# STATUS OF HUMAN WILDLIFE CONFLICTS IN VILLAGES ADJACENT TO MPANGA/KIPENGERE GAME RESERVE

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## CERTIFICATION

The undersigned certify that he has read and hereby recommend for acceptance by the University of Dodoma a dissertation entitled “Status of Human Wildlife Conflicts in villages adjacent to Mpanga/Kipengere Game Reserve” in partial fulfillment of the requirements for the Master of Science in Natural Resources Management of the University of Dodoma.

……..

Prof. Abiud L. Kaswamila

(Supervisor)

……

Date

## DECLARATION

## AND

## COPYRIGHT

I, **Allan William Mashalla,** declare that this dissertation is my own original work and has not been presented and will not be presented to any other University for a similar or any other award.

Signature……

Date……

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## DEDICATION

This dissertation is dedicated to my dear parents Mr. William J. Mashalla and Mrs. Mary S. Mashalla who laid down the foundation of my education which made me what I am today.

## ABSTRACT

Human wildlife conflicts is one of the major threats to wildlife conservation in Tanzania's wildlife protected areas. The study on status of Human Wildlife Conflicts (HWC) was conducted in three villages adjacent to Mpanga/Kipengere Game Reserve. The objectives of the study were to examine human wildlife conflicts, to assess impacts of human wildlife conflicts on local people's livelihoods and to identify mechanisms used by local people to mitigate these conflicts. Questionnaires and key informants interviews were used to collect data. The collected data were analyzed using descriptive statistics in form of crosstabs, percentages and frequencies of counts. Conflicts varied across villages and were mainly boundary conflicts between villages and Mpanga/Kipengere Game Reserve, crop raiding by wild animals and restriction to use game reserves natural resources due to by land scarcity for socio-economic activities. An analysis of gender conflicts associations varied. Major mitigation measures used currently are day and night crop guarding, digging trenches and informing game reserve officials. Several mitigation measures are suggested by both local communities, key informants and other experts. These include implementation of compensation schemes for destruction made by wildlife, sharing benefits from wildlife-related activities and boundary demarcation. The study concludes with a series of recommendations and proposing areas for further research.

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| FAO | Food and Agriculture Organization |
| GCA | Game Controlled Area |
| GDP | Gross Domestic Product |
| GMP | General Management Plan |
| GN | Government Notice |
| GR | Game Reserve |
| HWC | Human Wildlife Conflicts |
| IUCN | International Union for Conservation of Nature |
| MDG | Millennium Development Goals |
| MNRT | Ministry of Natural Resources and Tourism |
| MPKGR | Mpanga Kipengere Game Reserve |
| NCA | Ngorongoro Conservation Area |
| NP | National Park |
| PACU | Problem Animal Control Unit |
| TANAPA | Tanzania National Parks |
| UMEMARUWA | Uhifadhi na Matumizi Endelevu ya Maliasili Rujewa na Wanging'ombe |
| UN | United Nations |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment Programme |
| VEO | Village Executive Officer |
| VGS | Village Game Scout |

| | |
|---|---|
| WCS | Wildlife Conservation Society |
| WD | Wildlife Division |
| WMA | Wildlife Management Area |
| WWF | World Wildlife Fund for Nature |

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background of the Problem

Over 5% of our planet's land surface has been allocated for conservation purposes, in virtually all countries (Jonathan, 2011). The management of protected areas has been based on the idea that the protected areas are of primary importance to a nation and they must be protected and shielded from people living adjacent to them (Sarker, 2010). This is often achieved through the strict enforcement of rules to prevent illegal activities. Attempts to protect forest reserves and wildlife reserves through exclusion have often led to local people developing hostile attitudes towards forests and wildlife. In some cases open conflicts have occurred which resulted into losses of life and property (Coser, 2010).

Conflicts between wildlife and people, particularly those who share the immediate boundaries with protected areas, are common phenomenon all over the world (Shemweta and Kidegesho, 2005), and are a major conservation problem which conservation organizations all over the world are dealing with (Antoine *et al.,* 2012). Human–Wildlife conflict situations often have a long history of competition between man and wildlife from time immemorial in various parts of the world (Coser, 2002). These conflicts usually occur when wildlife requirements overlap with those of human populations, creating costs to residents and wild animals (Dickman, 2010). Interaction with wildlife occurs in both urban and rural areas, but it is generally more common inside and around protected areas, where wildlife population density is higher and domestic animals often

stray into adjacent cultivated fields or grazing areas. According to Jones *et al* (2009), globally, protected areas are sometimes instrumental in fueling social conflicts between groups. Simply put, conservation of wildlife has been a source of conflict in many parts of the world (Shemweta and Kidegesho, 2005).

In many countries of Sub-Saharan Africa, conflict arises from a range of direct and indirect negative interactions between humans and wildlife. These can culminate in potential harm to all involved, and lead to negative human attitudes, with a decrease in human appreciation of wildlife and potentially severe detrimental effects for conservation (Nyhus *et al*., 2000). Conflict generally arises from economic losses to agriculture, including loss of cattle through predation and destruction of crops. In arid areas it often occurs over access to water and competition for resources. A wide range of species are responsible for conflict, with the principal culprits being primates, rodents, ungulates, lions, leopards and hyenas (Larmaque *et al.*, 2009).

Tanzania devoted more than quarter of her land for wildlife protected areas (MNRT, 2010). Their coverage with percentages in brackets are as follows; Ngorongoro Conservation Area (1%), National Parks (6 %), Game Reserves (14%), Game Controlled Areas (6 %), Wildlife Management Areas (5 %), Open Areas (2%) and other land areas which are jointly managed with Forest Division (MNRT, 2010). Most of these protected areas face the challenges of human wildlife conflicts which call for the attention of researchers and other stakeholders in order to rescue the situation (Jonathan, 2011).

## 1.2 Statement of the problem

In Tanzania the contribution of wildlife sector to Gross Domestic Product (GDP) is more than 5% (MNRT, 2007). Despite the significant contribution realized from wildlife protected areas, human wildlife conflicts is a problem to both conservation and to the socio-economic status of the adjacent communities bordering the protected areas (MNRT, 2007). These conflicts are manifested in National Parks, Game Reserves and other protected areas and have been affecting wildlife conservation and local people's wellbeing (Gereta *et al.,* 2010; Nyahongo and Roskaft, 2010). Mpanga/Kipengere Game Reserve is one of the wildlife protected areas in Tanzania which was upgraded in 2002 from an open area with the goal of maintaining the catchment function of the area and sustainably managing natural resources found in and around it. Before being upgraded, the area had people living and farming in it for many years (GMP, 2004). After eviction, people were compensated for their losses. However vast illegal activities within the reserve seem to be increasing over years (Melamari, 2005). On the other hand, communities living adjacent to the game reserve suffer from wildlife induced effects resulting to the prevailing human wildlife conflicts (Frontier, 2009)

Currently, scanty information exist on the situation of these conflicts in such a way that they cause significant threats to ecosystem viability, large mammal populations, people's security and livelihoods (Swai, 2004; Staddon & Bracebridge, 2009). Despite the problems mentioned above, little is known about the extent of these problems in the study area. Therefore, the proposed study is an attempt to reach to that end.

## 1.3 Objectives of the Study

### 1.3.1 General Objective

To assess the status of human wildlife conflicts in villages adjacent to Mpanga/Kipengere Game Reserve.

### 1.3.2 Specific objectives

i. To identify types human wildlife conflicts.

ii. To assess impacts of human wildlife conflicts on local people's livelihoods.

iii. To identify the mechanisms used by local people to mitigate these conflicts.

## 1.4 Research Questions

1. What are the conflicts caused by Wild animals to Local people in the study area?
2. What are the impacts of HWC's in the study area?
3. What mechanisms are used to manage HWC's in the study area?

## 1.5 Significance of the Study

This study will contribute to awareness of Human Wildlife Conflicts in wildlife protected areas in Tanzania, and paves the way for further investigation of HWC's in the game reserves. This is because; the findings of this study show the general overview of existing HWC's between the reserve and its adjacent communities i.e. types and impacts of HWC's. Moreover, the output of this study can be used as a working tool for Game reserve administration in their day to day activities through suggesting the better mitigation measures which can be used as the solutions for sustainability of people's livelihoods and wildlife conservation.

## 1.6 Scope of the study

The study focused on HWC's and their impacts to both local communities and Mpanga/Kipengere Game Reserve. The study was carried out among locals in Igomelo, Igando and Luduga villages in Mbarali and Wanging'ombe districts. This study investigated wildlife induced effects to communities adjacent to MPKGR and impacts of human wildlife conflicts in the study area. Again the study identified the mitigation measures used by local communities to mitigate HWC's.

## 1.7 Organization of the Dissertation

This dissertation is organized into Chapter format. Chapter two of this dissertation presents literature review; it reviews works done by different scholars on HWC's Globally, Regionally and Locally. Chapter three presents research methodology, which provides detailed explanation on methods and materials which were used to collect, analyze and present data. Chapter four presents findings of the study based on responses provided by respondents and discussion of the findings. The last chapter of this dissertation is chapter five which presents conclusion and recommendations.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 History of human-wildlife conflict

Fossil records show that the first hominids fell prey to the animals with which they shared their habitats and shelters. Forensic evidence has recently demonstrated that the "Taung skull", perhaps the most famous hominid fossil, which was discovered in South Africa in 1924, belonged to a child who was killed by an eagle two million years ago (Berger, 2006). Crocodiles have an ancient lineage dating back to the Mesozoic era, and have remained functionally unchanged for longer than the human species has been in existence. It is likely that crocodiles have attacked and eaten humans and their predecessors in Africa over the last four million years. Egyptian historical records reveal that in 2000 BC, hippopotamuses in the Nile delta in Egypt fed on cultivated crops while crocodiles ate livestock and occasionally humans.

Human-elephant conflict is as old as agriculture in Africa. San or Bushman rock art in Africa frequently portrays people fleeing from predators or other large animals. Pre-colonial and early nineteenth century historians describe areas in Africa and other parts of the world where elephants invaded human cultivations, causing food shortages and leading to the displacement of settlements. Some authors blame colonialism for ruining traditionally harmonious relations between wildlife and local people (Lamarque, *et al.*, 2009).

In actual fact, from the eighteenth to the mid-twentieth centuries, the larger African mammals were regarded more as a resource to be exploited than a major threat. Ivory formed a cornerstone of the early trade with Europe and the Orient, while meat and hides were essential products both for the African people and colonialists alike. In the twentieth century, with the expansion and development of modern agriculture, exploitation diminished and interaction with large wildlife species came to be increasingly dominated by conflict.

### 2.2 Magnitude of HWC Worldwide

In the northern United States, bears raid dustbins in the national parks and even at the edge of towns, waking up residents and creating disorder in the streets. Deer collisions with automobiles in the United States injure an average of 29,000 people annually and cause more than US$1 billion in damages (Berger, 2006). In Alberta, Canada, over a period of 14 years (1982–1996) wolves killed 2,806 domestic animals, mainly cattle but also some dogs, horses, sheep, chickens, bison, goats, geese and turkeys. In Idaho, Montana and Wyoming in the United States, wolves killed 728 animals, mainly sheep and cattle, over a similar time period (1987–2001) (IUCN, 2005).

Several wildlife species are responsible for causing substantial damage both to crops (wild boar, wild rabbit, hare, wood pigeon) and to regenerating forests (red deer, roe deer). For this reason, some of these species are labeled as “pests” and can be killed outside of the hunting season. The monetary losses can be high. In France in 2007, damage caused by wild boar and deer to agricultural crops amounted to € 22 million to € 23 million (McNeely *et al.,* 2011). Large predators such as bears, wolves or lynx are

regularly responsible for attacks on sheep or even cattle. In Slovenia, damage caused by large predators has increased since 1993. In the period 2000–2003, 1,440 claims were made for predation damage, mostly to livestock. The compensation for damage exceeded € 706,000 (McNeely et al., 2011). In the United Kingdom, badgers are known to spread bovine tuberculosis to dairy cattle (Berger *et al.*, 2006).

Large feline predators (tigers, leopards, lions and snow leopards) and elephants are the principal sources of conflict in Asia. In India, in the state of Himachal Pradesh, near the Kibber Wildlife Sanctuary, wild carnivores mainly snow leopards killed 18 percent of the total livestock holdings in 1995 (Sarker, 2010). In the state of Gujarat, near the Gir National Park and Sanctuary, the Asian lion and leopard hunt prey such as buffalo, cattle, pigs and dogs (IUCN, 2005). In China, the rural inhabitants of the mountain area of Simao, near the Xishuang Banna Nature Reserve, claimed that elephant damage reduced the community's annual income in 2000 by 28 to 48 percent, and that the total economic losses between 1996 and 1999 amounted to US$ 314,600 (Hart, 2008).

Moreover, human-wildlife conflict is more intensive in developing countries where livestock holdings and agriculture are important parts of rural people livelihoods and income (Kaswamila, 2009). In these areas, competition between local communities and wild animals for the use of natural resources is particularly intense and direct. As a result, resident human populations or wildlife is vulnerable (Kidegesho and Shemweta, 2005). Species most exposed to conflict are also shown to be more prone to extinction (Kagiri, 2010), because of injury and death caused by humans; these can be either

accidental, such as road traffic and railways accidents, capture in snares set for other species or from falling into farm wells, or intentional, caused by retaliatory shooting, poisoning or capture (Dickman, 2010).

Parker, (2007) and Hart, (2008) argue that one major source of conflict between wildlife and farmers in Nigeria is crop raiding. Crop raiding by wildlife is neither a new phenomenon nor a rare one. Until recently, there has been little attention given to vertebrates' species that damage crops with the exception of elephants and rodents (Parker, 2007). Local Masai pastoralist deliberately converted the traditional calving grounds of wildebeest to wheat farms in southern Kenya to reduce the contact between their livestock and the wildebeest, which carry this malignant disease (Woodroffe *et al*, 2007).

In communities with little subsistence economy even small losses can be an economic importance and can generate negative attitudes towards wildlife and conservation in general (Kaswamila, 2009). According to Nahonyo (2001), crop raiding by wild animals is one of the major causes of human wildlife conflict which involves wild animals moving from their natural habitat on to agricultural land to feed on the produce that humans grow for their own consumption. Kidegesho and Shemweta (2005) studied the human-wildlife interface in Western Serengeti, Tanzania. They found out that protected areas which neighbor agricultural areas may be sources of existing rodent invasion into farmlands and houses. Many of the rodent species which are among the most serious crop pests across sub-Saharan Africa are also very anthropogenic and live mainly in

man-made structures, such as houses and stores. These species cause considerable damage to crops and property, and spread diseases. According to a study by Jonathan (2011), 60% of Tanzanian farmers rated pests as their main economic problem. Similarly, Nyahongo and Roskaft (2010) described how the presence of wildebeests caused problems for cattle herders because this animal spreads malignant catarrhal fever which is fatal to livestock in northern Tanzania.

### 2.3 Impacts of wildlife to humans

Wildlife conservation is accused for, marginalizing people, denying people access to traditional and legitimate rights, property damage and risk to human life through attack by wild animals and disease transmission (Sarker, 2010). These impacts are expounded more as follows:

#### 2.3.1 Crop raiding

Crop raiding is a cause of much conflict between farmers and wildlife throughout the world and the most prevalent form of human-wildlife conflict across the African continent (Kaswamila, 2009). In Africa the great dependence of a large proportion of the human population for their survival on the land, coupled with the presence of many species of large mammal leads to many sources of conflict between people and wildlife. This in turn creates increasing friction between protected area managers, and local communities living in the regions that border these protected areas (FAO, 2005). The occurrence and frequency of crop-raiding is dependent upon a multitude of conditions such as the availability, variability and type of food sources in the area, the level of human activity on a farm, and the type and maturation time of crops as compared to

natural food sources. A wide variety of vertebrates' conflict with farming activities in Africa, these include birds, rodents, primates, antelopes, buffalos, hippopotamuses, bush pigs and elephants. While it is widely recognized that in most cases elephants do not inflict the most damage to subsistence agriculture, they are generally identified as the greatest threat to African farmers (Parker *et al.*, 2007).

Elephants can destroy a field in a single night raid. Most peasant farmers are unable to deal with the problem of elephant damage themselves and governments rarely offer any compensation. In most cases the adult male elephants carry out crop-raiding, while the female herds prefer to keep away from areas inhabited by humans. It is worth noting that during dry seasons elephants can also break into storage bins and steal grain (Sarker, 2010). When they do so the consequences for food security are even more serious. Hippopotamuses can cause substantial damage to fields while feeding at night. Cultivations at risk are those close to rivers or lakes such as rice, vegetables and other crops grown on river banks during a drop in the water level, or crops grown directly in the water. Primates cause widespread damage to plantations of exotic trees by stripping away bark. Baboons and vervet monkeys are also highly skilled at raiding food crops. They will even chew on young tobacco or wheat stems to extract the juice and then spit out the fiber, in the same way that humans chew on sugar cane (Dickman, 2010).

### 2.3.2 Predation on livestock

Another adverse effect of the human-wildlife conflict is the killing of domestic animals by predators. The number and type of domestic animals killed by wildlife varies

according to the species, the time of year, and the availability of natural prey. In the savannah and grasslands where pastoralism remains the main source of livelihood for many people, attacks on livestock are an issue (Kaswamila, 2009). On a national level the losses are hardly significant, but for the individual stock owner, they can be catastrophic. For a small-scale herder, losses to wildlife can mean the difference between economic independence and dire poverty. Large carnivores are the principal culprits, Parker *et al*., (2007), for example, analyzed 312 attacks claiming 433 heads of livestock over a four-year period on two neighboring arid-land ranches adjoining Tsavo East National Park in Kenya. Lions were responsible for 86 percent of the attacks while the rest were carried out by hyenas and cheetahs. Lions and hyenas attacked mainly cattle and at night, whereas cheetahs nearly always took smaller sheep and goats. Some other smaller carnivores are also responsible for attacks on livestock.

Of the three species of crocodiles in Sub-Saharan Africa, the Nile crocodile is the most common, and the main culprit in attacks on livestock. This large species (with a mass of up to 1,000 kg) lives off aquatic and terrestrial prey species. In the Jukumu Wildlife Management Area in the United Republic of Tanzania, for example, 53 cows were killed and 41 injured by crocodiles in a single year (Sifuna, 2011). Lion predation on livestock is responsible for direct losses in animals killed and for indirect economic losses such as reduced breeding because of stress when herds are attacked. Although the proportion of stock killed may seem small, the economic impact is often severe, especially for poor communities. The rate of lion attacks on livestock depends on circumstances such as the type of domestic animal and the herd size in relation to the socioeconomic situation of the owner (FAO, 2005).

### 2.3.3 Transmission of diseases

Serious diseases are known to be transmitted by wildlife to domestic livestock and possibly also to humans (i.e. rabies). Scavengers and predators, such as spotted hyenas, jackals, lions and vultures, also play a role in disseminating pathogens by opening up, dismembering and dispersing parts of infected carcasses. For example, predators ingest anthrax spores together with carcass tissue; the spores are then widely disseminated in the predators' faeces (Sarker, 2010). The key role played by the African buffalo as maintenance host of foot-and mouth disease was identified in the late 1960's. It is now generally accepted that the parasite *Theileria parva parva* is a cattle adapted variant of *Theileria parva lawrenci* borne by buffalo. Infection with this organism, which is generally silent in buffalo, causes high mortality rates in cattle (Bengis *et al.*, 2002). Cattle farming are therefore risky where buffaloes as a suitable vector are present. In the Gaza Province of Mozambique, 228 cows, of which 76 were pedigree Brahmans died from theileriosis as a result of contracting the disease from buffalo (Larmaque *et al.*, 2009).

In many places of Tanzania diseases transmission is not a major problem major problem. This could be attributed to the fact that the grazing system practiced by the local people around protected areas is zero grazing where the fodder and water is supplied inside the house. This therefore limits the overlap in resource use between the livestock and wild animals (Nyahongo and Roskaft, 2010). However, disease transmission is a major problem in areas where pastoralism and agro pastoralism are practiced. For example Selela, a wildlife corridor which connects Ngorongoro Conservation Area and Lake

Manyara National park is a major concern to people who complain of disease transmission (Kidegesho and Shemweta, 2005).

### 2.3.4 Human deaths and injuries

Human deaths and injuries, although less common than crop damage, are the most severe manifestations of human-wildlife conflict (Sanginga, 2012). The hippopotamus was long considered to be responsible for more deaths than any other large animal in Africa. Large mammalian carnivores are responsible for numerous fatal attacks on humans, and large herbivores, such as elephants, are also involved in human deaths every year, albeit more rarely (Dickman, 2010). Elephants and hippopotamuses will rarely deliberately attack humans; in most cases deaths occur while people are protecting their crops against raiding animals (usually at night); when people accidentally come into close contact with the animals, especially on paths near water at night; or when people encounter injured animals whose normal sense of caution is impaired (Parker, 2007). Baboons are seldom, if ever, dangerous to humans, though they are capable of inflicting serious wounds to dogs. But they will intimidate humans especially women in urban areas, when scavenging for food (Jonathan, 2011).

### 2.3.5 Road accidents

Road accidents caused by wildlife can result in human death and injury. This phenomenon, well known in Europe and the United States (Parker, 2007), is also a serious problem in Namibia where vehicle collisions with greater kudus are responsible for more human deaths than attacks by both crocodiles and elephants (IUCN, 2005).

### 2.3.6 Socio-economic costs

There are other socio-economic costs associated with human-wildlife conflict which can outweigh the direct costs of agricultural damage and be a major component of the conflict as perceived by local people (Coser, 2010). The examples includes, restrictions on movement, competition for water sources, the need to guard property (which may lead to loss of sleep), reduced school attendance (through loss of sleep, or fear of travel), poor employment opportunities, increased exposure to malaria, and psychological stress (Balmiford *et al.,* 2001; Williams *et al.,* 2001). Others socio-economic costs are caused by poor implementation of land use plans in protected areas bionetworks (Kaswamila and Songorwa, 2009)

## 2.4 Impacts of human to wildlife conservation

Human wildlife conflicts also have severe repercussion on wildlife conservation. These consequences fall into short term, midterm and long term. Short term consequences are basically related to conservation of individual wild animal. This occurs when an individual animal is hunted and ultimately killed for retaliation of killing or injury to livestock or human being. This form of retaliation is indiscriminate since it is not always possible to identify the actual animal which was involved in causing injury or death (Dickman, 2010). Midterm consequences are concerned with the conservation of species. It is feared that some species which are considered as problem animals or a threat may undergo extinction. According to Nyhus (2000) wildlife managers and land owners retaliate by deliberately killing species considered to be threat. The methods they use range from various types of snares, traps, shooting as well as poisons.

Long term consequences are concerned with unexpected alteration of ecosystem functioning. The removals of some species from ecosystem always disturb the state of equilibrium which ensures existence of habitat for the survival of wild animals inhabiting a particular habitat. For instance removal of large carnivores and large herbivores can result into proliferation of small and medium carnivores and a deep change in local vegetation and landscape. All these may result into a dramatic change of wild population (Lamarque *et al*., 2009). The overall consequence of human wildlife conflict therefore is that of posing a great challenge to conservationist in order to ensure sustainable wildlife conservation (McNeely, 2011).Without addressing these consequences it is not possible to attain sustainable conservation of natural resources and may result into some species undergoing extinction often with greater consequence to mankind who depends on wild flora and fauna (Dickman, 2010; Antoine *et al.,* 2012).

### 2.5 Human Wildlife Conflicts Mitigation Measures

Human-wildlife conflict can be managed through a variety of approaches. Prevention strategies endeavor to avoid the conflict occurring in the first place and take action towards addressing its root causes. Protection strategies are implemented when the conflict is certain to happen or has already occurred. Mitigation strategies attempt to reduce the level of impact and lessen the problem (Sanginga *et al.*, 2012). The main difference between the options is the moment at which the measure is implemented (IUCN, 2005). By definition management techniques are only cost-effective if the cost of implementing the technique is less than the value of the damage, taking into account the fact that a short period of active management may have a continued effect, by instating longer-term protection of crops or herds (Nahonyo, 2001). The various

management possibilities are presented according to the characteristics of conflict (whether they relate to humans, production, animals and the environment), rather than according to their ability to prevent or mitigate damage. These includes, Traditional methods, Disturbance methods, Killing animals, Translocation, Repellent methods, Physical barriers, Compensation schemes, Wildlife utilization schemes and Land use planning (Gereta *et al.,* 2010; Sifuna, 2011).

### 2.6 Knowledge Gap

Conflicts between wildlife and people, particularly those who share the immediate boundaries with protected areas, are common phenomenon all over the world (Dickman, 2010). These conflicts are a major conservation problem which conservation organizations in Africa and all over the world are dealing with (Coser, 2010). However, in Tanzania, particularly in Mpanga Kipengere Game Reserve little is known on Human wildlife conflicts (Stadddon and Bracebridge, 2009). Having this information/knowledge gap, this study was therefore undertaken to assess the Human Wildlife Conflicts in three villages adjacent to Mpanga/Kipengere Game Reserve.

### 2.7 Conceptual Framework

Conceptual framework tries to show the relationship between different variables as used in the study. It forms the key part of the research as an overview of ideas or concepts organized in a manner that makes them easy to communicate to others (Engestrom, 2001).

Demographic and social changes place more people in direct contact with wildlife: as human populations grow, settlements expand into and around protected areas as well as

in urban and sub-urban areas. Human population growth led to encroachment into wildlife habitats. Therefore, direct competition between wildlife and local communities result to loss of people's lives. Land use transformation is very much associated with the previous one, as the transformation of forests, savannah and other ecosystems into agrarian areas or urban agglomerates is a consequence of the increasing demand for land for food production, energy and raw materials hence results into boundary disputes.

Moreover, growing densities in livestock populations can create an overlap of diets and forage competition with wild herbivores, resulting in overgrazing, livestock depredation and decline or local extinction in wild herbivore populations.

Furthermore, the successful wildlife protection and conservation programmes with poor implementation of wildlife policy fuels conflicts between local people and protected areas. As people suffer from crop raiding done by wildlife without compensation and or benefiting from wildlife they end up doing illegal activities such as bush meat hunting and charcoal burning.

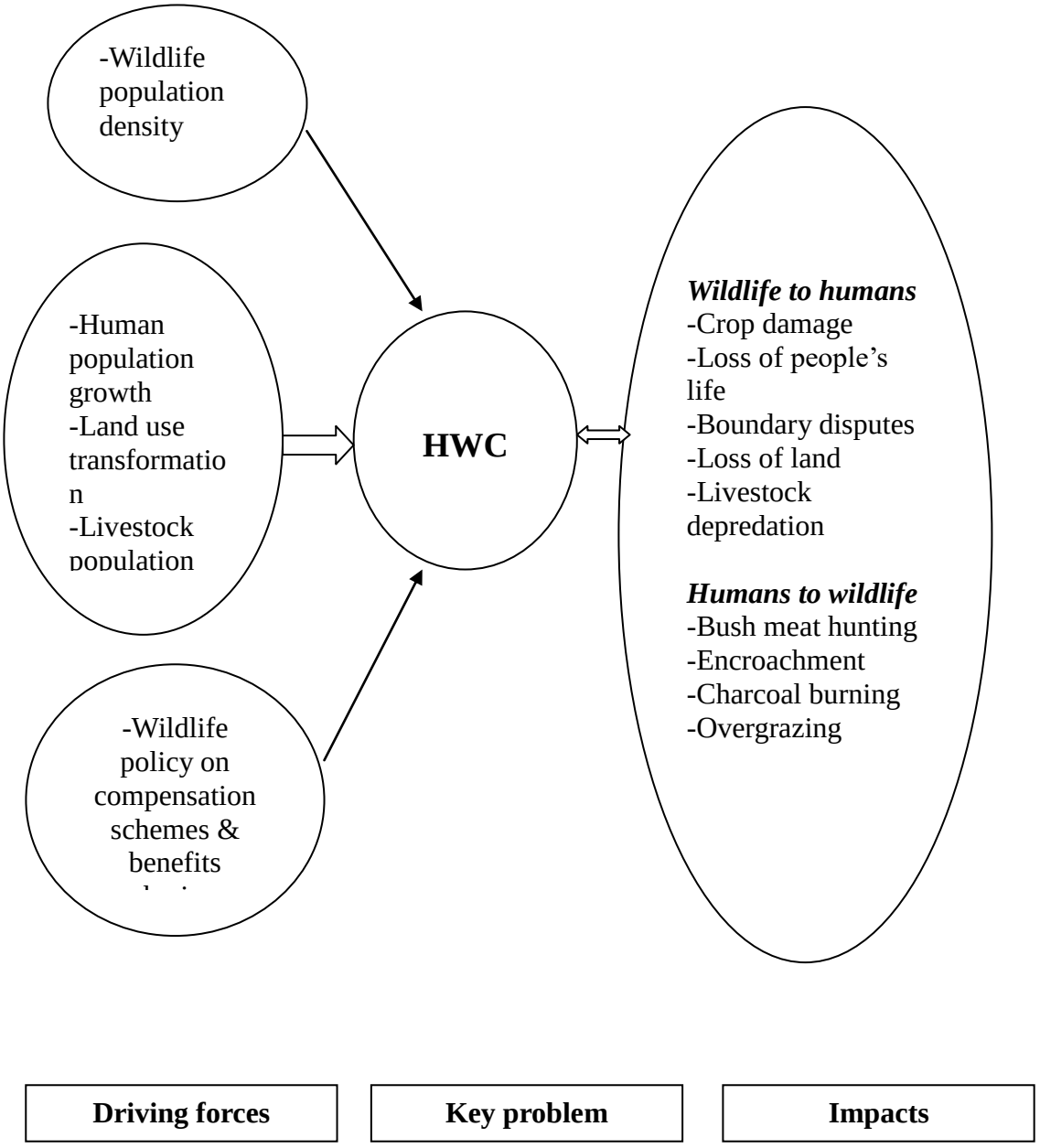


Figure 1: The Conceptual framework

# CHAPTER THREE

## RESEARCH METHODOLOGY

This chapter describes a combination of different techniques and methods that were applied in data collection. It is organized under the following major sections; Background of the study area, Research design, Target population, Sampling and sample size, Data collection methods and techniques, Data analysis, Data validity and reliability.

### 3.1 Study area

#### 3.1.1 Selection of the study area

This study was conducted in three villages which are adjacent to Mpanga/Kipengere Game reserve. This game reserve was selected over other game reserves in the country because of three reasons. First, HWC between the protected area and its adjacent villages have been increasing over time since its establishment in 2002 (Frontier, 2009). Second, it comprises an important wildlife corridor namely Igando-Igawa which link it with Ruaha National Parks (Jones *et al*, 2009). Third the reserve comprises large number water catchments which are under threat due to illegal activities such as encroachment, charcoal burning done by local communities (Melamari, 2005). Three villages adjacent to MPKGR namely Igomelo, Igando and Luduga were selected due to their proximity to the game reserve and high intensity of human wildlife conflicts.

### 3.1.2 Description of the study area

Mpanga/Kipengere Game Reserve covers a total area of 1,574.25 $km^2$. It was gazetted as a new Game Reserve under Government Notice (GN) 483 of 23rd October, 2002. The Reserve is located between latitude $8^o$ 50', and $9^o$ 10', S and longitudes $34^o$ 00', and $34^o$ 30', E (GMP, 2004). The Game Reserve partly lies in Wanging'ombe and partly in Makete Districts in Njombe Region and also borders Mbarali District (Mbeya region) in its northern border.

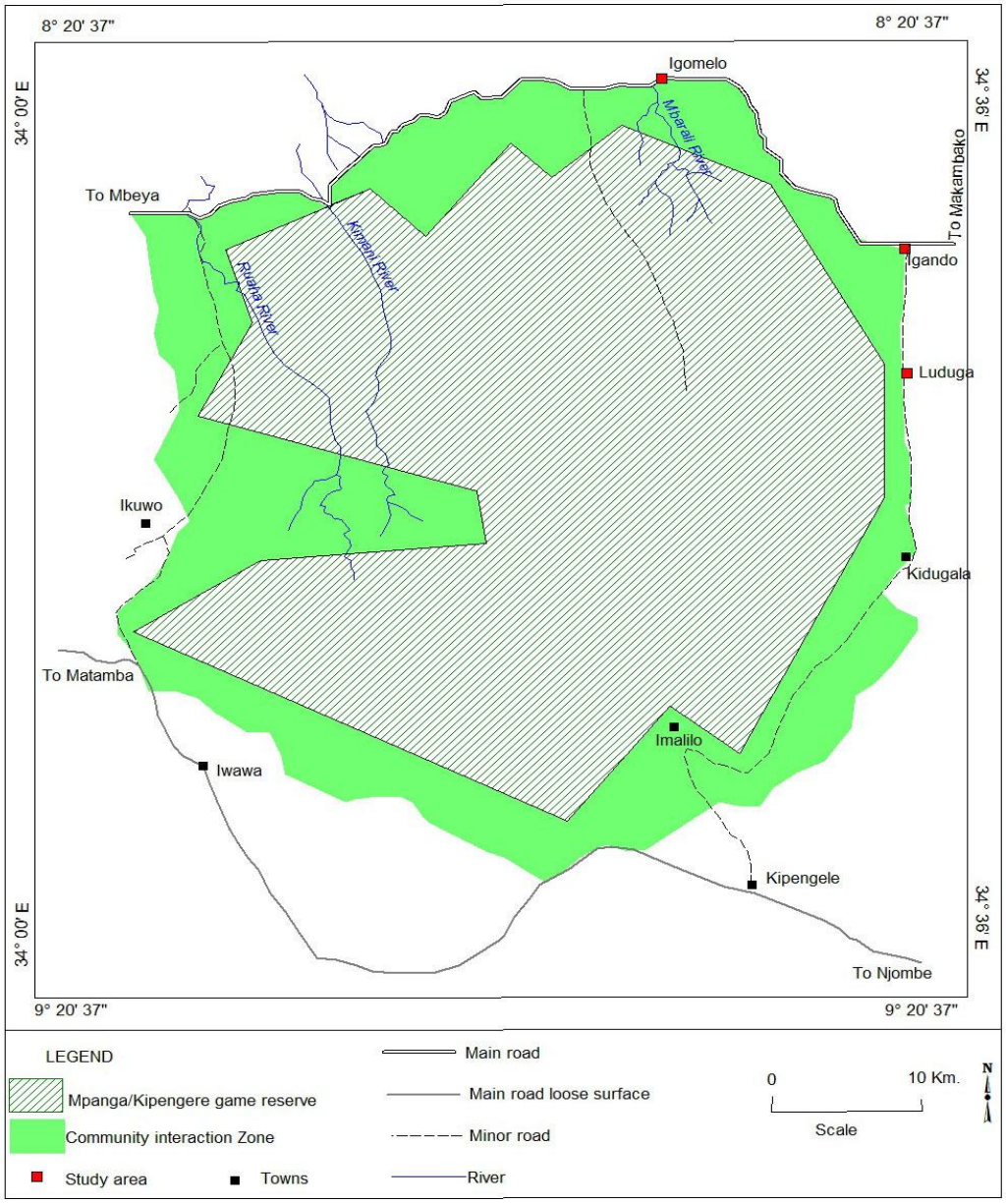


**Figure 2: The study area**

### 3.1.3 Climate

The average annual rainfall of the area ranges between 594 and 846 mm. Rainfall in the area is usually recorded highest between October and May every year. Unlike in the

north where there are two seasons (short and long), the rainfall season in the southern highlands is one similar to western Tanzania. On average, the months of December and January usually record the highest rainfall even though it is not consistent every year. The mean monthly maximum temperature ranges from $16^0$ C to $18^0$ C (GMP, 2004).

### 3.1.4 Relief and Topography

Mpanga/Kipengere Game Reserve consists of lowland, medium and high altitude areas ranging between 1,080 and 2,858 meters above sea level in the south of the Kipengere ranges. The highlands form a great arc of high ground from 1,300-3,000 m, where the Kipengere Ranges border Kitulo Plateau to the west above 2,400 m and fall gradually to the east around Kidugala. The Kipengere Ranges are interrupted by a series of fault valleys and rolling hills in the central Mpanga.

### 3.1.5 Drainage and Hydrology

Three major rivers start and traverse in this reserve, namely the Ruaha, Kimani and Mbarali. Between the Ruaha River and the Kimani River flood plains there are the Lugala Mountains. Some of the tributaries of these main rivers contribute quite significantly to the permanent flows to downstream users all year round. The Mbarali River partly starts and traverses on the eastern and northern parts of the reserve, both rivers are catchments for the Great Ruaha River. The main catchment area for the Great Ruaha River is the Kipengere ranges in the south from which several rivers originate and flow down to the Usangu Plains, then into the Utengule or Ihefu swamps. Out of the Ihefu swamps flows the Great Ruaha River which then flows through the Ruaha National Park, and the Mtera and Kidatu Dams and the Kilombero Sugarcane estates

before joining the Kilombero River after which forms the Rufiji River further down in the east (GMP, 2004).

### 3.1.6 Geology

The geology of the reserve consists of rocks that belong to the *Ubendan*, *Ukingan*, *Buanji* systems and volcanic in the west, whereas in the east it consists of rocks belonging to *Ubena granitods*. Scientists who worked in the area sub-divided the *Ukingan* rocks into three formations including the Kipengere formations, *Matwaki quartzites* and *Ilolo* formations. The *Buanji* rocks occupy a large portion of the area and *Buanji* sediments are found in the Kipengere ranges (GMP, 2004).

### 3.1.7 Vegetation

The Mpanga/Kipengere Game Reserve has principally three vegetation communities. These are; (a) Tall montane forest trees; The tall layer (20-40 m) includes *Podocarpus gracilis*, *Polyscias fulva*, and *Pouteria adolfi-friedericii*, *Hagenia abyssinica*, *Rapanea melanophloeus* and *Juniperus procera*, all of which are timber trees bringing income to national economy (except *Polyscias fulva*), (b) Grassland; Short, tussock grasses and tuberous forbs dominate this vegetation, which remain dormant during the cold season, and are the richest floristically (c) Miombo woodland; This community occupies the greater area of the game reserve. Dominant species are *Brachystegia microphylla* and *Julbernardia globiflora* (GMP, 2004). The dominance of *Brachystegia microphylla* in association with *Julbernardia globiflora* indicates selective overharvesting of *Brachystegia spiciformis*, which is normally most dominant with *Brachystegia boehmii* elsewhere in miombo woodlands. The latter group is uncommon in the study area

although some individuals are very sparsely distributed. Exclusive dominance of *Brachystegia microphylla* is also noticeable in many patches (Frontier, 2009).

### 3.1.8 Land uses and Socio-economic activities

Agriculture is the main land use in the study area and hence farming is the main economic activity in villages surrounding Mpanga/Kipengere game reserve (Staddon & Bracebridge, 2009). Farming is practiced by more than 90% of the population. Other activities include and livestock keeping are fishing, mining and other small businesses. The poverty level in these villages is high as the per capita income is estimated at US$ 350 per annum (Staddon & Bracebridge, 2009). Crops grown in the area are mainly maize, onions and groundnuts sunflower, sweet potatoes cassava. Currently the crop production level is low mainly due to climatic conditions (Frontier, 2009).

### 3.1.9 Wildlife Resources

The vegetation zones of MPKGR harbors a great variety of small to mega fauna including rodents, primates, mammals, birds, reptile, amphibians and fish. Unfortunately, there have been no detailed studies or surveys on the wildlife resources of Mpanga/Kipengere Game Reserve (GMP, 2004). The final report of Frontier Tanzania (2009), shows that the reserve has more than 17 species of wild animals; that include the elephant, buffalo, greater kudu, warthog, bush pig, bushbuck, common duiker, leopard, civet, wildcat, yellow baboon, pied black and white colobus monkey, vervet monkey, bush baby, hyenas and mongoose. Most of the large mammals migrate to and from Usangu Game Reserve (Currently annexed to Ruaha National Park) using a small corridor called Igando-Igawa, that lies on the northern side of the reserve (GMP, 2004).

The populations of most of these mammals are either restricted to certain areas where suitable habitat exists or some are too scanty or rare that it is difficult for them to be seen. Also the area is rich in both resident and migratory birds. It is estimated that there are more than 150 species of birds in the reserve representing 48 families, one was endemic to Tanzania; 6 were range restricted and 3 were globally threatened species (GMP, 2004).

### 3.2 Research Design

According to Kothari (2004) research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. Kothari further argues that the research design is in fact, the conceptual structure within which research is conducted; it constitutes the blueprint for collection, measurement and analysis of data. This research used the cross sectional design. This design was adopted during data collection because it helps to collect data from a large number of respondents within short period of time. Moreover, with cross sectional design, data are collected once (saves both time and costs) with the assumption that data will not change (Kothari, 2004).

### 3.3 Target population

The target population for this study included households from three selected villages adjacent to Mpanga/Kipengere Game reserve and key informants which included Village executive officers, Natural resources committee members and Game officers.

### 3.4 Sampling

#### 3.4.1 Sampling and Sample size

Households were sampled from household village register list using a systematic random sampling method. Systematic random sampling involved selecting the sample at regular intervals from sampling frame that is from every $K^{th}$ observation from a random order target population (Kothari, 2004). Systematic random sampling was chosen over other sampling techniques because of higher degree of representativeness of the sample, sample is spread evenly over the population, less tedious, more time saving and cost saving (Krishnaswami, 2003). Purposive sampling method was also used to select key informants. The researcher chose the sample based on who would be appropriate for the study. This technique was primarily used to limited number of people that had expertise, experience and involved in HWC in their working areas.

#### 3.4.2 Sample size

The sample size for the households was 30 people in each village. This sample was thought to be appropriate because it represent the population on the study area. Saunders *et al*., (2004) argues that a minimum of 30 items is suggested to be included in sample when statistical analysis will be adopted. With an addition of 10 key informants, the total sample was 100 people.

### 3.5 Data Collection

Three methods of data collection were used in this study. These included a Household questionnaire survey, interviews and documentary review. While the first two methods were employed to get primary data, the latter one was useful in getting secondary information. The description for each method is detailed below:-

#### 3.5.1 Household questionnaire Survey

The survey was carried by using questionnaires to the households which were a unit of enquiry. According to Ader (2008), the use of questionnaires is among the quickest tools of data collection. The aspects that were included in the questionnaire were: presence or absence of HWC, types and causes of HWC, main problem/dangerous animals, most affected crops and livestock, HWC mitigation measures and suggestions of respondents. In this study a set of 90 household self-administered questionnaires (30 to each village) were administered by researcher and his assistants to sampled households. The questionnaire consisted of both open and closed ended questions (See Appendix 1). Closed ended questions ensures saving of time during data collection while open ended questions give respondents an opportunity to express their views more freely and increase the level of interaction between two subjects (Kothari, 2004).

##### 3.5.1.1 Training of enumerators

Training was conducted to three enumerators, one from each village who were identified by the help of the village government authority in cooperation with the researcher. The use of using local enumerators helped in reducing costs and duration of data collection

(Kothari, 2004). The local enumerators had no personal interests in the study except extending their support to the researcher to obtain quality and bias free data. The training included how to interview respondents, how to probe and how to fill questionnaires accurately.

#### 3.5.1.2 Questionnaire Pre-testing

Pretesting means trial of the instrument to a sample of respondents before finalizing it. Questionnaire pre-testing aims at testing questionnaire elicit, response required, time, content relevancy and adequacy, wording, sequencing, quality aspects, train and test enumerators and appropriate procedure for administering questionnaire (Saunders *et al.*, 2004). Pre-testing also assess whether the questions are clear, specific, answerable, interconnected and substantially relevant (Punch, 2000). In this study, questionnaires were pre-tested by a researcher and enumerators. After pre-testing, the questionnaires were revised in such a way that some necessary corrections in question wording and sequence were made.

#### 3.5.1.3 Administration of questionnaire

Household questionnaires were administered by the researcher and enumerators to sampled households in three selected villages. Research team visited the selected households sample at their residential area because it was easy to locate them at their residence than other place.

### 3.5.2 Key informants interviews

Structured interviews were conducted to the key informants (See plate 1& 2) to obtain

relevant information on Human wildlife conflicts and their impacts. This method was chosen for use over other types of interviews due to the fact that it gives in-depth information about particular cases of interest to researcher and it is systematic, in the sense that the researcher intensively investigates a particular issue before moving to the next (Kombo and Tromp, 2006). The researcher also gets a complete and detail understanding of the issue from the respondents by asking one respondent after the other on a particular issue before going to another.

Plate 1: The researcher discussing with Igomelo natural resources committee.

Photo by Severine Msoffe, 01.06.2013

Plate 2: The researcher interviewing MPKGR Game officers. Photo by Amili Kitamkanga, 17.06.2013

### 3.5.3 Documentary sources/Literature review

Data collected from reviewed documents gathered earlier for some other purposes are referred as secondary data (Beri, 2005). Publications relevant to the study were accessed from libraries, different search engines, government offices and Mpanga/Kipengere game reserve itself. These included books, policies and regulations, journal papers and conceptual material on all the ideas, debates and issues relevant to the subject matter.

## 3.6 Data Analysis

Ader (2008) considers data analysis, as a process of inspecting, cleaning, transforming and modeling data with the goal of highlighting useful information, suggesting conclusions and supporting decision making. Furthermore data analysis is a practice

where raw data is ordered and organized so that useful information can be extracted from it. The collected data from questionnaire were thoroughly examined, variables coded and imported into Statistical Package for Social Scientist (SPSS) 16.0. After completion of data entry in the SPSS, data analysis was carried out and cross tabulations, frequencies and percentages were obtained. On the other hand, the collected data from interviews were mainly qualitative in nature. As pointed out by several social scientist researchers, qualitative data analysis has no one right way to proceed with analysis (Kombo and Tromp, 2006). So the researcher recorded the key issues of the interview such as types of HWC, mitigation measures used and suggestions recommended then summarized those key findings and provided explanation of the findings.

### 3.7 Validity and Reliability

#### 3.7.1 Validity

Validity is the most critical criterion and indicates the degree to which an instrument measures what it is supposed to measure (Kothari, 2004). In this study validity was achieved in various ways. First, the use of probability sampling (systematic random sampling) helped to reduce biasness. Second, careful formulation of questions and pre-testing questionnaires made the questions clear, and the research assistants aware of research requirements, possible problems and it was easy to encounter them. Third, selection of research assistants and training of research assistants helped to match interviewer characteristics with those of sample being interviewed helping to minimize biasness hence fostered validity. Last, edited study data helped in identifying and eliminating errors, and omissions done by either interviewer or respondents hence helped

to attain completeness, accuracy and uniformity.

### 3.7.2 Reliability

Reliability refers to the degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions (Kothari, 2004). To ensure reliability in this study the researcher used different methods and tools during data collection including, interviews, questionnaires, checklists and review of secondary data.

# CHAPTER FOUR

## RESULTS AND DISCUSSION

### 4.1 Socio-economic profile of respondents

Table 1 below shows the profile information of the respondents. Findings reveal that overall males were the majority (82% n=90). At village level similar trend was also observed. This scenario could have happened by chance. As for age, overall the majority (58.8% n=90) were aged between 18-49 years. In other words the majority were youths implying that the majority are still economically active population. At village level population varied. In Igando and Luduga villages the majority were youths compared to Igomelo where only 33.3% were youths. Reasons for this scenario could not be established. Regarding education, overall 60% had informal education. At village level similar trend was also observed. This scenario indicated that illiteracy level was high in the study area.

**Table 1: Socio-economic profile of respondents**

| | Gender (%) | | Age Category (%) | | | Education (%) | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Villages** | **M** | **F** | **18-29** | **30-49** | **> 50** | **IN** | **PR** | **SE** | **>SE** |
| **Igando (n=30)** | 66.7 | 33.3 | 6.6 | 66.7 | 26.7 | 30 | 63.3 | 3.3 | 3.3 |
| **Igomelo (n=30)** | 90 | 10 | 3.3 | 30 | 66.7 | 20 | 43.3 | 30 | 6.7 |
| **Luduga (n=30)** | 90 | 10 | 6.7 | 63.3 | 30 | 6.7 | 73.3 | 16.7 | 3.3 |
| **Total** | 246.7 | 53.3 | 16.6 | 160 | 123.4 | 56.7 | 179.9 | 50 | 13.3 |
| **Average** | 82.2 | 17.8 | 5.5 | 53.3 | 41.1 | 18.9 | 60 | 16.7 | 4.4 |

**Source:** Field data 2013, n=Sample size M=Male F=Female IN=Informal Education PR= Primary Education SE=Secondary Education >SE=Above Secondary Education

### 4.2 Main types of Conflicts in the Study Area

Respondents were asked to mention the main types of conflicts in their areas. Results in Table 2 show that the main types of conflicts were crop raiding (41.1% n=90), boundary conflicts (22.2%) and restrictions to use resources (12.2%). Other minor conflicts in order of importance included lack of grazing land, loss of life, land scarcity for agriculture and livestock depredation. Detailed elaboration on these conflicts is provided below.

**Table 2: Main types of human-wildlife conflicts**

| | Responses (%) | | | |
|---|---|---|---|---|
| **Types of conflicts** | **Igomelo (n=30)** | **Igando (n=30)** | **Luduga (n=30** | **Average (%)** |
| Boundary conflicts | 46.7 | 3.3 | 16.7 | 22.2 |
| Crop Raiding | 10 | 66.7 | 46.7 | 41.1 |
| Restriction to use resources | 16.7 | 3.3 | 16.7 | 12.2 |
| Land scarcity for agriculture | 3.3 | 10 | 3.3 | 5.5 |
| Lack of grazing land | 16.7 | 10 | 3.3 | 10 |
| Loss of life | 3.3 | 3.3 | 10 | 5.5 |
| Livestock depredation | 3.3 | 3.3 | 3.3 | 3.3 |

**Source:** Field data 2013, n=Sample size

### 4.2.1 Crop raiding

Results in Table 2 show that crop raiding was mentioned as one of the major conflicts in the study area. Views on crop raiding varied at village specific level as it was revealed that 66.7% (n=30) of the respondents in Igando, 46.7% in Luduga and 10% in Igomelo perceived this problem. This implied that villagers in Igando perceived more crops raiding, this is probably because most villagers' farms are located less than 1 kilometer from the Game Reserve's boundary as compared to other villages; also the village has one VGS and therefore few patrols are done. Interview with Game Officers and Village Executive Officers revealed that crop raiding by wildlife has made people economically

worse-off each year. This scenario indicates that crop raiding was a problem in the area and it could lead to negative attitudes of the people towards wildlife conservation. A study in Ruaha ecosystem done by Nahonyo (2001) indicated that crop raiding is a disincentive to wildlife conservation as it escalates non-conservation activities like poaching, deforestation and wild fires.

### 4.2.2 Boundary conflicts

Boundary conflicts between villages and the reserve was reported by respondents as a type of HWC in the study area (Table 2). This problem is pronounced more in Igomelo and Luduga villages. The local communities complained that the part of their land have been taken by the reserve for conservation. In Igomelo, respondents argued that the expansion of Igomelo irrigation scheme attracted many villagers to cultivate closer to the game reserve. This situation implied that a tug of war was between the game reserve and the villagers. In order to achieve a win-win situation, mitigation measures such as boundary demarcation and land use planning should be given an upper hand so as to balance conservation and development issues.

### 4.2.3 Restriction on the use of reserve resources

Results in Table 2 indicate that 12.2% of the respondents perceived restriction on the use of reserve's natural resources as a conflict in the area. Results at the village specific level showed that 16.7% of the respondents in Igomelo, 3.3% in Igando and 16.7 in Luduga perceived this problem. This implied that restrictions on accessing reserve resources perceived more in Igomelo and Luduga. The possible reason could be lack of buffer zones between these villages and the reserve.

According to wildlife conservation legislations, local people are strictly prohibited to hunt wild animals, cut trees, collect honey, collect fire wood, and graze livestock or cultivating inside the reserve. This study found that restricting local people to harvest game reserve's resources to sustain their livelihoods had fueled poaching and deforestation. This trend concurs with findings indicated by Kaswamila, (2007) that denying local access to resources is a disincentive to conservation because it escalate illegal killing of wild animals and wildfires in the protected areas. Therefore provision of conservation education to the public is necessary so as to ensure that local people comply with conservation regulations.

Furthermore, association between gender and HWC's were explored (Table 3). Results indicated that crop raiding were more associated to males than females. This could be due to the time spent by men, both during the day and at night, guarding their crops against destructive wild animals. Moreover, most women were associated with land scarcity for agriculture, restrictions on the access to reserve resources and boundary disputes. This could be probably due to women depending on forest resources for fire wood and land for crop production to feed their families.

**Table 3: Association between gender and conflicts (%)**

| | Gender of Respondents | |
|---|---|---|
| **Types of Conflicts** | **Male** | **Female** |
| Crop Raiding | 37 | 2 |
| Boundary disputes | 13 | 3 |
| Restriction to use resources | 3 | 8 |
| Loss of Life | 1 | 0 |
| Land scarcity for agriculture | 12 | 2 |
| Pastoralists and GR over grazing land | 7 | 1 |
| Livestock depredation | 1 | 0 |
| *Total* | *74* | *16* |

**Source:** Field data, 2013.

### 4.3 Impacts of Human-wildlife conflicts on livelihoods

Respondents and key informants were asked to assess the impacts of HWC's on their livelihoods. Results in Table 4 show that overall the major impacts included household food insecurity (66.7%, n=90) and reduced household income (33.7%). At the village specific level, views on these impacts varied. For example, in Luduga 76.7% (n=30) perceived food insecurity while 70% and 53.3% perceived this problem in Igando and Igomelo respectively. As for reduced household income, results indicated that 47.7% (n=30) of the respondents in Igomelo perceived this problem while views in Igando were 30% and 23.3% for Luduga. Respondents reported that the most game species which raided crops and depredated livestock were bushpigs (*Potamochoerus porcus*), baboons (*Papio cynocephalus*), African elephants (*Loxodanta africana*), buffaloes (*Syncerus*

*caffer*), and hyenas (*Crocuta crocuta*).

Table 4 : Major impacts of Human wildlife coflicts

| | Responses (%) | | | |
|---|---|---|---|---|
| **Impacts** | **Igando** | **Igomelo** | **Luduga** | **Average (%)** |
| Food Insecurity | 70 | 53.3 | 76.7 | 66.7 |
| Reduced income | 30 | 47.7 | 23.3 | 33.7 |

Source: Field data 2013. n=sample size

Results of the study on the impacts of HWC's in the study area indicated substantial losses to people's livelihoods in various ways. Records by Wanging'ombe District Agriculture officer revealed that crop loss due to game species between 2006 and 2010 was 5 tons which amounted to Tshs. 30 million. This study found out that most incidents involved damage to maize, sweet potatoes, and rice, with damage to sweet potatoes and maize being common. Furthermore, records by MPKGR office showed that livestock losses in the area due to game species amounted to Tshs. 1,000,000 in 2012. These records imply that food security was aggravated severely by wildlife in the area. Therefore in such circumstances, it is difficult to expect local people to value wildlife since entailed losses to their livelihoods. Nahonyo (2001) argued that in Africa than elsewhere in the world, the average loss caused by wildlife is about 40% of all crops that are planted.

As for reduced household's income, results indicated that this problem exacerbated and deprived livelihoods to the local people. Nyhus *et al,* (2000), asserted that when crop

damage occurs finances are diverted from other uses to cover the costs of staple foods. Discussions with Game officers, Village executive officers and Natural resources committee members revealed that local people loose income due to the damages of main staple crops in the area which are maize and sweet potatoes. This trend concurs with the study by Kaswamila *et al.,* (2007) in Mkonga Ijinyu, Barabarani and Chemchem villages in Northern Tanzania that crop damages by wildlife reduced household cash income by 1.3%. This scenario indicates that crop damages by wildlife in the study villages had not only affected local people's ability to feed their families, but also reduced cash income and had repercussions for health, education, nutrition, and ultimately development.

### 4.4 Strategies used to mitigate human-wildlife conflicts

Various mechanisms were identified by local people to mitigate HWC's in the area. The major mechanisms included crop guarding, digging trenches, and informing GR officials. Other minor mechanisms in order of importance included simple barriers, noise/shouting, raised livestock enclosures and scarecrows (Table 5).

**Table 5: Mechanisms used to mitigate conflicts**

| | Responses (%) | | | |
|---|---|---|---|---|
| **Methods of control** | **Igomelo n=30** | **Igando n=30** | **Luduga n=30** | **Average** |
| Crops guarding | 46.7 | 66.7 | 46.7 | 53.4 |
| Noise/Shouting | 3.3 | 3.3 | 6.7 | 4.4 |
| Simple barriers | 16.7 | 3.3 | 3.3 | 7.8 |
| Informing GR officials | 10 | 10 | 16.7 | 12.2 |
| Digging trenches | 16.7 | 10 | 16.7 | 14.5 |
| Raised livestock enclosures | 3.3 | 3.3 | 3.3 | 3.3 |
| Scarecrows | 3.3 | 3.3 | 3.3 | 3.3 |

Source: Field data, 2013, n=Sample size

### 4.4.1 Crop guarding

Results in Table 5 show that overall 53.4% (n=90) of the respondents had the views that crop guarding was the major mechanism used by local people to control wild animals in their farms. Respondents argued that crop guarding was mainly done both at day and night times (See plate 3). Crop guarding was perceived to be the most effective tool to deter wild animals such as baboon which were very mobile species as they can jump both trenches and barriers to raid crops. This was confirmed by one discussant who had this to say:

*"If I don't stay in this hut from morning to evening, this maize farm will be gone and I will not have enough food to survive".*

This study found out that local people were spending nights on watchtowers with some means of alerting the community to crop raiding animals like the use of whistles and shaking cans. This scenario indicated that local people spent most of their time and efforts at their farms guarding crops. This could have indirect impacts on reduced school attendance and increased exposure to diseases like Malaria.

Plate 3: Farm guarding against wild animals in Luduga village.

Photo by Author, 05.05.2013

### 4.4.2 Digging trenches

The research results show that 14.5% (n=90) of the respondents mentioned that local people in the study villages opt to dig trenches to control wild animals in their farms (Table 5). Digging trenches to stop animals from entering the farm could lead to kill some wild animals when they fall in the trenches. This could have negatively impacted wild animal's populations. Studies in Amboseli ecosystem on HWC showed that similar method has been used and it was anti-wildlife survival (Kagiri, 2010). Therefore there is need to sensitize the community on the importance of conserving the species around the area and the danger involved by digging trenches around their farms. This calls for a real need to develop new conflict mitigation strategies in communal farming areas.

Plate 4: Unfenced farm in Igando. Photo by Author, 28.05.2013

### 4.4.3 Informing the Game Reserve officials

The results show that 12.2% (n=90) of the respondents argued that local people had a tendency of informing the game reserves' administration when problem animals enter their farms (Table 5). However, it was revealed by respondents that local people were tired of reporting crop raids to the management of MPKGR because several complaints were laid but nothing positive was done to that effect. Instead they were told to be patient and sometimes the GR do not do something about it. This study found out that this problem existed partly because the MPKGR has few Game Officers and Game

Wardens to support villager's claims. Discussions with MPKGR officials revealed that the reserve has only 11 Game wardens who are not adequate as it indicated that the reserve size is 1,574 $km^2$ and surrounded by more than 15 villages. This implied that one ranger patrolled 143 $km^2$ which was disproportional. Therefore MPKGR could recruit more Game officers and Wardens to effect patrols and control problem animals.

### 4.5 Suggestions to mitigate HWC

Local people, key informants and other experts were further asked to suggest the measures which could be used to mitigate HWC's in order to improve their livelihoods. The most suggested measures included Compensation for damage/losss caused by wildlife, benefits sharing and boundary remarking (Table 6).

**Table 6: Suggestions to mitigate conflicts**

| Suggestions | Igando n=30 | Igomelo n=30 | Luduga n=30 | Average (%) |
|---|---|---|---|---|
| Sharing benefits | 16.7 | 30 | 30 | 25.6 |
| Fencing the GR | 30 | 3.3 | 16.7 | 16.7 |
| Boundary remarking | 3.3 | 46.7 | 10 | 20 |
| Compensation | 40 | 10 | 30 | 26.7 |
| Problem animal control unit | 3.3 | 3.3 | 10 | 5.5 |
| Effective patrols | 6.7 | 6.7 | 3.3 | 5.6 |

Source: Field data, 2013, n=Sample size

#### 4.5.1 Compensation

Majority of local people perceived lack of compensation for damages caused by wildlife

as a major intensifier of HWC's in their villages (Table 6). This perception of respondents is an indication that they are already aggrieved due to losses and consistently suffered seasonally without any compensation. Besides they could have perceived that the management of MPKGR would not be able to sustainably compensate them in a way commensurate to the losses being experienced seasonally.

Discussions with Game Reserve's officials revealed that according to the wildlife conservation (Dangerous Animals Damage Consolation) regulation, 2011 the Director of Wildlife (DW) is the one responsible for consolation. Furthermore they stated that some people are not consoled because they are not eligible for consolation according to the Regulation stated above. For example section 4 (2) of the regulation states that 'the director shall not make any payment under these regulations where;- the damage of livestock or crops occurred in any area within the buffer zone, migratory routes, wildlife corridors and dispersal areas' (URT, 2011). This study found out that the study villages were in the Igando-Igawa wildlife corridor which link Mpanga/Kipengere Game reserve and Ruaha National Park. So this could be a reason why most respondents claimed that they were not compensated for losses done by wildlife; and that is why most of them suggested compensation as one of the best ways of mitigating HWC's for their livelihoods sustainability. Natural resources officers and Agriculture officers suggested that amounts of money for consolation should be raised in order to ensure that the amount paid especially for crop raiding is equivalent to the damaged crops.

### 4.5.2 Boundary demarcation

The research data shows that boundary remarking was suggested by majority of respondents in the study area especially in Igomelo village (Table 6). In this village boundary conflicts were severe. This could be the reason why most of the respondent's recommended this as a strategy to mitigate HWC's in the area. Village Executive officers in all study villages suggested that the boundaries could be demarcated in order to give back some fertile and productive areas to local people for their agricultural activities. Game officers supported this by arguing that this could reduce encroachment to the reserve by local people for agriculture.

### 4.5.3 Benefit sharing

Local communities suggested benefits sharing as a way forward to mitigate HWC's in the study area (Table 6). In this context benefit sharing refers to mutual socio-economic gains realized from photographic safaris done inside the game reserve. Respondents argued that obtaining benefits from wildlife would definitely reduce their pains for wildlife damages. However, GR officials pointed out that the GR is surrounded by more than 15 villages and the WD doesn't send enough amount of funds for local communities' development, for example between 2009 and 2012 Wildlife Division allocated only 20 Million Tshs. for socio-economic projects in villages adjacent to MPKGR. This amount was used to build two classrooms of Luduga Ward Secondary School. In 2012/2013 no any fund was allocated for development projects in adjacent villages. This scenario implied that not only fund allocated for benefit sharing was insufficient, but also local peoples' priorities were not met.

District natural resources officers and suggested that the Game reserve should provide funds for women's development projects in adjacent villages in order to reduce poverty which in turn will provide motives to local people to participate in conservation of the reserve. Kaswamila (2010), suggest that efforts should be made to ensure that income/benefits trickle down to household or individual level for sustainable conservation.

# CHAPTER FIVE

# CONCLUSION AND RECOMMENDATIONS

## 5.1 Summary

This study has assessed the status of human-wildlife conflicts in the villages adjacent to Mpanga Kipengere Game Reserve. The selected villages included Igando, Luduga and Igomelo. The study revealed that the main HWC's in the study villages were crop raiding (41.1%, n=90), boundary disputes (22.2%), and restrictions on accessing the reserve resources (12.2%). Furthermore, the study has revealed that the major impacts of HWC's in the study area were food insecurity (66.7%, n=90) and reduced income (33.7%). Similarly the study revealed that crop guarding (68.9%), digging trenches (15.6%) and informing the GR official's information (5.6%) were the main strategies used by local people to mitigate HWC's in the area. Different measures are suggested to mitigate HWC'S in the study area. These include benefits sharing, compensation for damages caused by wild animals and boundary remarking.

## 5.2 Conclusion

The results of the research have indicated that HWC's were severe in the study area. It was found that HWC's in the area have led to antagonism between local communities and MPKGR Authority due to crop raiding and reduced household income due to damage caused by wild animals. These impacts have acted as a disincentive to conservation and development in the area. In such circumstances it was revealed that it was difficult to involve local people to conservation as a result non-conservation activities like poaching, deforestations and wild fires were observed in the study area.

Therefore measures to mitigate HWC's and enhancing conservation in the area are of prime importance. These include putting in place compensation schemes, improving benefit sharing and boundary demarcation.

### 5.3 Recommendations

From the findings of this study, the following recommendations are made;

i. Conservation education for local population at different levels must be done in order to disseminate innovative techniques, building local capacity in HWC resolution and more understanding of Human -Wildlife Conflict (HWC). This will promote commitment towards conservation.

ii. The mechanism of cost-benefit sharing should be clearly stipulated and copies be distributed in all village council offices. Documentation should include compensation procedures and respective amounts when there is crop damage, attack by wild animals and livestock depredation.

iii. Construction of permanent ranger's post in either of the two villages i.e Igomelo and Luduga villages to prevent them against problem/dangerous animals.

iv. Boundary disputes in the study area is the prevailing conflict, it is recommended that Mbarali district council, Wildlife Division and Village councils and other key stakeholders to sit together to set permanent borders marking along conflict zone areas. Mapping of village resources and preparing land use plans for each village would reduce village to MPKGR boundary disputes and land use conflicts as well.

## 5.4 Areas for further research

- Impacts Igomelo Irrigation Scheme expansion on Mpanga/Kipengere Game reserve.
- To understand underlying socio-economic and political factors leading to HWC's.

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## APPENDICES

### Appendix 1: Household Questionnaire

Respondent number……

Village……..….Ward…….

Date…….

### Section A: General Information

1. Sex

   Male 1[ ]

   Female 2[ ]

2. Age (years)

   18-29 1[ ]

   30-49 2[ ]

   Above 50 3[ ]

3. Level of education of the household

   Informal Education 1[ ]

   Primary 2[ ]

   Secondary 3[ ]

   Above Secondary 4[ ]

4. Family size (number of people in the household)

   1-4 1[ ]

   5-9 2[ ]

   10-14 people 3[ ]

   More than 15 people 4[ ]

5. Duration of stay in the village (years)…….....

6. Household income (per annum) in Tshs

   Below Tshs. 150 000.00 1[ ]

   Between Tshs. 150 000.00 and Tshs. 400 000.00 2[ ]

   Between Tshs. 401 000.00 and Tshs. 1 000 000.00 3[ ]

   Beyond Tshs. 1 000 000.00 4[ ]

7. Main socio-economic activities related to natural resources use

   Farming 1[ ]

   Pastoralism 2[ ]

   Charcoal burning 3[ ]

   Bush meat hunting 4[ ]

   Fishing 5[ ]

Others (mention)……

**Section B: Human Wildlife Conflicts (HWC)**

8. Do you experience any Human Wildlife Conflicts in this area?

   Yes 1[ ]

   No 2[ ]

9. If yes, what are the main types of human wildlife conflicts in this area?

   ……

10. Which season of the year do these conflicts mostly happen in this area?

    ……

11. What are the main causes/drivers of existing human wildlife conflicts in the area?

    ……

12. What are the main problem animals in this area?……...

13. Mention main types of crops damaged and main types of livestock depredated by wildlife from the game reserve.……..

14. Which impacts of human wildlife conflicts are more severe to your livelihood……

15. Do you normally receive any compensation from the Game reserve after crop raiding, property loss or any other impacts caused by wild animals?

Yes 1[ ]

No 2[ ]

16. If yes, Mention kind of compensation……

17. Are there ways which you normally use in order to mitigate conflicts between you and wild animals from the Game Reserve?

Yes 1[ ]

No 2[ ]

18. If yes, mention at least three.....

19. Among those mentioned above, which method is more effective in resolving these conflicts? ……..

20. Why methods mentioned in question 19 are effective in resolving these conflicts?.....

21. What are your suggestions/recommendations for mitigating these Human Wildlife Conflicts in order to improve your livelihoods?……...

**Appendix 2: Checklists for key informants**

**a) Game officers from the Game reserve**

- Types of HWC, their underlying causes and impacts

- Conflict management system

- Opinions/view on how to manage conflicts

- Existing by-laws, policies, and acts on problem/dangerous animals and compensation

- Involvement of local communities on conservation

**b) Checklist for Village chairpersons, Village Executive 0fficers and Natural Resources Committee Members**

- Types of HWC

- Underlying causes of conflicts and respective frequency

- What is the reaction of people towards conflicts?

- Conflicts implication to livelihood of people

- What benefits/merits village gets from participation in wildlife conservation?

- Opinions/view on how to manage conflicts