The amended questionnaire was then used for data collection for the final study.

### 3.5.2 Validity of the Instrument

Kothari (2010) asserts that validity indicates the degree to which an instrument measures what it is supposed to measure and can also be thought as utility. That is the extent to which variance found in the measuring instrument replicate true variance amongst those that have been tested Kothari (2004). The validity test was done to test the tool for accuracy and meaningfulness using content validity test. The items that were not consistent were rejected while some were changed. The researcher sought an expert judgment to assess whether questions perfectly represented the concept of study and also sought help from the supervisor so as to improve content validity.

### 3.5.3 Reliability of the Instrument

Reliability is the stability or consistency of scores over time and is therefore, the degree to which measures are free from error and in effect yield consistent results (Mugenda and Mugenda 2008). The researcher employed the split-half method to test reliability. The instrument was divided into two sub sets whereby all even and odd numbered responses in the pilot study were analyzed independently. The researcher aimed at determining the co-efficient of internal consistency and the reliability co-efficient whose value varied between 0.00 (indicating no reliability) and +1.00 (indicating perfect reliability). The odd numbered scores for all items were correlated with even numbered scores using Pearson Product Moment Correlation Co-efficient of the entire test. The researcher used Spearman Brown Prophecy formula:

$$Re = \frac{2xr\ half-test}{1+\text{r half-test}}$$

Where Re = reliability of the original test

r = reliability of the coefficient resulting from correlating the scores of the odd items with the scores of the even items. A coefficient of 0.78 was obtained which according to (Gay 2003) was considered adequate.

### 3.6 Data Collection Procedures

The researcher acquired a permit from National Commission of Sciences, Technology and Innovation (NACOSTI) and introduction letter from the Department of Extra Mural studies University of Nairobi before visiting the field. The researcher visited MMNR KWS station to alert them on the collection of data. A visit to the participating households was required for administering the instrument. The researcher administered questionnaires and conducted the interviews in person. Questionnaires were collected immediately they are filled.

### 3.7 Data analysis technique

Data analysis entails categorizing, ordering, manipulating and analysing raw data to get answers to the research questions (Kothari, 2004). Quantitative data was analyzed using descriptive statistics using the Statistical Package for Social Sciences (SPSS) version 21 and presented through percentages, means, standard deviations and frequencies. Data was presented by use tables.

Qualitative data that was generated in the study from interview guide were organized in themes and patterns, grouped through content analysis and then tabulated. Coefficients from Linear Regression analysis were used to establish the relation between resources competition, human settlement increase, human invasion, conservation measures and

human wildlife conflict whereby if the p value was less than 0.5 the relationship was considered significant and if the p value was greater than 0.5 the relationship was considered not significant.

### 3.8 Ethical considerations

According to Mugenda and Mugenda (2008) ethical considerations are crucial for any research. Research ethics were revised by an Ethics Board to establish ethical guidelines for carrying out the research so that ethical values are not dishonored. The respondents were guaranteed of discretion of the information to be provided and concealment of the source of data as the questionnaire did not call for revelation of identity. To enable independence in the study, measures were taken to make sure that individual bias of the researcher did not interfere with the research process and that all parties were given a fair consideration. In reporting the findings, the researcher accurately represented data collected and it was used only for the purposes of this study.

**Table 3.3: Operationalization of Variables**

| **Objectives** | **Variables** | **Indicators** | **Data Collection Instruments** | **Analysis Tool** |
|---|---|---|---|---|
| To assess the influence of resources competition on human wildlife conflict in MMNR | **Independent variable** Resources Competition | Land<br>Water<br>Fodder | Questionnaire<br>Interview guide | Descriptive statistics<br>Inferential statistics |
| To determine the influence of human migration settlement on human wildlife conflict in MMNR | **Independent variable** Human migration | Urban centres emergence<br>Migration<br>Agricultural expansion | Questionnaire<br>Interview guide | Descriptive statistics<br>Inferential statistics |
| To establish extent to which human intrusion to protected areas influence human wildlife in MMNR | **Independent variable** Human intrusion to protected areas | Fence vandalism<br>Deforestation<br>Poaching | Questionnaire<br>Interview guide | Descriptive statistics<br>Inferential statistics |
| To determine how Kenya Wildlife Service conservation measures influence human wildlife in MMNR | **Independent variable** KWS Conservation measures | Community education<br>Fencing<br>Compensation | Questionnaire<br>Interview guide | Descriptive statistics<br>Inferential statistics |
| Human Wildlife Conflict | **Dependent variable** Human Wildlife Conflict | Reduction in HWC<br>Reduced crop damage<br>Reduced killing of livestock's<br>Reduced human fatalities | Questionnaire<br>Interview guide | Descriptive statistics<br>Inferential statistics |

# CHAPTER FOUR

# DATA ANALYSIS, PRESENTATION AND INTERPRETATION

## 4.1 Introduction

This chapter presents data analysis, interpretation, presentation and discussion of findings. The purpose of this study was to find out the factors influencing human wildlife conflict in communities surrounding protected areas, a case of Kenya Wildlife Service. The study was organized based on the objectives of the study including influence of resources competition on human wildlife conflict, influence of human migration settlement, influence of human invasion to protected areas as well as determining the influence of KWS conservation measures on human wildlife conflict. The responses were analyzed into frequencies, percentages and mean and presented in tables.

## 4.2 Response rate

The respondents involved were the residents of areas surrounding MMNR and KWS officers stationed at MMNR. They returned the questionnaires as tabulated in Table 4.1.

**Table 4.1: Questionnaire return rate**

| **Respondents** | **Sampled size** | **No. collected** | **Return rate (%)** |
|---|---|---|---|
| Residents | 118 | 90 | 76.3 |
| KWS officers | 30 | 26 | 86.7 |
| **Total** | **169** | **116** | **-** |

Table 4.1 indicates that the average questionnaire return rate was well above 70 percent.

### 4.3 Demographic Information

The background information of residents concentrated on their gender, age and period of living in the area. Background information of KWS staff concentrated on their gender, age, period of working in the station and highest level of training related to wildlife. Table 4.2 presents residents and KWS officers' gender.

**Table 4.2: Residents and KWS Officers Gender**

| Gender | Category | Frequency | Percentage |
|---|---|---|---|
| **Residents** | Male | 50 | 55.6 |
| | Female | 40 | 44.4 |
| **Total** | | **90** | **100.0** |
| **KWS officers** | Male | 15 | 57.7 |
| | Female | 11 | 42.3 |
| **Total** | | **26** | **100.0** |

The findings in Table 4.2 indicate that (55.6%) of the residents were male and (57.7%) of KWS officers were male. This implies that both gender was well presented in the study which indicates that KWS as a public entity it has fulfilled the one third gender rule.

Table 4.3 presents residents' and KWS officers' Age.

**Table 4.3: Residents and KWS Officers Age**

| Age | Category | Frequency | Percentage |
|---|---|---|---|
| **Residents** | Below 20 years | 10 | 11.1 |
| | 20-29 years | 20 | 22.2 |
| | 30-39 years | 39 | 43.4 |
| | 40-49 years | 21 | 23.3 |
| **Total** | | **90** | **100.0** |
| **KWS officers** | 20-29 years | 9 | 34.6 |
| | 30-39 years | 12 | 46.2 |
| | 40-49 years | 5 | 19.2 |
| **Total** | | **26** | **100.0** |

Findings in Table 4.4 show that (43.4%) of the residents were aged between 30-39 and (46.2%) of the officers were aged between 30-39. This shows that majority of the respondents were household head and the KWS officers were young and energetic to work in a national reserve.

Table 4.4 presents residents period of living around MMNR and KWS officers period of working in MMNR.

**Table 4.4: Period of Working/Living around MMNR**

| Period of living/working in the area | Category | Frequency | Percentage |
|---|---|---|---|
| **Residents** | 1-10 years | 6 | 6.7 |
| | 11-20 years | 22 | 24.4 |
| | 21-30 years | 54 | 60.0 |
| | Over 30 years | 8 | 8.9 |
| **Total** | | **90** | **100.0** |
| **KWS officers** | Less than 1 year | 2 | 7.8 |
| | 1-2 years | 4 | 15.4 |
| | 3-4 years | 14 | 53.8 |
| | Over 5 years | 6 | 23.0 |
| **Total** | | **26** | **100.0** |

The results in Table 4.5 show that (60%) of the residents have lived in the area for between 21-30 years and (53.8%) of the KWS officers had worked at MMNR for between 3-4 years. This shows that the residents had lived in the area for a considerable number of years to understand factors influencing human wildlife conflict in the area and the KWS officers were familiar with the factors affecting human wildlife conflict in communities living around MMNR

Table 4.5 presents KWS officers' level of education.

**Table 4.5: KWS Officers Level of Education**

| Level of education | Frequency | Percentage |
|---|---|---|
| Certificate | 13 | 50.0 |
| Diploma | 9 | 34.6 |
| Degree | 4 | 15.4 |
| **Total** | **26** | **100.0** |

Results in Table 4.5 show that (50%) of the KWS officers had attained a certificate in studies related to wildlife conservation hence in a good position to protect the national reserve by implementing measures aimed and reducing human wildlife conflict.

### 4.4 Resources Competition and Human Wildlife Conflict

The first objective was to determine the influence of resources competition on human wildlife conflict. Respondents were asked to indicate whether sharing resources between wildlife and communities surrounding MMNR influence human wildlife conflict. Findings are presented in Table 4.6.

**Table 4.6: Residents Opinions on Influence on Resources Competition.**

| Responses | Frequency | Percentage |
|---|---|---|
| Yes | 72 | 80.0 |
| No | 18 | 20.0 |
| **Total** | **90** | **100.0** |

Findings in Table 4.6 show that (80%) of the residents feel that sharing of resources with wildlife influenced conflict. This indicates that human and wildlife compete for limited

land, water sources and fodder which creates conflict. The finding concurs that struggle for space, resource and the continuous decrease of habitation could be the main factors contributing to reduction of wildlife.

The researcher also sought to establish the extent to which land, water and pasture influence human wildlife conflict. Residents were asked to tick the extent to which each of the parameters lead to human wildlife conflict. Findings are presented in Table 4.7.

**Table 4.7: Extent to which Resources Influence Human Wildlife Conflict**

| Resources | Very great extent | | Great extent | | Moderate extent | | Low extent | |
|---|---|---|---|---|---|---|---|---|
| | F | % | F | % | F | % | F | % |
| Land | 71 | 79.0 | 11 | 12.2 | 5 | 5.5 | 3 | 3.3 |
| Water | 75 | 83.3 | 8 | 8.9 | 7 | 7.8 | 0 | 0 |
| Pasture | 78 | 86.7 | 8 | 8.9 | 4 | 4.4 | 0 | 0 |

**N=90**

Results in Table 4.7 show (79.0%) of the residents indicated that sharing of land influence human wildlife conflict to a very great extent, (83.3%) indicated that sharing water influence HWC to a very great extent and (86.7%) of the residents indicated sharing of pasture influence HWC to a very great extent. The KWS officers indicated that the Maasai graze their livestock at the boundaries of the river where there is fodder and water where they risk attack by wild animals. This indicates that land scarcity leading to sharing it with wildlife, sharing water sources like rivers and springs and sharing of fodder between livestock and wildlife lead to HWC. This finding concurs that major

source of HWC conflict globally is the struggle amongst increasing human populations and wildlife for similar scarce natural resources.

In order to assess how sharing of resources influence HWC, residents were asked their agreement level on influence of resources competition on human wildlife conflict. Findings are presented in Table 4.8.

Key: 1-Strongly agree, 2- Agree, 3-Neutral, 4-Disagree, 5-Strongly disagree

**Table 4.8: Residents Level of Agreement on Influence of Sharing Resources**

| **Statements** | **1** | | **2** | | **3** | | **4** | | **Mean** | **Std Deviation** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **F** | **%** | **F** | **%** | **F** | **%** | **F** | **%** | | |
| Obstruction of water for domestic purposes and no water streaming into protected areas for wildlife | 17 | 19.0 | 49 | 54.4 | 14 | 15.5 | 10 | 11.1 | 2.19 | .873 |
| Natural factors like drought that push animals to human habitations for pastures and water | 50 | 55.5 | 25 | 27.8 | 8 | 8.9 | 7 | 7.8 | 1.69 | .932 |
| Need of land for human development | 31 | 34.4 | 47 | 52.3 | 12 | 13.3 | 31 | 34.4 | 1.87 | .962 |

**N=90**

Table 4.8 indicate that; (54.4%) of the residents agreed that community members obstruct water for domestic purposes thus no water streaming into protected areas which lead to wild animals invading the community in search of water; (55.5%) strongly agreed that natural factors like drought push wild animals to human habitations for pastures and hence creating conflicts and (52.3%) of the residents agreed that needs for human development like road expansion has led to sharing land with wildlife which contributes to HWC. This shows that the increase on the demand for land, changing climatic conditions which contribute to drying of some water sources and drought has contributed to sharing of the scare natural resources leading to conflict. The finding concurs that during famine, pastoralists take their livestock to the limited water sources where their livestock are simply preyed on by wild animals.

The researcher employed linear regression to establish the relationship between sharing of resources and HWC. Findings are presented in Table 4.9.

**Table 4.9: Relationship between Resources Sharing and HWC**

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | .500 | .179 | | 2.787 | .007 |
| Do you think that sharing resources between wildlife and communities influence HWC? | 1.583 | .142 | .766 | 11.162 | .000 |

a. Dependent Variable: How often do you experience HWC?

The established linear regression equation is:

$Y = 0.500 - 1.583 X_1$

Where

Constant = 0.500, shows that if resources competition was rated as zero, human wildlife conflict would be 0.500

X1= 1.583, implies that a unit reduction in competition of resources would result to reduction in human wildlife conflict by a factor of 1.583.

The results in table 4.9 also shows that resources sharing had significant ($p<0.05$) influence on human wildlife conflict. This shows that competition over limited natural resources like land, water and pasture contribute to conflict between human and wildlife.

### 4.5 Human Migration Settlement and Human Wildlife Conflict

The second objective was to assess the influence of human migration settlement on human wildlife conflict. Residents were asked whether human settlement increase around MMNR has contributed to escalation of HWC. Findings are presented in Table 4.10.

**Table 4.10: Residents Opinions on Influence of Human Migration Settlement**

| Responses | Frequency | Percentage |
|---|---|---|
| Yes | 52 | 57.8 |
| No | 38 | 42.2 |
| **Total** | **90** | **100.0** |

Results in Table 4.8 show that majority of the residents (57.8%) indicated that people migration and settlement near MMNR have contributed to escalation of HWC. This is an indication that emergence of urban centres, migration and agriculture expansion has

contribute to escalation of Human Wildlife Conflict. This is in agreement with the assertion that rapid migration cause compression on land, decrease habitation of wild animals and eradicate passageways for migration thus increasing chances of contacts which creates HWC.

The researcher further sought to establish how human migration settlement has contributed to HWC. Residents were asked to give affirmative of negative answers on influence of HWC. Findings are presented in Table 4.11.

**Table 4.11: Residents Level of Agreement on Influence of Human Migration Settlement**

| Statements | Yes | | No | | Mean | Std Deviation |
|---|---|---|---|---|---|---|
| | F | % | F | % | | |
| Establishment of settlement schemes along national parks has led to the increase in conflict between people and wildlife | 65 | 72.2 | 25 | 27.8 | 1.28 | .450 |
| Emergence of towns and trading centers next to national park has contributes to increase of HWC | 52 | 57.8 | 38 | 42.2 | 1.42 | .497 |
| High population has resulted to difficulty in catching up with poachers whenever they strike | 41 | 45.6 | 49 | 54.4 | 1.54 | .501 |
| Farmers move from other parts of the country so as to benefit from the favourable climatic conditions near national parks | 63 | 70.0 | 27 | 30.0 | 1.30 | .461 |

**N=90**

Findings in Table 4.11 show that human migration settlement contribute to HWC through establishing settlement schemes along national parks as indicated by (72.2%), emergence of towns and trading centres as indicated by (57.8%), while (54.4%) disagreed that high population has resulted in difficulty catching up with poachers and migration from other parts of the country as indicated by (70%) of the residents. The KWS officers indicated that there are people who have settled near the park after post-election violence and they experience frequent attack by wild animals. These migrants have started income generating activities contributing to emergence of urban areas near the parks. This shows that demographic and social modifications like establishment of urban centres, human migration and agriculture expansion near national parks/reserves have led to HWC. The finding is in agreement that the establishment of settlement schemes along national parks in Africa is highly attributed to migration of people displaced by famine and by political instability and the human population increase has contributed to invasion into wildlife habitats and direct struggle with indigenous people.

Coefficients from linear regression were used to determine the relationship between human migration settlement and HWC. Findings are presented in Table 4.12.

**Table 4.12: Relationship between Human Migration Settlement and HWC**

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | .534 | .167 | | 3.197 | .002 |
| Do you think that human migration settlement increase around MMNR contribute to HWC? | 1.312 | .111 | .783 | 11.813 | .000 |

a. Dependent Variable: How often do you experience HWC?

The established linear regression equation is:

$Y = 0.534 - 1.312\ X_1$

Where

Constant = 0.534, shows that if human migration settlement increase was rated as zero, human wildlife conflict would be 0.534.

X1= 1.312, implies that a unit reduction in human migration settlement increase would result to reduction in human wildlife conflict by a factor of 1.312.

The results in table 4.12 also shows that human migration settlement had significant ($p<0.05$) influence on human wildlife conflict. This indicates that migration of people to live near protected areas due to drought and political instability leading to emergence of towns and expansion of agriculture expansion has contributed to human wildlife conflict.

### 4.6 Human Invasion to Protected Areas and Human Wildlife Conflict

The third objective was to assess the influence of human invasion to protected areas on human wildlife conflict. Residents were asked whether they had witnesses people from their village encroaching MMNR. Findings are presented in Table 4.13.

**Table 4.13: Residents Responses on Influence of Human Invasion to Protected Areas**

| Responses | Frequency | Percentage |
|---|---|---|
| Yes | 72 | 80.0 |
| No | 18 | 20.0 |
| **Total** | **90** | **100.0** |

Land- use division which results from establishment of subsistence agricultural practices has increased HWC. The results in Table 4.13 show that (80%) of the residents have witnessed people from their village encroaching the national reserve to carry out various agricultural or economic activities. This is an indication that vandalizing park fence, cutting down forests and subsistence or commercial poaching contribute to conflict between people and wildlife. The respondents were asked the extent to which the encroachment has contributed to HWC and results are presented in Table 4.14.

**Table 4.14: Extent to which Encroachment Contributed to HWC**

| Extent | Frequency | Percentage |
|---|---|---|
| Very great extent | 53 | 58.9 |
| Great extent | 15 | 16.7 |
| Moderate extent | 4 | 4.4 |
| Not applicable | 18 | 20.0 |
| **Total** | **72** | **100.0** |

Table 4.14 show that (58.9%) of the residents indicated that people from their village who encroach MMNR contributed to HWC to a very great extent. This indicates that encroachment of MMNR through fence vandalism, deforestation and poaching has led to human wildlife conflict. This finding concurs that increase in economic activities like farming up to boundaries of wilderness and protected areas increase pressure on protected areas.

In order to assess how human invade to protecting areas hence causing HWC, the researcher asked the residents their level of agreement on the listed statements on human invasion. Findings are presented in Table 4.15.

Key: 1-Strongly agree, 2- Agree, 3-Neutral, 4-Disagree, 5-Strongly disagree

**Table 4.15: Residents Level of Agreement on Human Invasion to Protected Areas**

| Statements | 1 | | 2 | | 3 | | 4 | | 5 | | Mean | Std Deviation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F | % | F | % | F | % | F | % | F | % | | |
| Some community members vandalize KWS park fence | 17 | 18.9 | 40 | 44.4 | 23 | 25.5 | 8 | 8.9 | 2 | 2.2 | 2.50 | .974 |
| People invade the park in search of firewood | 47 | 52.2 | 26 | 28.9 | 9 | 10.0 | 8 | 8.9 | 0 | 0 | 1.77 | .984 |
| Some community members graze their livestock inside the park | 30 | 33.3 | 56 | 62.2 | 3 | 3.3 | 1 | 1.1 | 0 | 0 | 1.72 | .581 |
| Unknown people carry out subsistence poaching of wildlife | 44 | 48.9 | 33 | 36.7 | 8 | 8.9 | 5 | 5.6 | 0 | 0 | 1.71 | .851 |
| Some community members have been found and arrested inside the park for trespassing. | 11 | 12.2 | 25 | 27.8 | 40 | 44.4 | 9 | 10.0 | 5 | 5.6 | 2.69 | 1.002 |
| Human activities changes wildlife habitats | 45 | 50.0 | 22 | 24.4 | 10 | 11.1 | 7 | 7.8 | 6 | 6.7 | 1.97 | 1.240 |

**N=90**

Findings in Table 4.15 show that; grazing livestock inside the reserve was the main aspect of human invasion that contributed to HWC as indicated by (62.2%); searching firewood in the reserve also contributed to HWC as indicated by (52.2%) of the residents; human activities like development of infrastructure and tourism also contributed to HWC

as indicated by (50%), carrying out of subsistence poaching of wildlife contributed to HWC as indicated by (48.9%), vandalizing KWS park fence contributed to HWC as indicated by (44.4%) and tress pass in the park also contributed to HWC as indicated by (44.4%) of the residents. The KWS officers indicated that there are people who have tilled at the boundaries of MMNR and the crops are frequently destroyed by wild animals. Some people have been arrested in MMNR for either poaching for subsistence or commercial purposes or vandalizing the fence. This indicates that human invasion to protected areas through fence vandalism, deforestation and poaching contributed to HWC to a very large extent. This finding is in agreement that human activities livestock keeping, farming, fishing, the establishment of roads and building, tourism or conservation measures, can radically alter wildlife habitation.

The researcher employed linear regression analysis to assess the relationship between human invasion to protected areas and HWC. Findings are presented in Table 4.16.

**Table 4.16: Relationship between Human Invasion to Protected Areas and HWC**

| **Model** | **Unstandardized Coefficients** | | **Standardized Coefficients** | **t** | **Sig.** |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | .460 | .149 | | 3.082 | .003 |
| To what extent has human invasion contributed to HWC? | 1.492 | .108 | .826 | 13.771 | .000 |

a. Dependent Variable: How often do you experience HWC?

The established linear regression equation is:

$Y = 0.460 - 1.492\ X_1$

Where

Constant = 0.460, shows that if human invasion to protected areas was rated as zero, human wildlife conflict would be 0.460.

X1= 1.492, implies that a unit reduction in human invasion to protected areas would result to a reduction in human wildlife conflict by a factor of 1.492.

The results in table 4.16 also indicates that human invasion to protected areas had significant ($p<0.05$) influence on human wildlife conflict. This implies that human activities and illegal activities like fence vandalism, deforestation and poaching in the protected areas contributed to HWC.

### 4.7 KWS Conservation Measures and Human Wildlife Conflict

The fourth objective was to assess the influence of KWS conservation measures on human wildlife conflict. Residents were asked their opinion on whether KWS has developed some ways by which they control the movement of wild animals and the damages they cause in residences/farms. Findings are presented in Table 4.17.

**Table 4.17: Residents Responses on KWS Conservation Measures**

| Responses | Frequency | Percentage |
|---|---|---|
| Yes | 65 | 72.2 |
| No | 25 | 27.8 |
| **Total** | **90** | **100.0** |

Results in Table 4.15 show that (72.2%) of the residents indicated that KWS has developed some ways to control movement of wild animals hence reducing HWC which

included erecting electrical fences, aerial surveillance of wild animal movement and compensating the victims of HWC. This is an indication that community education, fencing and compensating victims of HWC have played a role in reduction on the crop damages, injury to domesticated animals and decrease in poaching. This finding concurs that conflict resolving measures could result to a reduction on the crop damages by wildlife, changing peoples' opinions on wildlife, aiding farmers to increase their farm produce and decreasing cases of poaching.

The researcher sought to establish the approaches used by KWS to reverse HWC in communities surrounding MMNR. Residents were asked level of agreement on the listed statement on conservation measures. Findings are presented in Table 4.18.

**Table 4.18: Residents Level of Agreement on KWS Conservation Measures**

| Statements | 1 | | 2 | | 3 | | 4 | | 5 | | Mean | Std Deviation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F | % | F | % | F | % | F | % | F | % | | |
| KWS organize community awareness programs to sensitize them on importance of wildlife | 45 | 50.0 | 20 | 22.2 | 17 | 18.9 | 5 | 5.6 | 2 | 2.2 | 1.70 | .893 |
| The government has enacted enough laws to handle the problem of national park encroachment. | 21 | 23.3 | 48 | 53.3 | 15 | 16.8 | 3 | 3.3 | 3 | 3.3 | 2.09 | .882 |
| The Kenya Wildlife Service has erected a fence as a boundary around the MMNR | 37 | 41.1 | 24 | 26.7 | 16 | 17.8 | 9 | 10.0 | 4 | 4.4 | 2.10 | 1.181 |
| The Kenya Wildlife Service does regular patrols in and around the park to keep off encroachers and poachers | 53 | 58.9 | 24 | 26.7 | 10 | 11.1 | 3 | 3.3 | 0 | 0 | 1.59 | .820 |
| The Kenya Wildlife Service frequently engages aerial surveillance to monitor the park. | 24 | 26.7 | 48 | 53.3 | 11 | 12.2 | 5 | 5.6 | 2 | 2.2 | 2.03 | .905 |
| KWS had developed lethal control programs to kill dangerous animals which stray to human habitation | 7 | 7.8 | 11 | 12.2 | 25 | 27.8 | 37 | 41.1 | 10 | 11.1 | 3.36 | 1.084 |
| KWS has corporate social responsibility/community enterprise for the affected communities | 5 | 5.6 | 16 | 17.8 | 13 | 14.4 | 38 | 42.2 | 18 | 20.0 | 3.53 | 1.163 |

**N=90**

The results in Table 4.18 show that KWS sensitize community on importance of wildlife as indicated by (50%) of the residents, has enacted enough laws as indicated by (53.3%), has erected a fence as indicated by (41.1%), KWS does regular patrols as indicated by

(58.9%) and engages frequently in aerial surveillance as indicated by (53.3%) of the residents. However, (41.1%) of the residents disagreed on whether KWS has developed lethal control programs to kill dangerous animals and (42.2%) of the residents strongly disagreed that KWS practices corporate social responsibility for the affected community. This implies that KWS has employed various conservation measures to curb HWC. The residents also suggested that the government should relocate squatters who have settled along Maasai Mara National Reserve also KWS should erect electric fences to prevent animals from invading homes as well people from entering the park for firewood or subsistence farming. KWS officers suggested that the national assembly should pass restrictive laws on poaching and encroaching to protecting areas and the organization should procure CCTV to monitor all the activities taking place in and around the protected area. This is an indication that creating awareness on wildlife conservation through community education, erecting electric fences and compensation victims of conflict have contributed to the reduction of human wildlife conflict cases. This finding concurs that lawbreakers of conservation laws ought to be ruthlessly punished to discourage them and others from breaking them, KWS (2016) that fencing helps to successfully isolated wildlife from human settlements and farms that creating awareness in the community help to reduce HWC.

The researcher employed linear regression to establish the relationship between KWS conservation measures and HWC. Findings are presented in Table 4.19.

**Table 4.19: Relationship between KWS Conservation Measures and HWC**

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | .440 | .189 | | 2.323 | .003 |
| Has KWS developed some ways by which they control HWC | 1.680 | .155 | .757 | 10.861 | .000 |

a. Dependent Variable: How often do you experience HWC?

The established linear regression equation is:

$Y = 0.440 + 1.680\ X_1$

Where

Constant = 0.440, shows that if wildlife conservation measures were rated as zero, human wildlife conflict would be 0.440.

X1= 1.680, implies that a unit increase in wildlife conservation measures would result to a reduction in human wildlife conflict by a factor of 1.680.

The results in table 4.19 also indicates that KWS conservation measures had significant ($p<0.05$) influence on human wildlife conflict. This shows that measures taken up by KWS to curb HWC have contributed to reduction in the number of cases of HWC.

Residents living around MMNR were asked to indicate how often they experience HWC. Findings are presented in Table 4.20.

**Table 4.20: Occurrence of HWC**

| Extent | Frequency | Percentage |
|---|---|---|
| Daily | 8 | 8.9 |
| Weekly | 40 | 44.4 |
| Monthly | 27 | 30.0 |
| Only during wildebeest migration | 15 | 16.7 |
| **Total** | **90** | **100.0** |

Table 4.20 show that HWC occurrence in villages around MMNR is very frequent although some of the villages only experience the conflict during the annual wildebeest migration. This is an indication that cases of crop damage, predation of domestic animals, death and injuries to both people and animals occur very frequently in the areas surrounding MMNR. This result confirms a report from KWS Narok station which showed that there are many cases of wildlife attacks on livestock and people.

In order to assess the indicators on HWC, the researcher sought to find out the losses that the residents have incurred as result of invasion by MMNR wild animals. Residents were asked to tick on the listed statemens. Findings are presented in Table 4.21.

**Table 4.21: Indicators of Human Wildlife Conflict**

| Statements | 1 | | 2 | | 3 | | 4 | | Mean | Std Deviation |
|---|---|---|---|---|---|---|---|---|---|---|
| | F | % | F | % | F | % | F | % | | |
| Dangerous wild animals have attacked and injured people in my community | 44 | 48.9 | 30 | 33.3 | 5 | 5.6 | 3 | 3.3 | 1.80 | .985 |
| Herbivorous wild animals destroy crops in my community | 56 | 62.2 | 24 | 26.7 | 8 | 8.9 | 2 | 2.2 | 1.51 | .753 |
| Some of my community members have been killed by wild animals | 48 | 53.3 | 30 | 33.3 | 9 | 10.0 | 4 | 4.4 | 1.64 | .825 |
| Dangerous wild animals have killed livestock in my community | 60 | 66.7 | 25 | 27.8 | 5 | 5.5 | 0 | 0 | 1.39 | .594 |

Findings in Table 4.187 show that the main indicators of HWC are injured people as indicated by (48.9%), crop destruction as indicated by (62.2%), people death as indicated by (53.3%) and (66.7%) of the residents indicated that killing of livestock as an indicator of HWC. This implies that HWC has a severe negative impact on people and their resources which include crop damage by herbivorous animals, predation of domesticated animals especially livestock, death and injuries of both people and domestic animals. The finding concurs that a number of wildlife conflicts with farmers in search of pasture hence causing crop damage and death of the animals.

# CHAPTER FIVE

# SUMMARY OF FINDINGS, DISCUSSIONS CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Introduction

This section presents a summary of the findings, discussion, conclusions and recommendations for possible actions and suggestions for future research.

## 5.2 Summary of Findings

The purpose was to find out the factors influencing human wildlife conflict in communities surrounding protected areas, a case of Kenya Wildlife Service. The study research questions were; how does competition of resources influence human wildlife conflict in communities living around Maasai Mara National Reserve, how does human migration settlement influence human wildlife conflict in communities living around Masaai Mara National Reserve, how does human invasion to protected areas influence human wildlife conflict in communities living around Masaai Mara National Reserve, and to what extent has Kenya Wildlife Service conservation measures influenced human wildlife conflict in communities living around Masaai Mara National Reserve. The study adopted Social Conflict theory and Stakeholder Theory. The study adopted descriptive survey research design since it enabled correction of information from respondents without compromising their privacy. Target population comprised of 1200 households and 30 KWS officers. Stratified sampling was applied to sample 118 villagers and the whole population of KWS officers was sampled. Data was collected using questionnaires and interview guide, analyzed and presented in frequencies, percentages and mean. The

return rate was well above 70 percent which according to Mugenda A. and Mugenda O. (2008) is an acceptable proportion and can be termed adequate for analysis. Data was presented in relation to the study findings; both gender was represented in the study, majority of the respondents had lived in the area for more than 20 years as well as the KWS who had worked at MMNP for more than 3 years. The KWS officers were also trained on wildlife conservation.

### 5.3 Discussion of Findings

In line with objective one: findings established that sharing of resources with wildlife influenced conflict between people and wildlife as indicated by 80% of the residents whereby they shared the natural resources like land, water and fodder with wild animals resulting to conflicts. Findings also established that some residents obstructed water for domestic use thus reducing the amount of water for use by wild animals especially in areas where there was seasonal rivers and during drought animals invade farms in search of fodder. The finding was in agreement with Madden (2008) that the major source of HWC globally is the struggle amongst increasing people populations and wildlife for similar scarce natural resources.

In line with objective two: findings established that people migration and settlement near MMNR have contributed to escalation of HWC as indicated by 57.8% of the residents whereby people have migrated and established settlements near the reserve resulting to emergence of towns and urban centres which sometimes harbor poachers making it hard for KWS officers to arrest them. The finding is in agreement with McGregor (2005) that

the establishment of settlement schemes along national parks in Africa is highly attributed to migration of people displaced by famine and by political instability and population increment.

In line with objective three: findings established that human invasion to protected areas influence HWC as indicated by 80% of the residents who affirmed that they had witnessed people from their villages encroaching MMNR. Findings also established that grazing livestock inside the reserve, fetching firewood, agricultural practices, fishing, development of infrastructure and tourism, carrying out of subsistence poaching of wildlife, vandalizing KWS park fence and tress pass in the park were the main aspect of human invasion that contributed to HWC. This finding is in agreement with Kate (2012) that human activities such as livestock keeping, farming, fishing, the establishment of roads and building, tourism or conservation measures, can radically alter wildlife habitation

In line with objective four: findings established that KWS had put in place measures to reverse HWC as indicated by (72.2%) of the residents through sensitizing the community on importance of wildlife, enacting enough laws, erecting a fence, carting out regular patrols, engaging in frequently in aerial surveillance, developing lethal control programs to kill dangerous animals and compensating the victims of HWC. The finding concurs with; Jimoh (2003) that lawbreakers of conservation laws ought to be ruthlessly punished to discourage them and others from breaking them, KWS (2016) that fencing helps to

successfully isolate wildlife from human settlements and farms and Messmer (2009) that creating awareness in the community help to reduce HWC.

### 5.4 Conclusion

The researcher was able to achieve the study objectives whereby the factors that influence human wildlife conflict in communities surrounding protected areas were clearly identified as sharing on natural resources which were land, water and pasture, human migration settlement, human invasion to protected areas and KWS conservation measures. During drought the pastoralists graze their livestock in the protected areas and some residents also block water for domestic and agricultural use hence blocking the water from flowing to the protected areas. People migration due to various reasons have led to an increase in human populations which has greatly contributed to overpopulation on areas surrounding Maasai Mara National Park which has contributed to escalation of conflict between wildlife and people. It is also concluded that invasion to protected area for agricultural and economic activities are also on the rise. People invade protected areas in search of firewood, agricultural activities and illegal activities like poaching and vandalizing park fence. However, KWS has come up with measures to curb human wildlife conflict.

### 5.5 Recommendations

Based on the findings of this study recommends that:

i) The government of Kenya through the ministries of lands and Agriculture in conjunction with ministry of Natural resource should establish coherent policies that will protect the environment and sustainable use of natural resource.

ii) The government should resettle squatters and post- election violence evictees from the Park to other areas where they will not be in conflict with wild animals.

iii) The Kenya Wildlife Service should review its policy through enforcement of regulations and legislation on the safe distance on which people should build their houses away from the National Park for the minimization of human wildlife conflicts.

iv) Maasai Mara National Reserve should consider reinforcing its electric fence and even install alarms on the fences to help in detection of any stray wild animals or people from illegal entry to the park.

v) Since farmers are affected to a great extent by crop raiding, the government should establish a substitute way of livelihood that suits the farmers living around Maasai Mara National Reserve, especially programs like wildlife enterprises and creation for community conservancies that can assist farmers to accrue revenue.

vi) Community education and awareness by Kenya Wildlife Service should be implemented in the areas where HWC is experienced.

### 5.6. Suggestions for Further Study

The researcher recommends the following:

i) Further research to be carried out on influence of national park/reserve encroachment on endangered wildlife in Kenya.

ii) A study on the role of government on human encroachment to national park/reserves.

iii) A study on the impacts of Geographic Information System (GIS) technology in the minimization of human wild life conflict at Maasai Mara National Reserve should be considered in future research.

iv) A study to investigate the wild animal that are frequently involved in human wildlife conflict in Maasai Mara National Reserve surrounding so as to assist KWS in decision making of how to control such animals.

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# APPENDICES

## APPENDIX I: INTRODUCTION LETTER

Letter to Park Warden,

Lydia Machoka

University of Nairobi

P.O. Box 30197-00100

Nairobi – Kenya

Dear Sir,

**RE: PERMISSION TO CONDUCT RESEARCH**

I am a post graduate student at the University of Nairobi currently carrying out a research on factors influencing human wildlife conflict in communities surrounding protected areas.Maasai Mara National Park has been selected as a case study . I am therefore humbly requesting for your permission to gather the required information from your staff. The questionnaires will be specifically meant for this study and therefore no name of the respondents or that of your school will be required. The responses are strictly meant for this study and your schools identity will be treated with confidentiality.

Your assistance and support on this matter will be highly appreciated.

Thank you in advance

Yours Faithfully,

Lydia Machoka.

**APPENDIX II: QUESTIONNAIRE FOR RESIDENTS**

This questionnaire is for research only. Please tick ( ✓) in appropriate bracket or write your response to all questions. Do not write your name anywhere.

**SECTION A: Demographic information**

1. Gender

Male [ ] Female [ ]

2. Age in years.

Below 20 years [ ] 21-30 [ ] 31-40 [ ]

41-50 [ ] Above 50 [ ]

3. How long have you lived in this area?

1-10 years [ ] 11-20 years [ ]

21-30 years [ ] Over 30 years [ ]

**SECTION B: Influence of Resources Competition**

4. Do you think that sharing resources between wildlife and communities surrounding MMNR influence human wildlife conflict?

Yes [ ] No [ ]

5. To what extent do the listed resources influence human wildlife conflict?

| **STATEMENTS** | **Very great extent** | **Great extent** | **Moderate extent** | **Low extent** |
|---|---|---|---|---|
| Land | | | | |
| Water | | | | |
| Pasture | | | | |

6. Kindly indicate your level of agreement on the listed statements on influence of resources competition on human wildlife conflict.

Key: 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree, 5-Strongly disagree.

| **STATEMENTS** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Obstruction of water for domestic purposes and no water streaming into protected areas for wildlife | | | | | |
| Natural factors like drought that push animals to human habitations for pastures and water | | | | | |
| Need of land for human development | | | | | |

**SECTION C: Influence of Human Migration Settlement**

7. Do you think that human migration settlement around MMNR has led to increase of human wildlife conflict?

Yes [ ] No [ ]

8. What is your opinion on the listed statements on influence of human migration settlement on human wildlife conflict?

| **Statements** | **Yes** | **No** |
|---|---|---|
| Establishment of settlement schemes along national parks has led to the increase in conflict between people and wildlife | | |
| Emergence of towns and trading centers next to | | |

| | | |
|---|---|---|
| national park has led to increase of HWC | | |
| High population has resulted to difficulty in catching up with poachers whenever they strike | | |
| Farmers move from other parts of the country so as to benefit from the favourable climatic conditions near national parks | | |

**SECTION D: Influence of Human Invasion to Protected Areas**

8. Have you witnessed people from your village encroaching MMNR?

Yes [ ] No [ ]

9. If yes to what extent has the encroachment contributed to human wildlife conflict?

Very great extent [ ] great extent [ ] moderate extent [ ] little extent [ ] no extent [ ]

10. Kindly indicate your level of agreement on the listed statements on influence of Human invasion to protected areas on human wildlife conflict.

Key: 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree, 5-Strongly disagree

| **STATEMENTS** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Some community members vandalize KWS park fence | | | | | |
| People invade the park in search of firewood | | | | | |
| Some community members graze their livestock inside the park | | | | | |
| Unknown people carry out subsistence poaching of wildlife | | | | | |
| Some community members have been found and arrested inside the park for trespassing. | | | | | |
| Human activities such as livestock keeping, farming, fishing, | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| the establishment of roads and building, tourism or conservation measures changes wildlife habitats | | | | | |

**SECTION E: KWS Conservation Measures**

11. Has KWS developed some ways by which they control the movement of wild animals and the damages they cause in residence/farm?

Yes [ ] No [ ]

If yes kindly list some of the control measures?

_____

_____

_____

_____

12. The following are some approaches used to reverse human wildlife conflict in communities surrounding MMNR. Tick the extent to which you agree with each.

Key: 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree, 5-Strongly disagree

| Approaches used to reverse human wildlife conflict | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| KWS organize community awareness programs to sensitize them on importance of wildlife | | | | | |
| The government has enacted enough laws to curb national park encroachment. | | | | | |
| The Kenya Wildlife Service has established a fence as a boundary around the MMNR | | | | | |
| The Kenya Wildlife Service carry out frequent patrols to keep off invaders and poachers | | | | | |
| The Kenya Wildlife Service frequently carry out aerial surveillance to observe the park. | | | | | |
| KWS had developed lethal control programs to kill dangerous animals which stray to human habitation | | | | | |
| KWS has corporate social responsibility/community enterprise for the affected communities | | | | | |

13. The fine for encroaching protected areas is not more a hundred thousand shillings or a jail term not more than six months or both. What other fines do you think would discourage human invasion on parks?

……

……

**SECTION F: Indicators of Human Wildlife Conflict**

13. How frequently do you experience HWC in your community?

Daily [ ] Weekly [ ] Monthly [ ] Only during wildebeest migration [ ]

14. Kindly indicate your level of agreement on the listed statements on some of the losses you have incurred caused by Maasai Mara National Reserve wild animals.

Key: 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree, 5-Strongly disagree

| **Statements** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Dangerous wild animals have attacked and injured people in my community | | | | | |
| Herbivorous wild animals destroy crops in my community | | | | | |
| Some of my community members have been killed by wild animals | | | | | |
| Dangerous wild animals have killed livestock in my community | | | | | |

**THANK YOU FOR YOUR COOPERATION.**

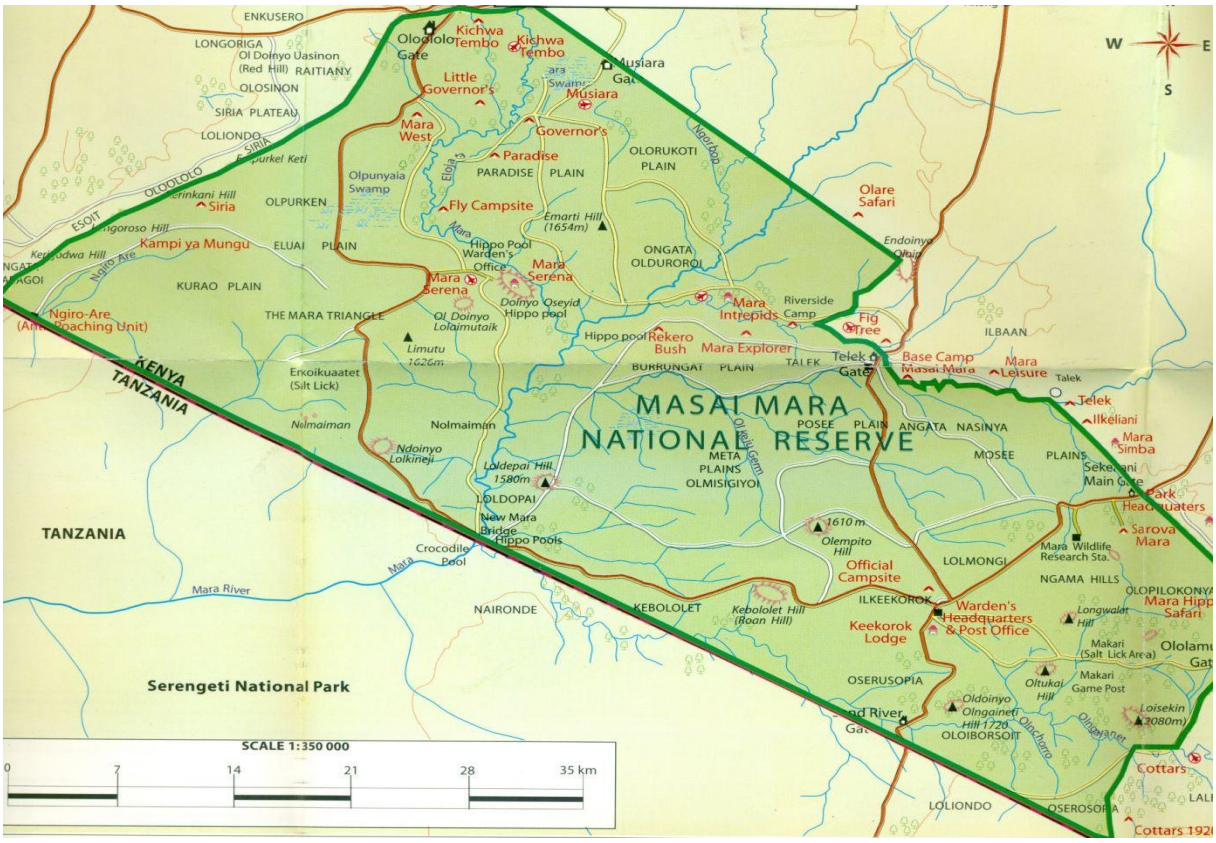
## APPENDIX III: Interview Schedule for KWS Officers

1. Gender
2. Age in years
3. How long have you worked at MMNR?
4. What is your highest level of training related to wildlife?
5. How does resources competition influence human wildlife conflict in communities surrounding MMNR?
6. How does human migration settlement increase influence human wildlife conflict in communities surrounding MMNR?
7. To what extent has human invasion to protected areas affected contributes to escalation of human wildlife conflict in communities surrounding MMNR?
8. What conservation measures have been adopted to curb human wildlife conflict in communities surrounding MMNR?
9. What measures do you think would reduce human wildlife conflict in communities surrounding MMNR?
10. Apart from jail term and penalties what do you think would also reduce human wildlife conflict?

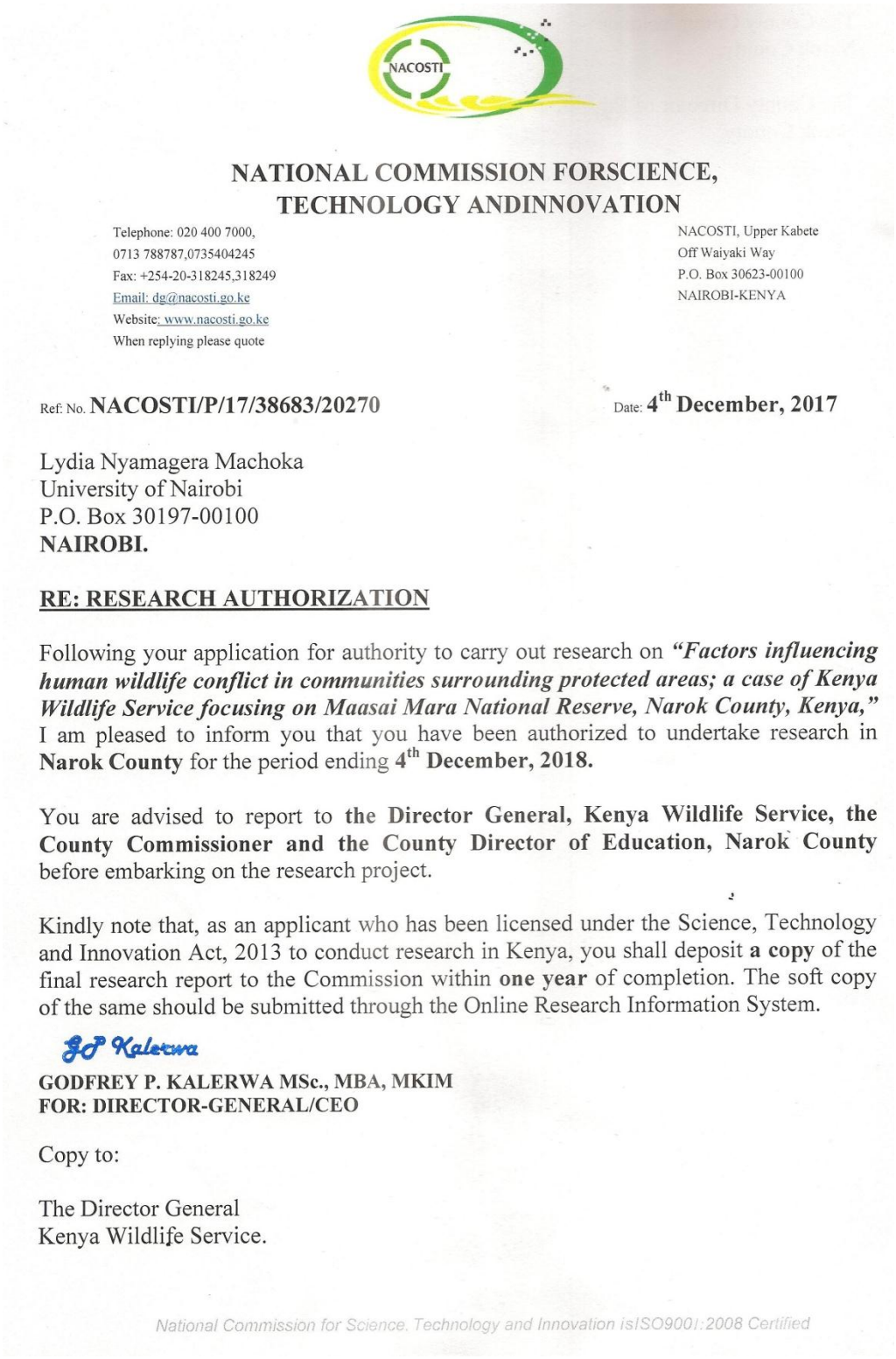
**THANK YOU FOR YOUR COOPERATION.**

## APPENDIX IV: MAP OF MAASAI MARA NATIONAL RESERVE AREA

Maasai Mara National Reserve is located at about 300 Km Northwest of the Kenyan capital, Nairobi in Narok South District, south rift valley on the north of Tanzania. Its exact location is at 10 31'and 10 45' South and between 34 25' East. MMNR covers an area of approximately 1510 km2. It lies at an average altitude of 2100 meters above the sea level in the high altitude area. The study area is surrounded by the Loita plains on the north, the Siria escarpment on the west and Loita hills on the east. The study area is bordered to the north by Koiyiaki, Lemek, Ol kinyei, north east Maji moto and North-West Kimintet ranges. To the east is Siani, Naikara and to the south east is Olderrkesi ranges. To the west the study area is bordered by Oloirieni and Kerinkani ranges (Researcher, 2017).



## APPENDIX V: AUTHORIZATION LETTER



**NATIONAL COMMISSION FORSCIENCE, TECHNOLOGY ANDINNOVATION**

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NAIROBI-KENYA

Ref: No. **NACOSTI/P/17/38683/20270** Date: **4th December, 2017**

Lydia Nyamagera Machoka
University of Nairobi
P.O. Box 30197-00100
**NAIROBI.**

**RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on ***"Factors influencing human wildlife conflict in communities surrounding protected areas; a case of Kenya Wildlife Service focusing on Maasai Mara National Reserve, Narok County, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Narok County** for the period ending **4th December, 2018.**

You are advised to report to **the Director General, Kenya Wildlife Service, the County Commissioner and the County Director of Education, Narok County** 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.

GP Kalerwa

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

Copy to:

The Director General
Kenya Wildlife Service.

National Commission for Science, Technology and Innovation isISO9001:2008 Certified

## APPENDIX VI: RESEARCH PERMIT

**Permit No : NACOSTI/P/17/38683/20270**
**Date Of Issue : 4th December,2017**
**Fee Recieved :USD 10**

GP Kaleewa

.....

***Director General***
***National Commission for Science,***
***Technology & Innovation***

### CONDITIONS

1. **The License is valid for the proposed research, research site specified period.**
2. **Both the Licence and any rights thereunder are non-transferable.**
3. **Upon request of the Commission, the Licensee shall submit a progress report.**
4. **The Licensee shall report to the County Director of Education and County Governor in the area of research before commencement of the research.**
5. **Excavation, filming and collection of specimens are subject to further permissions from relevant Government agencies.**
6. **This Licence does not give authority to transfer research materials.**
7. **The Licensee shall submit two (2) hard copies and upload a soft copy of their final report.**
8. **The Commission reserves the right to modify the conditions of this Licence including its cancellation without prior notice.**