

**LAND USE ACTIVITIES IN PROTECTED AREAS AND ITS IMPLICATIONS  
IN CONSERVATION: A CASE STUDY OF MASWA GAME RESERVE**

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REQUIREMENTS FOR THE DEGREE AWARD OF MASTER OF ARTS IN  
TOURISM PLANNING AND MANAGEMENT OF THE OPEN UNIVERSITY  
OF TANZANIA**

**2015**

**CERTIFICATION**

I, **Dr Paul Wilfred**, hereby certifies that I have read and hereby recommends for acceptance by the Open University of Tanzania a dissertation entitled “*Land use Activities in Protected Areas and its Implications for Conservation: A Case Study of Maswa Game Reserve*” in partial fulfilment of the requirements for degree of Master of Arts in Tourism Planning And Management of The Open University of Tanzania.

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**I, Ayo Seth Senyael**, do hereby declare that this dissertation is my own original work and that it has not and will not be presented to any other institution for the award of the degree or other similar award.

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Signature

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Date

**DEDICATION**

This dissertation is first dedicated to God under whose care I did my studies safely and successfully. Secondly, the work is dedicated to my wife Enezael Ayo and our sons Christopher, Erick, Emmanuel and Steven who bore the consequences but remained my unfaltering source of inspiration and encouragement.

## ACKNOWLEDGMENTS

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## ABSTRACT

Uncontrolled land uses near wildlife conservation areas present a greater challenge to biodiversity and reduce the size of protected areas something which will limit their ability to conserve biodiversity in this century. The present study was conducted in Maswa game reserve with the aim of studying land use practices/activities in protected areas using the reserve as a case study. Implications to conservation and the interactions between the local and the reserve were also explored. The objectives of the study were to: identify the land use systems around Maswa game reserve; assess the conservation impact of land use activities around Maswa game reserve and to determine the measures that can address the conservation problem. The study used interviews and questionnaires as data collection procedures and 93 respondents from 3 villages around Maswa game reserve answered the questionnaires. Twenty people were interviewed and these were people working in Maswa game reserve and local leaders. The questionnaire was analyzed using SPSS and interviews through three thematic approaches which included: - types of land use around Maswa game reserve, effects of the identified land use activities and possible solutions to the effects. The findings shows that, land use activities practiced near Maswa game reserve includes crop cultivation; livestock grazing; charcoal burning; hunting and lodging. The results show that land uses activities in the area has adverse effects to Maswa Game Reserve, such effects includes causing desertification; overgrazing; loss of habitat and destruction of ecosystem; land degradation/soil erosion; spread of zoonotic diseases; deter movement of wild animals; human wildlife conflict and poaching.

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**LIST OF ACRONYMS**

FGD	Focus Group Discussion
IUCN	International Union for Conservation of Nature
C BC	Community Based Conservation
MNRT	Ministry of Natural Resources and Tourism
PAS	Protected Areas
TANAPA	Tanzania National Parks
TAWIRI	Tanzania Wildlife Research Institute
WMA	Wildlife Management Areas

GMP	General Management Plan
MGR	Maswa Game Reserve
URT	United Republic of Tanzania
WCA	Wildlife Conservation Act No 5 of 2009
SENAPA	Serengeti National Park
SPSS	Statistical Package for Social Sciences

## CHAPTER ONE

### 1.0 Introduction

This chapter is intended to introduce the topic and what will be discussed; including the background to the problem, statement of the problem, objective of the study, significance of the study, research questions and hypothesis.

### 1.1 Background Information

The setting aside of protected areas is intended to preserve areas of considerable ecological, spiritual, or aesthetic value and safeguard biodiversity. However, protected areas do not operate in isolation of regional ecological flows and processes influenced by non-local human activity (Cole, D.N, 1996). The intensive and uncontrolled human land use activities present a greater challenge to protected areas and its wildlife resources around the world in this century (Dale, 1997). For years, more than half of the earth's land surface has been transformed by human activity driving widespread of habitat losses and ecosystem alteration, species extinction, changes in species diversity, declines in water and climate change at regional and global scales (Sala et al, 2000; Bonan, G.B, 1997). It has been observed that with the apparent increase of human land use is likely to further isolate protected areas, inhabiting landscape and biological connectivity and diminishing habitat quality (Wilson .S. et al, 2014).

Throughout the world human beings have co-existed with wildlife in a compatible manner since time immemorial because of the value a man attached to wildlife. This balance is interdependency and is now facing great threat from anthropogenic activities (Karpati, 2013). There is faster degradation due to shift in land use patterns that has lead

into reduction of the biodiversity in those respective areas, that results into natural habitat destruction and over exploitation of natural resources.

Some protected areas are now becoming ecological islands because of land use system interfering the wildlife corridors, resulting into loss of wildlife critical areas and /or extinction (Mpanduji, 2004).

Wildlife corridors as protected areas are the key of the survival of wild animals and ecosystem health. Their importance lies in the five main reasons, Firstly, if population of different species decline to low levels or become extinct in one area or habitat patch, individuals from another patch can migrate and rescue the populations from the risk of extinction (Pulliam *et al.*, 1994). Secondly, they are important as they allow genetic exchange among different populations. Thirdly, a corridor increases the area and diversity of habitats over and above the area of habitat patches that it connects (majka *et al.*, 2009). Fourthly if the habitat in one area becomes unsuitable (e.g. because of climatic change), wild animals can move along corridors to reach more suitable habitat and thus be 'rescued' (Trevor *et al.*, 2009). Lastly, these corridors provide the opportunity for wild animals to traverse through habitat that is not suitable for permanent residency to locate better habitat, find a mate, and disperse from natal areas, salt licking, escape predation or other dangers and access habitats needed seasonally or at different life history stages (Beier, 1995).

When a protected area is not large enough for certain population to maintain itself, there are certain consequences that may ensue including decrease in population size,

formation of breeding depression, sink population and decreased genetic diversity and eventually extinction due to human activities (Smith, 1990).

The Serengeti ecosystem is an old still existing one. It is an important connection between Serengeti National Park, Maswa Game Reserve, Ngorongoro Conservation Area Authority (NCAA), Loliondo Game Controlled Area, Ikorongo/Grumet Game Reserve, Maasai - Mara Game Reserve in Kenya and Makao Wildlife Management Area (WMA). Wild animals such as Wildebeest and Zebras do migrate between Maasai Mara GR, Serengeti National Park, Ngorongoro Conservation Area Authority and Maswa Game Reserve especially during the rainy season (TAWIRI, 2006). Despite its importance in wildlife conservation, there is no adequate information about the conservation implications on land use activities and its conservation implications in the Serengeti Ecosystem; particularly Maswa Game Reserve Therefore this study aims at filling up this gap of knowledge.

## **1.2 Problem Statements and Justification**

Intensifying land uses around protected areas (PAs) often threaten their ecological integrity and make PAs administration more costly and difficult (Wallace; 2003). and Protected area and wildlife corridors is the central to the health of the wildlife but they have been interfered and shrinking as a result of different land use systems that are conducted in and around them (Vincent et al., 1999). They have been easily invaded because some lack legal protection status (Frontier, 2003). In Tanzania, protected areas and wildlife corridors have been interfered as a result of land use systems practiced in and around by local communities (TAWIRI 2009). Local communities around the

protected areas conduct activities such as unsustainable agriculture practices, cutting of woody forests and making fire, all of which are destructing the vegetation cover. For example, agricultural activities, human settlements and developmental activities have resulted to the interference of Tarangire - Makuyuni and Mswakini corridors in the Tarangire- Manyara ecosystem. Kideghesho, (2002); Shauri and Hitchcock, (1999) found that Manyara Ranch - Lake Natron corridor, Loliondo Game Controlled Area and SENAPA have been under a big pressure as a result of agriculture, human settlement and extensive livestock grazing. Moreover, the study done by IUCN, (1998); Mwamfupe, D. (1997.) noted that population increase and the concomitant expansion of human activities into the Maswa Game Reserve (on the south-western border of Serengeti National Park) has resulted in land use conflicts between crop cultivation and wildlife conservation. By cultivating (usually at an extensive scale) right on the edge of the Maswa Game Reserve these farms are located in high risk areas, exposed to damage by wildlife. In response farmers feel justified to poach/hunt animals as a protection or defensive measure (Serengeti Regional Conservation Strategy 1994). Referring to the highlighted trends above, there are relatively no study on land use activities in protected areas and its implications for conservation. Therefore, there is a need of determining different land use systems and their implications to wildlife conservation in MGR.

### **1.3 Objectives**

#### **1.3.1 Overall Objective**

The overall objective of this study is to assess land use activities in protected areas using Maswa Game Reserve as a case study and their implications to conservation.

### **1.3.2 Specific Objective**

The specific objectives of the study were:

1. To indentify land use systems around Maswa Game Reserve.
2. To assess the impacts of land use activities on conservation in the reserve.
3. To determine the measures to address land use activities for the sustainable conservation of the reserve.

### **1.4 Research Question**

The study was guided by the following research questions

1. What are the land use systems around Maswa Game Reserve?
2. Are there impacts of land use activities on conservation in the Reserve?
3. What measures should be taken to address land use activities for the sustainable conservation of the reserve.
4. Are the local communities around Maswa Game Reserve aware of conservation issues?

### **1.5 Hypothesis**

The hypothesis that guided this study included:-

1. There was no relationship between people's awareness of the game reserve as protected and the current status of the Maswa game reserve
2. The intensity of land use around the reserve has a negative relationship with the current status of the Game Reserve.

### **1.5 Significance of the Study**

The information that will be obtained from this study will be important for effective long-term monitoring and management of different land use systems threatening the existence of the Serengeti ecosystem including MGR, promote and enhance sustainable land use in the area. In addition, information will be useful for conservation and management strategies for the whole ecosystem (Serengeti ecosystem) as well as other wildlife protected areas and corridors in the country.

The study will document negative impacts to wildlife resources caused by human settlements and land use changes as a result of pressure from human land use systems and population growth and other human activities of local communities in MGR

Understanding impacts on wildlife conservation due to land use changes will assist in proposing short-term and long - term management strategies for the Reserve to responsible wildlife departments and conservation agencies on what should be done to stem the situation for the sustainable management of and conservation of wildlife in Tanzania.

The understanding of land use and land-use change around protected areas is important to have a better understanding of human pressures on protected areas. It is also important because species relate to the landscape in different ways. Species differ in their home range size requirements, movement and dispersal capabilities, and perception of the environment. Therefore, it is important to understand land-use change at different scales that correspond to the range of scales at which species relate to landscapes

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter deals with the works of various authors who have written literatures related to the topic. The literatures assisted the researcher to investigate and understand the research problem. This section involved the studying of various credited documents such as books, magazines, journals, internet, and other relevant publication that were of value to the research study.

#### **2.2 Definition of key terminologies**

##### **2.2.1 Protected Areas**

An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural associated to cultural resources, and managed through legal or other effective means (IUCN/WCMC, 1994). The primary objectives of conservation include to:- maintain sample ecosystems in their natural state, ecological diversity and environmental regulation, conserve genetic resources, provide education, research and environmental monitoring, control erosion, provide recreation and tourism services protect sites and objectives of cultural, historical, archaeological heritage (Dudley & Stolton, 2007).

##### **2.2.2 Land use in and around Protected Areas**

Land use for agriculture, forestry, and settlements provides food, fiber, and other ecosystem services that satisfy immediate human needs (Millennium Ecosystem Assessment 2003). Protected areas provide a host of other services, including

biodiversity, watershed protection, and carbon storage, as well as more difficult to quantify cultural services such as recreation and spiritual fulfilment. As land use change occurs outside the administrative boundaries of existing protected areas, with potential negative consequences for the ecological functioning of the protected areas themselves (Hansen and DeFries 2007), the trade-offs between human uses and longer term conservation of ecosystem services become complex. Land-use change very broadly follows a trajectory from natural land cover to frontier clearing, subsistence agriculture, and ending in intensive land use where the majority of land has been converted for agricultural use (Hamilton CM, et al. 2013).

### **2.2.3 Impacts of Land use systems in and around PAs**

Changes in land-use practices are one of the main threats to biological diversity. The alteration of land cover and subsequent appropriation of the Earth's resources has major effects on climate, water, and biodiversity, and these in turn affect management of fish and wildlife resources, intensive land use, which we defined as areas where natural cover has been converted into pasture, crop, or urban use, affects biodiversity through both habitat loss and fragmentation altering community composition limiting species ranges restricting animal dispersal and migration and facilitating invasion by non-native species (Hamilton CM, Martinuzzi S, Plantinga AJ, Radeloff VC, Lewis DJ, et al. 2013)

### **2.2.4 Wildlife Migratory corridors**

Wildlife corridor is a linear habitat whose function is to connect or facilitate movement of wild animals between different habitats. These areas serve as migratory routes for two or more fragmented areas and provide an important source of food and cover for many

species at any given time of their life cycle. (Shombe., 2000). They are essential for the genetic survival of wildlife and can be compared to lifelines for the animal. However, they establish connections between different habitats and enable unrestricted movement of the wild animals (Banko, 2001). For small protected areas, migratory corridors are vital for survival of wildlife as they establish connection between different habitats and facilitate animal dispersal that enables interbreeding with wildlife of different genetic setup, creating a genetic exchange (Robert *et al.*, 2006).

In Africa, establishment of protected areas lies on the socio-economic and pragmatism criteria instead of ecological ones. This has resulted into neglecting and or abandoning critical areas for survival of wild animal's i.e wildlife corridors, dispersal areas, foraging grounds, salt licking areas and breeding sites (Kideghesho, 2000). A population to be in a good health and be able to reproduce it needs among many factors, a sufficient area and each population has its own habitat requirement which most of the Protected Areas do not meet.

Worldwide the interaction and disturbance of the environment are disrupting natural processes; hence ecological integrity is significantly compromised by human induced changes (Idso *et al.*, 2003). In Tanzania most of these corridors have been lost (Vewmark, 1993). For example, Lamprey (1964) recognized eight corridors that originated from Tarangire National Park by which two linked to Lake Manyara National Park. The numbers of corridors were dwindling and by 1985 there were only five and currently there is only one of the two wildlife corridors, i.e. Kwakuchinja-Mbugwe

corridor linking Kilimanjaro national Park and other ecosystems after the blockage of former corridor to Tsavo West National Park in Kenya.

Arusha, Meru Forest Reserve and Mkomazi National Park in Tanzania (Noe., 2003). A study conducted by Gamassa (1998) in Lake Manyara Biosphere Reserve, exposed the serious threats posed by human activities over wildlife migratory corridors in which this park is ecologically linked to outside system by five corridors. The reasons behind include a growing human population and land use shift towards agriculture, infrastructure development and settlement in the previously unpopulated areas. Balmford *et al.*, (2001) commented that, people dependence on protected areas for the ecosystem services have increased tremendously in the recent years.

There are considerable numbers of corridors that are either under great threat or have been cut off due to human pressure (Patton, 1997). Mpanduji, (2004) has documented that Selous-Niassa wildlife corridor has already been encroached by human for various activities and their population density in 2004 was about four people per km<sup>2</sup>. Also according to Hassan, (2007) and TAWIRI, (2009), Kwakuchinja wildlife corridors is threatened from being cut off by human settlement, agriculture and development activities such as road construction. The current trend in land use changes around major migratory corridors suggest that core protected Areas are in huge danger of becoming isolated conservation islands (Bennet, 2003). The loss of wildlife corridor may result into massive death and/or extirpation of migratory species (Newmark *et al.*, 1991). The research conducted by TAWIRI, 2009 revealed that, the opportunities for establishing, maintaining or managing corridors between protected areas are rapidly diminishing,

endangering the future of the ecosystem services and biodiversity that these areas provide. The current increase in demographic pressure accompanied with climate change and variability is amplifying stresses to animals due to habitat shrinkage that tends to limit access to key resources for living including water, pasture and mineral salts (Daszak *et al.*, 2001, Olf and Grant, 2008).

### **2.3 Climate Change and Conservation Challenges**

Climate change is one of the emerging challenges of the 21<sup>st</sup> century. Tanzania, like other developing countries, is “highly vulnerable” to the impacts of climate change “because of the factors such as widespread poverty, recurrent droughts, inequitable land distribution, and over-dependence on rain-fed agriculture”. Experts predict the possibility of extreme events posing the greatest climate change threat to Africa, including Tanzania, where the frequency, intensity and unpredictability of drought, floods and tropical storms are expected to increase. The wildlife protected areas are not and cannot be exempted from the impacts of climate change. The circumstances through which climate change can negatively affect the protected areas include:

### **2.4 Increasing of Illegal Activities**

Low crop yield and death of livestock among the agricultural communities around the protected areas due to droughts, floods and diseases exacerbate poverty. When such situation happens the poor often resort to pursuing illegal and unsustainable activities inside and around the protected areas. For example, studies in Serengeti National Park have shown that illegal hunting is high among the poor households and increases at bad years when the crop yield is low. Similarly, illegal grazing of livestock inside the

protected areas increases during the severe droughts. This is due to reality that unlike unprotected lands, protected areas often contain abundant and higher quality pasture during the drought seasons. The livestock owners, therefore, trespass and graze their livestock illegally inside the protected areas leading to serious conflicts between wildlife staff and local communities. In many protected areas such as Kijereshi and Maswa Game Reserves, these conflicts have culminated into wounding and killing of wildlife staff. Often times pastoralists have coped with droughts by moving with their livestock to other parts of the country where they equally increase pressure in protected areas' exceptional resources and values. For instance, movement of Sukuma pastoralists towards southern Tanzania in 1990s and 2000s had serious ecological impacts in Ihefu and Great Ruaha River, which are key for survival of Ruaha National Park. Experience shows that in many protected areas, illegal activities such as poaching increase when events such as floods destroy the infrastructure and making the parts of the protected areas inaccessible by law enforcement staff (personal experience). The impacts of climate change like this compel livestock owners to graze their livestock inside the protected areas illegally.

## **2.5 Increase of the incidences of wild fires**

Incidences of fire become more severe during the extreme droughts and, thus, killing wildlife species, destroying forage resources, reducing water supply and habitats. A study by Hemp showed that loss of forest cover as a result of fire intensity and forest clearing in Kilimanjaro National Park has a more devastating impact than the melting glaciers. According to author glacier contributes one million cubic meters to water supply, while forest cover contributes 500 million cubic meters. Forest and bush fires

have also contributed to the destruction of forest resources in the Uluguru Mountains Nature Reserve, which could have similar implications for the water security of downstream communities. Experience of Tanzania Increased poverty leaves the poor without option other than poaching. Four suspected poachers arrested in Ngorongoro Conservation Area with poisoned watermelons and pumpkins targeted to kill the elephants.

## **2.6 Impact on Tourism Industry**

The floods and other climatic hazards affect the infrastructure such as roads and, therefore, render the protected areas, which are key tourist destinations, inaccessible. These consequently, reduce revenues which are important sources of funds for conservation work. A good example is the 1997/98 El Niño, which rendered most of the areas in the Tanzania's northern tourist circuit inaccessible. In order to cope with poor and inaccessible roads attributed to heavy rains in Serengeti and Arusha National Parks, various local tour operators resorted to taking their visitors around the park using tractors. The farming machines were used as path-finders or to perform the task of dragging, pulling or jostling tour vehicles that were stuck in the rain drenched, soggy grounds of the parks. The heavy downpours also caused several airstrips in the parks, including the most important, Seronera to be closed down.

## **2.7 Increased Human-Wildlife Conflicts**

Human-wildlife conflicts often increase during the extreme droughts. This is the time when illegal grazing of livestock occurs inside the protected areas as pasture becomes scarce. Illegal livestock grazing is a serious management issue in Maswa, Ibanda,

Burigi, Biharamulo, Moyovosi, Ugalla, Kimisi and Kitengule Game Reserves, Tarangire National Park and Kilombero Ramsar Site. Illegal grazing in protected areas is sometimes associated with widespread use of poison against predators in retaliation for livestock depredation. In Ibanda Game Reserve, for instance, this has led to local extinction of lions. On the other hand, wild animals move out from the protected areas and cause crop damage, livestock depredation and accidents to people. These scenarios occur in virtually all protected areas in Tanzania and they jeopardize the integrity of the protected areas.

## **2.8 Increased Risk of Species Extinction**

Extreme droughts and floods cause deaths to numerous wildlife species through destruction of important resources such as forage, water and shelter along with increasing incidences of diseases. For example, the aftermath of El-Nino/La-nina weather spells, in the Simanjiro District and Ngorongoro Conservation Area were reported to have brought forth the huge swarms of deadly insects known as "Stomoxys" which claimed the lives of both livestock and wildlife by inflicting bad wounds and painful sores to the animals. The first outbreak of Stomoxys flies occurred in 1962 following the extensive drought of 1961, followed by heavy rains of 1962. The epidemic resulted into the death of over 67 lions. The wildlife species which are globally threatened due to factors such as low population numbers, restricted or patchy habitats, limited climatic ranges and/or restricted habitat requirements are more exposed to risk of extinction than others. Based on this reality, the Intergovernmental Panel on Climate Change (IPCC) warns that climate change will worsen the risk to these species if

effective mitigation and adaptation measures will not be implemented. Recent report by UN Food and Agricultural

Organization (FAO) indicates that about 200 animal species in Tanzania classified by IUCN as vulnerable, endangered or critically endangered are subjected to more risk due to effects of climate change]. Of these species, are the large mammals including charismatic and flagship species such as elephant (vulnerable), black rhino (critically endangered), wild dog (endangered), cheetah (vulnerable), lion and abbott's duiker (vulnerable). These species constitute one of the key exceptional resource values in many Tanzanian protected areas. Therefore, their loss will obviously affect the tourism industry and lower the revenues which are important source of funds needed for conservation work.

## **2.9 Land use Theory:**

### **2.9.1 Theories and models of land use change:**

Land is used to meet a multiplicity and variety of human needs and to serve numerous, diverse purposes. When the uses of land decide to employ its resources towards difference purposes, land use change occurs producing both desirable and undesirable impacts. The analysis of land use change is essentially the analysis of the relationship between people and land. Why, when, how and where does land use change happen? To provide answers to these closely interrelated questions, theories have been advanced and models have been built in the last two hundred years (Gibson et al. (1998).

The contributions attempted to provide a panorama of theoretical and modeling approaches to the study of land use change as well as to examine broadly how well they

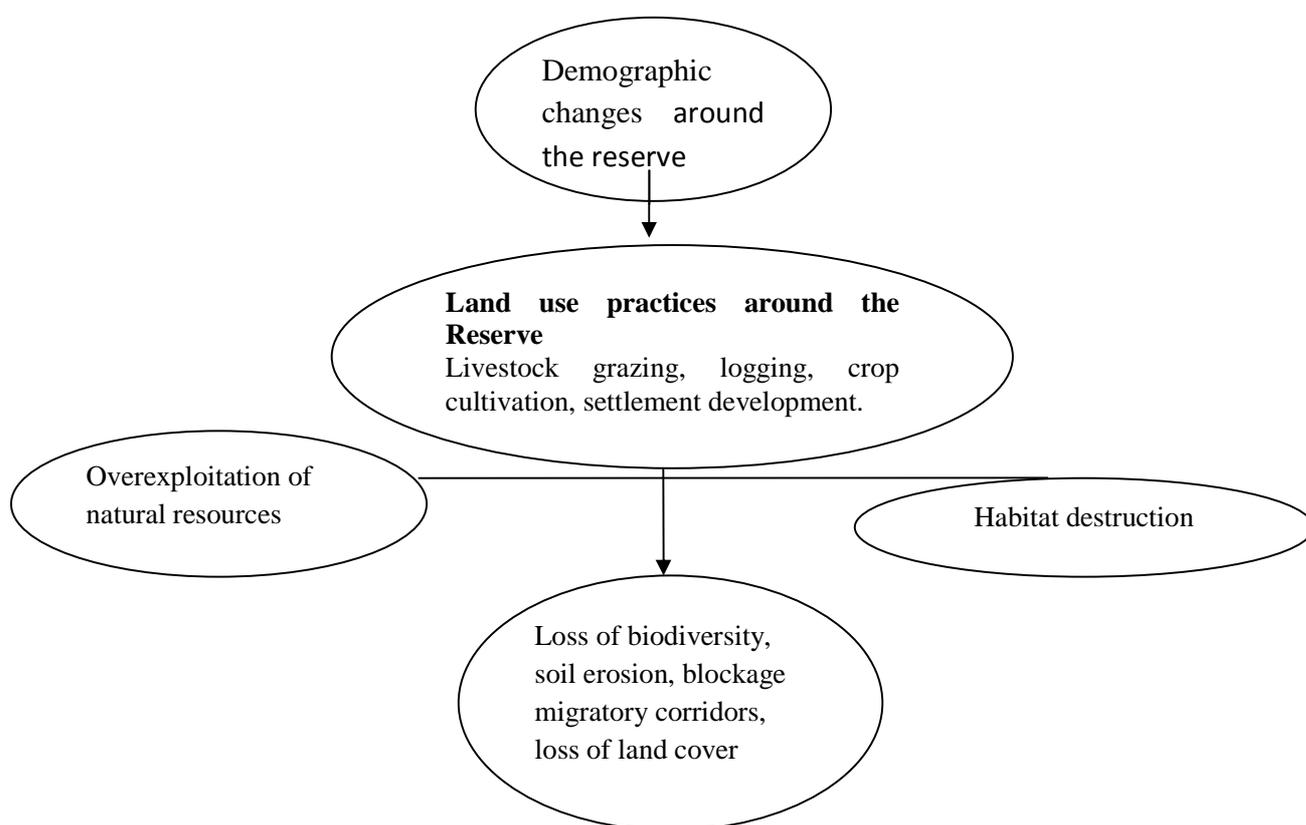
reflect the drivers, processes and implications of this change. e.g to explain the land use change and its impacts at the farm or the parcel level, relevant explanatory factors may include soil type, slope, water availability, local climate and the characteristics of the household or of the head of the family, in few words factors which operate at the same level of the spatial and perhaps of the temporal scale. However, other relevant factors which influence land use change at the farm or the parcel level operate at other higher and/or lower levels of the spatial and temporal as well as of economic, organizational skills such as financial assistance, agricultural policies, product prices, climate change, past types of land use, past policies etc. Hence, the need to employ a nested set of scales for a comprehensive explanation of land use change in concrete settings (Blaikie and Brookfield 1987, Veldkamp and Fresco 1996 b.)

### **1.10 Conceptual Framework**

The conceptual framework acts as a basis for discussing the relationships between different groups, individuals or issues and can always be progressively revisited as further information become available (Linda 1999 in Lusambo, 2009). Land use systems if not well managed can result into interference and shrinking of the wildlife corridors and buffer zones which are important for animal movement, food, water searching, mating. Route for escaping the predators, provision of shelter for other animals, increase genetics viability and as a home for other species. All these result into wildlife species conservation.

On the other hand mismanagement of land use such as agriculture, livestock grazing, settlement, infrastructure development and road construction lead into fragmentation,

isolation, inbreeding, human wildlife conflict and increase vulnerability to wild animals, that causes habitat loss, increasing poaching, loss of some species and danger of predation that results into loss of genetic variability, hence affect wildlife conservation efforts. The conceptual framework for the land use in and around Maswa Game reserve and its implications on wildlife conservation is as shown in figure 1 below



**Figure 12 : Conceptual framework for Maswa Game Reserve: (Source: own Construction)**

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

Research methodology is a science of studying how research is to be carried out. Essentially, the procedures by which researchers go about their work of describing, explaining and predicting phenomena are called research methodology. Thus this chapter deals with describing the methods which was used by the researcher in collecting data of the study to be undertaken, the research design, area of study, the targeted population and sampling techniques.

#### **3.2 Study Site Description**

##### **3.2.1 Location**

Maswa Game Reserve encompasses 2,765 square kilometers of predominantly acacia tree grassland and it is situated in Bariadi Meatu and Itilima districts in Simiyu region. It forms the most South western part of Serengeti Ecosystem whose area is 40350 square kms. The Game Reserve was gazetted in 1974 and recorded in the Government Notice number 275 for the general purpose to conserve the Biodiversity with emphasis on the wildlife and its habitat and to serve as a buffer zone to the adjacent Serengeti National Park and Ngorongoro Conservation Area Authority on its Eastern side. Before MGR received statehood from the Shinyanga Regional Administration in 1983, the Western boundary had been subjected to five-boundary changes, in 1966,1968,1974,1976 and

1980 due to agricultural migrations to fairly virgin lands towards the Game Reserve practiced by the adjacent Agro-pastoral Wasukuma tribesmen.

### **3.2.2 Climate:**

Climatic conditions are those of semi-Arid Acacia Savannah of Africa with rainfall ranging from 700mm to 850mm. The rainfall pattern is divided into wet season (November to May) and dry season (June to October). The wet season has two peaks, one in December and a higher peak in March. The Northern part of Maswa Game Reserve in Bariadi and Itilima Districts are wetter than the Southern in Meatu District. The Game Reserve is a water catchment area for the surrounding agro-pastoralist communities and for Wildlife itself. It is the source of all major rivers although they are seasonal. These include Duma, Simiyu, Semu and Mongomawe rivers. The numerous pools serve as reservoirs for both wildlife and livestock's during the dry season.

### **3.2.3 Fauna**

Maswa Game Reserve maintains about 50 species of large mammals which include 24 ungulates, 19 carnivores, 4 rodents and 3 primates. About 200 species of birds including the Grey breasted Francolin which is endemic to Maswa and Serengeti (Mlingwapers com) have been identified. The Game Reserve forms the last remaining refuge for the Roan antelope (*Hippotragusequinus*), The Greater kudu (*Strepsiceros strepsiceros*) and the Lesser Kudu (*Strepsiceros imberbis*) which are rare or absent elsewhere in the Serengeti Ecosystem. The Reserve remains an important area to the migratory wildebeest, Gazelles and the zebra as they spend part of the season in the Game Reserve especially at times of reduced rainfall.

### 3.2.4 Flora

Maswa Game Reserve lies within the great Acacia savannah belt. It can be described as ranging from “Mbuga” to wooded Acacia tree grassland and riverine forest intercepted by rocky hills and kopjes. It contains a more diverse vegetation and country if compared to the neighbouring Serengeti National Park. The vegetation is characterized chiefly by the many species of Acacia which form a dominant part of most of the plant communities. The Reserve is covered mainly by 15 species of Acacia, 4 species of Albizia, 3 of combretum and 3 species of *commiphora* woodland and open grassland.

The distinct tree and grass species which occur with approximately equal frequency include: *Acacia tortolis*, *Acacia lbida*, *Acacia Senegal*, *Acacia robusta*, *Acacia polycantha*, *Acacia drepanolobium*, *Acacia xanthophloea*, and *Acacia hockii*. Others are *Commiphora madagascariensis*, *Commiphoraemini*, *Commiphoramollis*, *Combretummolle*, *Combretumobovatum*, *Blanitea egyptica*, *Kigelia Africana*, *Dalbergiamelanoxylon* and *Ficussycormorus*. The grass growth include: *Themedatriandra*, *Chrorisroxburgiana*, *HyparrheniaPanicum*, *DigitariaCenchrus* and *Sporobolusrobustus*. GenerallyMaswa South is predominantly an AcaciaCommiphora and *combretum* woodland while the North is acacia tree thicket grassland.

### 3.2.5 Tourism potential and significance of Maswa Game Reserve.

Maswa Game Reserve is part of the Serengeti Maasai Mara Ecosystem whereby calving of the migratory wildebeests takes place and this is a good attraction for Tourists. Other tourist attractions are as detailed below;

### **3.2.6 Cultural Sites**

The reserve is the site of an attractive big rock which is situated to the south of Mwamalehe near the Simiyu River. A big rock sits to support another big rock with a flat surface. This rock produces fine sounds when one beats the top surface like drumming. The sounds become numerous when the prayers are many. This rock is also a good tourist attraction and it is locally known as Mlima Ngoma literally translated in English as Ngoma hill. It is said to have been used during times of chiefdoms. Near the rock there is a big chase board that was traditionally used by Chiefs for evening games (Maswa Game Reserve Management Plan, 2002).

### **3.2.7 Kopjes**

These are the old basement rocks which form the kopjes which are habitats for rock Hyraxes, leopard, klipspringer, different species of snakes, Agama lizards etc. These also are good attractions for Tourists.

### **3.2.8 Scenic Beauty**

Maswa Game Reserve has beautiful scenery composed of a series of undulating hills that are unique. The scenic beauty of the area offers an advantage for Tourists to enjoy the beauty of the landscape while undertaking their hunting and photographic activities.

Apart from these, Maswa game reserve protects an important part of the fauna and flora of the Serengeti-Mara Ecosystem and also serves as a buffer zone for the Serengeti National Park and Ngorongoro Conservation Area Authority. (Refer on the map of Serengeti Ecosystem below). Maswa Game Reserve forms one of the few last remaining refuges for roan antelope and the greater and lesser kudu which are rare or absent elsewhere within the Ecosystem. Also MGR generates revenue in terms of foreign currency from Tourists hunters and also Tourists who conducts photographic and walking Safaris. MGR is also a potential site for Ecological Research and Training

Maswa Game Reserve generates significant multiplier effects across a national economy and offer considerable economic value to the livelihoods of the local communities living around. It also creates investment opportunities and employment. Essentially, Maswa game reserve is recognized as an important vehicle towards poverty reduction and sustainable development, the most important avenue through which Maswa game reserve contribute significantly to local and national economy is through tourism industry. Maswa game reserve is cherished as the key tourist destinations offering a variety of attractions to both domestic and international visitors. Maswa game reserve is also an important hunting ground catering for international tourists. Essentially both consumptive and non consumptive forms of tourism are recognized as important economic engine and a development strategy for many developing Countries.

### **3.2.9 Social Economic of Local Communities living around Maswa Game Reserve.**

The major, and most lucrative, private sector wildlife based enterprise in Maswa game reserve is currently Tourist hunting and photographic safaris. There is demonstrable potential for increasing the level of local income accruing from these existing activities

and private hunting companies are beginning to allocate revenues directly to the villages on whose land they operate although these arrangements in general follow a similar model to Government benefit-sharing both the level of income generated, and the degree to which village councils are directly involved in receiving and using these revenues. All districts (i.e. Meatu, Bariadi and Itilima) receive 25% of all revenues accrued from tourist hunting and photographic safaris. These revenues are later channelled back to village governments around Maswa game reserve. Although direct employment in tourist –related enterprises is negligible in Maswa Game Reserve because most of employees originate from outside the area; some local income is generated from the supply of food stuffs (chicken, fruits and vegetables) to lodges and hotels.

Local Communities and the private sector interact in wildlife use and management have great potential to alter the local economic balance of wildlife. Extremely high levels of private sector income are generated from wildlife; worth far more than Government revenues e.g. local community from Makao Wildlife Management Area (WMA) sell most of its hunting quota allocated from Wildlife Division to private investor (i.e Mwiba Ranch).

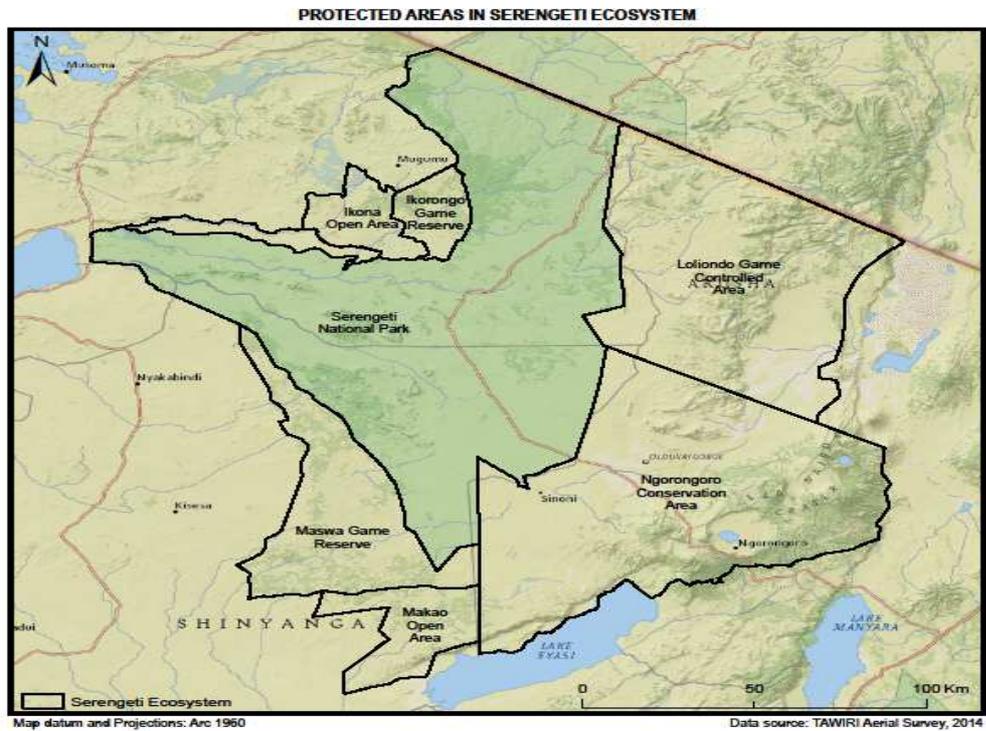


Figure 3.1 Map of the Study Area

### 3.3 Research Design and Sampling Procedure

#### 3.3.1 Household interviews and Focused Group Discussion

A cross-sectional design as suggested by Kothari, (2004) was adopted whereby the study area was visited once during data collection. The sampling frames for this study was the village registers containing the list of households while the sampling units being the households. A random sampling technique was used to select study villages from a set of villages around Maswa Game Reserve. The set of villages was determined with the following factors: proximity of the village and its influence to the Reserve, easy accessibility time and costs for the research (Kombo and Tromp, 2006). The sample consisted of three villages namely Buturi, Makao and Damidami. Random sampling approach was used in order to avoid any biasness. The head of the households was the

main respondents since in most African tradition and customs they are the spokespersons of the household and often major decision makers on importance matters concerning the welfare of other members of the household (Lubida., 2004).

In this study, the sample size for interview was 10% of all the households in each of the three selected villages. According to Boyd *et al.*, (1981) recommended and reasonable representative sample size for a particular population under study should be at least 5%. In each village one focus group discussion was conducted with each group comprising 10 - 15 people since this is regarded to be reasonable group size usually used in most studies (Saunders *et al.*, 2007). Participants included village leaders, different members of various committee, elders, youth men and women. The study used also key informants which comprised of Community Development Officer, District Game Officer, District Agricultural and Livestock Officer, Game Wardens from Serengeti National Park and members of Authorized Associations from Makao Wildlife Management Area

### **3.2.2 Participant observation**

A single 3km walked transect heading towards each of the three study villages was established from a random transect initiation point along the reserve boundary. The transect was called village transects in the proposed study. From each of the transect initiation point perpendicular to the reserve boundary, another 3km transect heading towards the reserve centre was established. These was reserve transects. Truncation distance on either side of the transect was 100m. The following information was quantified and recorded along each transect. Number and species of wild animals

encountered, number of humans encountered, number and species of livestock encountered, number and approximate size of farms encountered, number of abandoned bomas, vegetation type in every 100m, and the extent of vegetation cover in percentage in every 100m, 0% means bare land and 100% means there is no vegetation destruction), source of vegetation destruction (wild fire, grazing, trampling, settlements, deliberate clearing, agriculture etc).

### **3.3 Data Collection**

Primary and secondary data were collected in this study. In collecting primary data various methods was employed. These included questionnaire surveys, key informants interview, Focus Group Discussion (FGD) and participant observation.

#### **3.3.1 Questionnaire administration**

Semi - structured questionnaire was administered to both male and female headed households. Open and close-ended questions were used to collect information from households. The information to be collected included: social economic status of the house hold, livelihood activities (farming, livestock keeping, business etc.) conservation awareness and attitudes of local communities towards conservation.

#### **3.3.2 Key informants**

A checklist of probing questions was prepared for key informants. Key informants are individuals who were appropriate for their view on the issue pertaining to land use systems done along the MGR and their implication to wildlife conservation. Key

informants comprised of District Game Officer, District Agricultural and Livestock Officer, Game Wardens from Serengeti National Park and Makao wildlife management area. The Questions aimed to get information related to land use activities in and around the reserve, and their associated effect on the wildlife conservation.

### **3.3.3 Focus Group Discussion**

This was conducted with groups of people in the village with respect to their committee. This included village leaders, different members of various committee, elders, youth men and women. All groups had a mixture of sex and age classes. The information which was collected included the types of land use systems practiced in and around the Reserve and their effect to wildlife animals.

### **3.4 Secondary data**

A range of secondary data about the land use system done along the Reserve and their associated affect to wildlife conservation was collected from relevant offices, village and ward management, and relevant government and non-government offices. Other documents and publication was obtained through, literature search using Internet and relevant references cited in various articles was used. The articles was further searched on Google scholar using the following key cords; (1) Local land use activities, conservation (2) Grazing impacts, (3) Protected area, livestock grazing, tourism. All articles gathered was examined for old articles related to the issue regarding impacts of land use activities on conservation not found in the search conducted. This information was important to broaden perspectives and also provide in - depth understanding of the research topic.

### **3.5 Data Analysis**

Statistical Package for Social Science computer program (**SPSS**) was used in data analysis. Relevant parametric statistics was used in analyzing information collected through both house hold surveys and participant observation. Non parametric statistics was only used when the condition of normal distribution could not be fulfilled. The analysis identified important land use systems, with a special focus on land use activities, and their conservation implications. Drivers of environmentally unfriendly or destructive livestock keeping activities were also explored. Other data collected from key informants and group discussions was presented as averages, frequencies, mean, standard deviation and percentages.

## **CHAPTER FOUR**

### **DATA ANALYSIS AND PRESENTATION OF FINDINGS**

#### **4.0 Introduction**

This study was done around MGR with the aim of identifying land use systems in areas adjacent to the reserve and its conservation implications. Data were collected mainly through interviews and questionnaires. SPSS was used to analyze data obtained through questionnaires while thematic approach based on the research questions was used to analyze data obtained through interviews and focus group discussion. Three key objectives were answered by this section and these are to: identify land use systems around Maswa game reserve; assess the conservation impact of land use activities around Maswa game reserve and to determine the measures that can address the conservation problems.

#### **4.1 Demographic Characteristics of Respondents**

The table below shows the distribution of respondents according villages: - Makao, Butuli and Damidami and these villages are located around Maswa game reserve. Out of 93 respondents living around Maswa game reserve 30 were from Makao, 40 from Butuli and a total of 23 from Damidami villages. These respondents were important because they were living around Maswa game reserve and interact with wildlife in one way or another

#### 4.1.1 Name of the Villages for the study

**Table 1 : Distribution of Respondents according to three Villages.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Makao	30	32.3	32.3	32.3
Butuli	40	43.0	43.0	75.3
Damidami	23	24.7	24.7	100.0
Total	93	100.0	100.0	

#### 4.1.2 Distribution of Respondents According to Division

The table 2 below shows the distribution of respondents according to the divisions, Makao, Butuli and Damidami villages are also further divided into three divisions and these are Kimali, Nkololo and Kisesa. Out of 93 respondents Kamali had 30, Nkololo 23 and Kisesa 40.

**Table 2 : Distribution of Respondents According to Division**

	Frequency	Percent	Valid Percent	Cumulative Percent
Kimali	30	32.3	32.3	32.3
Nkololo	23	24.7	24.7	57.0
Kisesa	40	43.0	43.0	100.0
Total	93	100.0	100.0	

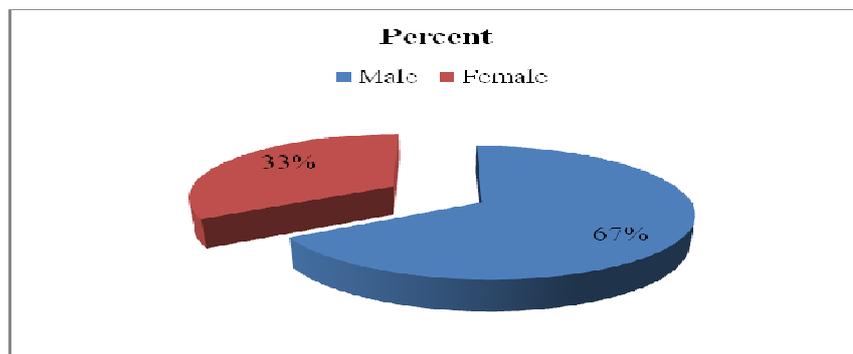
#### 4.1.3 Distribution of Respondents According to Wards

**Table 3 : Distribution of Respondents according to three Villages**

	Frequency	Percent	Valid Percent	Cumulative Percent
Mwangudo	30	32.3	32.3	32.3
Nkidwabiye	23	24.7	75.3	24.7
Sakasaka	40	43.0	100.0	43.0
Total	93	100.0		100.0

#### 4.1.4 Gender of Respondents

Figure 1 below shows the gender of respondents, 33% of the 93 respondents were women while 67% were male. The data is revealing the lower number of women compared to men and this may be attributed to existence of patriarchal societies in most of African societies where women are not involved in decision making and community participation of major events.

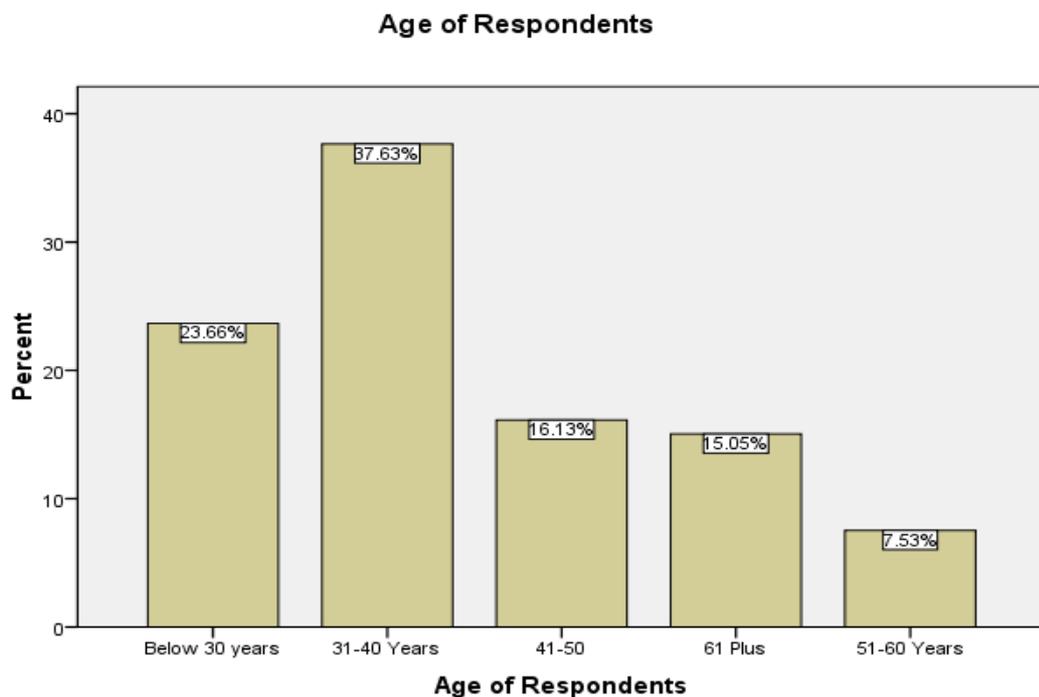


**Figure 2: Gender of Respondents (Source: Field Survey, 2015)**

#### 4.1.5 Age Distribution of Respondents

The figure 2 above shows the distribution of respondents according to age. The majority age group was 31- 40 with 37.6% of the 93 respondents, 23.6% of respondents were

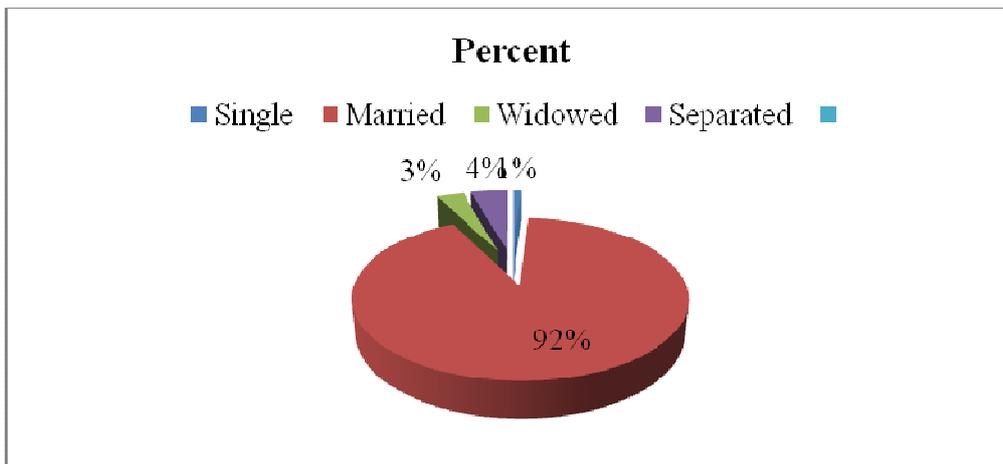
below 30 years of age, 16.1% were between the age group of 41- 50, seven percent were between 51-60 years and 15.1% were 61years old and above. The data exposed the balance of respondents according to age groups. It was shown that, the aged population of 61 years and above was more in number compared to those between 51-60 years. However the study showed that at least 61% of the total respondents were 40 years and below and this is against the notion that young and energetic migrate to urban areas since Maswa game reserve is located in a rural area. It was therefore interesting to note that, the population is balanced according to age groups



**Figure 3: Age Distribution of Respondents (Source: Field Survey, 2015)**

#### **4.1.6 Distributions of Respondents by Marital Status**

Figure 3 is an illustration of the distribution of respondents by marital status. Table 4 Shows the Distribution of Respondents by Family Size. At least 92% of the 93 respondents were married and the remainder of 1% were single (2%), separated (4%) and widowed (3%). The results indicate strong households with powerful family values because a total of 91% is a big number and a total of 7% for those separated and divorced is a small figure.



**Figure 4:** Distributions of Respondents by Marital Status (Source: Field Survey, 2015)

#### 4.1.7 Household Size of Respondents

Table 4 shows the family size per household for those married, 22 households had an average of below 4 children per family, 29 households had an average of 5 or 6 children, 21 households had 7 or 8 children per each household, and 20 households had children of above 9 while one value was missing. The study showed big families or households with many children and the family size affect the land use around Maswa game reserve directly because households should use land use as a way to feed their families. Smith (1990) argued that, to have people with larger families around game reserves is dangerous to the existence of wildlife because too many people can compromise the

ecosystem because they survive on land use activities which has great potential to disturb the game reserve.

**Table 4 : Family Size per Household (Source: Field Survey, 2015)**

	Frequency	Percent	Valid Percent	Cumulative Percent
Below 4	22	23.7	32.3	23.9
5-6	29	31.2	75.3	31.5
7-9	21	22.6	100.0	22.8
Above 9	20	21.5		21.7
Total	92	98.9		100.0
Missing Values	1	1.1		
Total	93	100.0		

#### **4.2 Response on whether Respondents are Aware that Maswa Game Reserve is a Protected Area (Source:Field Survey, 2015)**

Figure 4 above shows the responses of 93 respondents when asked on whether they were aware that Maswa game reserve is a protected area. Out of 93 respondents 59 males agreed that, they were aware, 3 males said no while all 31 women respondents said yes. This observation is very interesting because almost everyone around Maswa game reserve knows that the area is protected and this will make sure that local people may be forced to respect the reserve. The local authorities did very well in bringing awareness to people around the reserve and this will help in the smooth interaction between the local communities and wild animals. The finding is supported by Beier (1995) who stated that, usually people living around the game reserves are aware that, they are protected areas and local authorities are always making people aware.

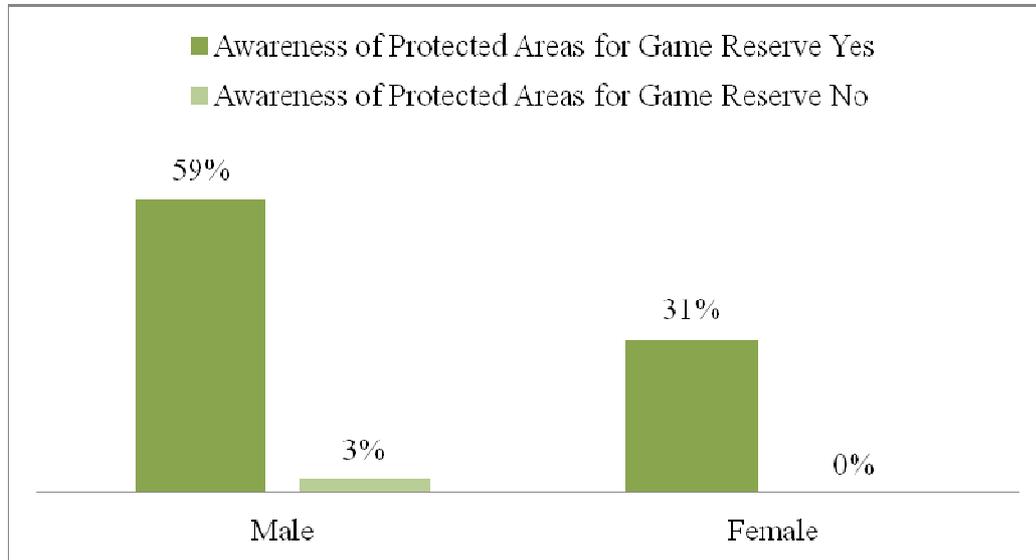


Figure 5: Above show the response on whether respondents are aware whether Maswa game reserve is a protected area (Source: Field Survey, 2015)

#### 4.3 Response on whether Land Use activities are practiced Around the Reserve

Figure 5 shows the responses of respondents when they were asked whether land use activities are practiced near Maswa Game Reserve. Out of 93 respondents 29 from Makao village said land use is being practiced in areas around the reserve, 38 respondents in Butuli village said yes as well while 22 respondents from Damidami also agreed. Only a handful of 3 people said no. The study clearly indicated that, people around Maswa Game Reserve are practicing land use and in most cases land use practice may be dangerous to the existence of wildlife an allegation discussed in this section. Frontier (2003) also observed that, majority of people are surviving from land use activities around the Reserves and that has a serious effect on the Game Reserves.

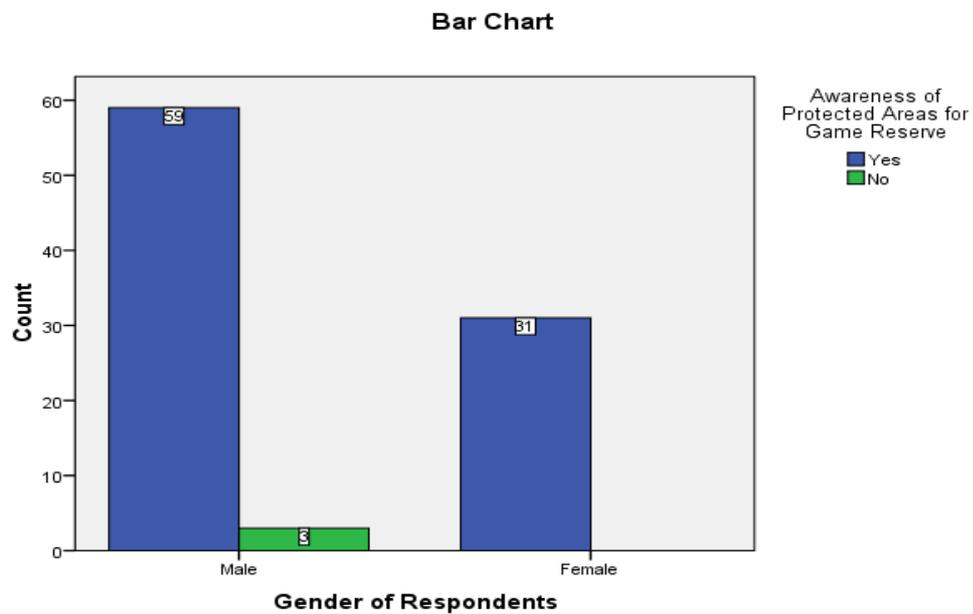
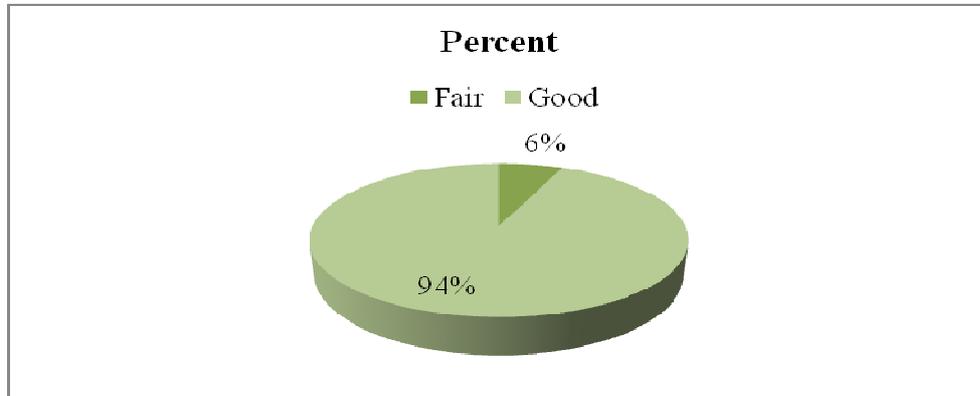


Figure 6: Response on whether Land Use is practiced Around Maswa Game Reserve (Source: Field Survey, 2015).

#### 4.4 Responses of the Current Status of the Wild Game Reserve

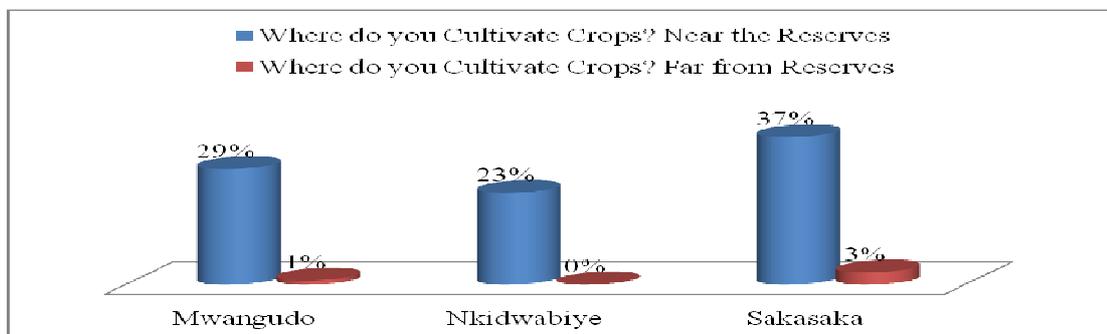
Figure 6 shows the responses of respondents on the current status of Maswa game reserve. Out of 93 respondents, 94% said the state of Maswa game reserve is still good while 6% said the state of the game reserve is still fair. It is interesting to note that, despite the practice of land use along Maswa game reserve, respondents still feel that the reserve is still in good shape. This is contrary to the view of Karpati (2013) it is very difficult for the game reserve to be in safe condition if people are practising land use activities around. Therefore for local residence to say the status of the game reserve is good is questionable since they agreed that, they practice land use activities intensively around the reserve.



**Figure 7: Responses of the Current Status of Maswa Game Reserve (Source: Field Survey, 2015)**

#### 4.5 Responses on where People Cultivate

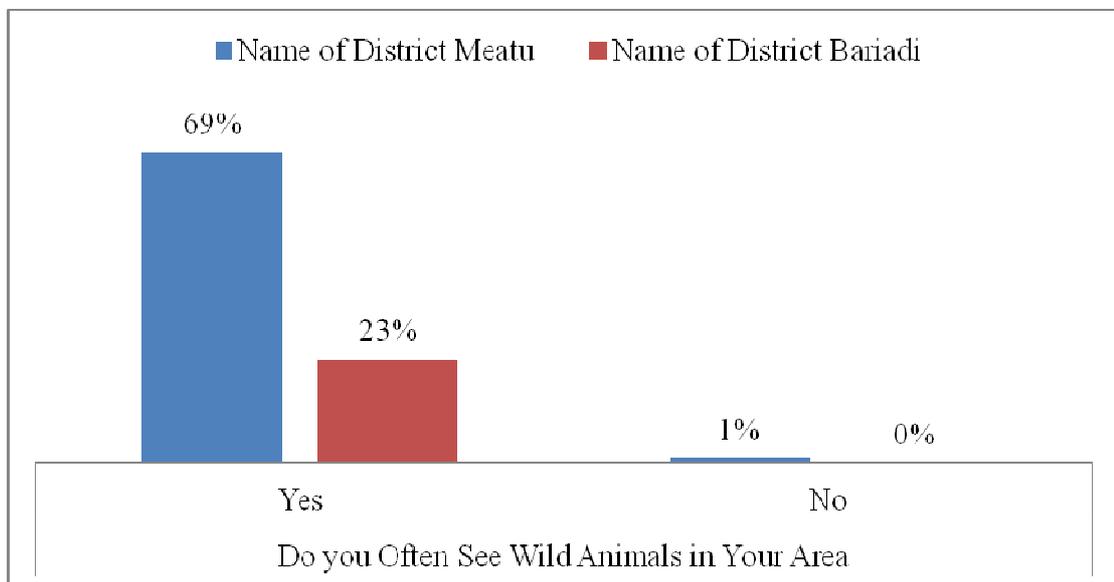
Figure 7 shows responses of respondents on whether people are cultivating close to the game reserve. Out 93 respondents, 29 in Mwangudo ward said yes (people cultivate near the reserve), 23 in Nkidwabiye ward and 37 in Sakasaka ward. Despite respondents saying that, the status of Maswa game reserve is still good, they accepted that people are cultivating very close to the Reserve which is contrary to Wildlife Conservation Act no 5 of 2009(Section 74) Karpati (2013) also supported the view that, majority of people cultivate near to the reserve and it can cause danger to the ecosystem around the reserve.



**Figure 7: Responses on where People Cultivate (Source: Field Survey, 2015)**

#### 4.6 Responses of Respondents on whether they see animals in their residential areas

Figure 8 shows the response of whether people see animals in their localities and out of 93 respondents 69 from Meatu district said yes and 23 from Bariadi district also agreed that they often see animals in their localities. Only one person said he/she has not seen any animal. This shows that residents around Maswa game reserve are living with animals in harmony because if people are violent to animals they may migrate. Mpanduji (2004) also argued that, in some cases people around the protected area do interact with animals but not to all types. Therefore this does not give a signal that there is health interaction between humans and animals because some animals may still migrate.



**Figure 8: Responses of Respondents on whether they see animals in their residential areas (Source: Field Survey, 2015)**

#### 4.7 Hypotheses testing one

Table 4 shows the testing of hypotheses using spearman correlation coefficient and it was hypothesized that, there was no relationship between people's awareness of the game reserve as protected and the current status of Maswa game reserve. Spearman correlation coefficient was used because data was nominal and parametric in nature. The table illustrate that,  $p(93)=0,048$ ,  $p>0.05$  the result shows a weak positive relationship which is insignificant and what it means is that there is a weak positive relationship between people's awareness of game reserve as a protected area and the current status of Maswa game reserve but the relationship is insignificant and by chance and hence not important for consideration. This is supported by Vincent et al (2003) who argued that, even if local people have good knowledge about the importance of animals and game reserves this does not stop them from negatively affecting the ecosystem.

**Table 5 : Hypotheses testing one Correlations**

			Awareness of Protected Areas for Game Reserve	Current Status of Game Reserve
Spearman's rho	Awareness of Protected Areas for Game Reserve	Correlation Coefficient	1.000	.048
		Sig. (1-tailed)	.	.324
		N	93	93
	Current Status of Game Reserve	Correlation Coefficient	.048	1.000
		Sig. (1-tailed)	.324	.
		N	93	93

#### 4.8 Hypotheses testing two

Table 5 shows the testing of hypothesis two, which stated that, the intensity of land use around the farm has a negative relationship with the current status of the reserve. Spearman correlation coefficient was used on the grounds that, the data is parametric and nominal in nature. The result shows that,  $p(93)=-0.060, p>0.05$  and it showed a moderate negative relationship between the intensity of land use in Maswa game reserve and current status of the reserve but the relationship is insignificant. This is supported by Pulliam et al (1994) who stated that practising land use activities around the protected area can lead to the destruction of natural habitat and can force animals to migrate.

**Table 6 : Hypotheses Testing Two Correlations**

		Intensity of Land Use in Game Reserves	Extend of Depending on Reserves
Spearman's rho	Intensity of Land Use in Game Reserves	1.000	-.060
	Correlation Coefficient	.	.565
	Sig. (2-tailed)	93	93
rho	Current Status of Game Reserve	-.060	1.000
	Correlation Coefficient	.565	.
	Sig. (2-tailed)	93	93
	N		

#### 4.9 Results of Analysis of Interviews and Focus Group Discussion data

##### 4.9.1 Land use activities being practiced around Maswa game reserve

Interviews were administered to 20 people who work with Maswa game reserve, SENAPA and local leaders and they stated that, the following land use activities were

being practiced around the reserve includes: - crop cultivation, livestock grazing, charcoal burning, hunting, logging and firewood collection.

#### **4.9.2 Respondents views on the effects on land use activities to Maswa game reserve**

When asked to state their views on the effects of the above land use activities to Maswa game reserve this is what they suggested: causing desertification, overgrazing, loss of habitat, land degradation/soil erosion, zoonotic diseases; movement of wild animals; human wildlife conflict and poaching.

#### **4.9.3 Possible Solution to the Problems**

Reponses from FGD and interviews suggested the following possible solution to the problems:-

Local Authority should introduce by-laws to protect the reserve against unsustainable use and activities that are incompatible with biodiversity conservation.

Control the number of livestock per household for local communities leaving close to the reserve.

Carrying out regular anti - poaching activities - Management of Maswa Game Reserve should conduct regular ant poaching patrols in and around the reserve in order to combat poaching. Illegal hunting of wildlife remains a persistent threat to wildlife across the country. Despite poaching becoming increasingly high and wide spread, its impact on the wildlife populations has not caught the attention of policy makers as it is assumed to

be minimal (Barnett 2000). This is partly true because many rangelands experiencing intensive poaching remain un-researched because the majority of them fall outside protected areas. Also, the available literature are sporadic and biased towards certain geographic locations and protected ecosystems particularly Serengeti (Hofer et al. 2000, Loibooki et, al.2002, Marealle et al. 2010).

Another strategy is to introduce cheap and alternative energy so that people can reduce cutting of trees.

## **CHAPTER FIVE**

### **DISCUSSION OF RESULTS**

This study was done around Maswa Game Reserve with the aim of identifying land use systems in areas adjacent to the reserve and its conservation implications. Three key objectives were answered by this section and these are to: identify the land use systems around Maswa game reserve; assess the conservation impact of land use activities near Maswa game reserve and to determine the measures that can address the conservation problem. This chapter presents the discussion of the findings according to the study objectives.

#### **5.1 Land use systems around Maswa Game Reserve**

Results from interviewed respondents showed that land use activities being practiced around Maswa game reserve includes: - crop cultivation, livestock grazing, charcoal burning, hunting, logging and firewood collection. The findings of the study found that out of 93 respondents 29 from Makao village said land use is being practiced in areas around the reserve, 38 respondents in Butuli village said yes as well while 22 respondents from Damidami also agreed. Only a handful of 3 people said no. The study clearly indicated that, people around the reserve are practicing land use around the reserve and in most cases land use practice may be dangerous to the existence of wildlife. Responses of respondents on whether people are cultivating close to the reserve indicate that out of 93 respondents, 29 in Mwangudo ward said yes (people cultivate near the reserve), 23 in Nkidwabiye ward and 37 in Sakasaka ward. The finding is supported by Beier (1995) who stated that, usually people living around the reserve practice land use. Frontier (2003) also observed that, majority of people are surviving

from land use activities around the protected areas and this has a serious effect on the reserve.

## **5.2 Impact of land use activities near Maswa Game Reserve.**

The researcher asked respondents to state their views on the effects of the land use activities to Maswa game reserve. The study found that if the activities will not be planned and controlled it will cause effects such as desertification, overgrazing, loss of habitat, land degradation/soil erosion, zoonotic diseases, and movement of wild animals, human wildlife conflict and poaching. The findings is supported by Pulliam et al. (1994) who stated that practicing land use activities around the protected area can lead to the destruction of natural habitat and can force animals to migrate. Karpati (2013) also supported the view that, majority of people cultivate near to the protected area and it can cause danger to the ecosystem. The findings was also supported by Whitty, (2007) and Blacke et al. (2009) who stated that, encroaching of wildlife corridors interrupt and affect interspecies dependencies which could eventually lead to extinction on the stability of the ecosystem.

## **5.3 Measures that can address the conservation problem resulting from Land use systems**

The third objective of the study was to determine the measures that can address the conservation problem. The respondents recommended that measures such as introduction of bylaws which will prohibit local people from practicing human activities (agriculture, settlement, live stock grazing etc.) at least 1km from the reserve, and to

control the number of livestock per house hold for local communities leaving close to the reserve.

Management of Maswa Game Reserve should conduct regular ant poaching patrols in and areas around the reserve in order to combat poaching, also introduce cheap and alternative energy so that people can reduce cutting of trees.

Local Authority should introduce land use planning programmes in order to use village land sustainably and eventually this will discourage shifting cultivation.

Developing deliberate measures to address about poverty of local communities around the reserve. The area has various economic potentials which could be used by poverty alleviation programmes hence reducing dependency to natural resources in the reserve. Among these potentials include ecological, cultural tourism and beekeeping.

## **CHAPTER SIX**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Summary**

A study was conducted in Maswa game reserve with the aim of studying; assess land uses practices/activities in protected areas, their implications to conservation and interactions of game reserve with people living around the reserve using Maswa game reserve as a case study. The objectives of the study were to: identify the land use systems around Maswa game reserve; assess the conservation impact of land use activities around Maswa game reserve and to determine the measures that can address the conservation problem. The study used interviews and questionnaires as data collection procedures and 93 respondents from 3 districts around the reserve answered the questionnaire. Twenty people were interviewed and they were people working with Maswa game reserve, Serengeti National Park and local leaders. The questionnaire was analyzed using SPSS and interviews through three thematic approaches which included:

- types of land use around Maswa game reserve, effects of the identified land use activities and possible solutions to the effects.

#### **5.2 The following were some of the findings**

Residents practice the land use activities near Maswa game reserve. Evidence on the ground has shown that agriculture and grazing of animals is done too close to the reserve and that has an impact on wild animals welfare because they are sometimes competing for pastures. The practice of agriculture near the reserve has significantly affected the natural ecosystem around the reserve.

The awareness of people of Maswa as a game reserve is extremely high. At least more than 97% were aware that Maswa game reserve is a protected area and therefore most people were cautious when practicing their land use activities. The knowledge on awareness is good because it helps local people to preserve and respect the game reserve. The local authorities did a lot to make people aware that Maswa game reserve is a protected area. People around the reserve are involved in poaching. That was the sad information to get because people poach animals for various reasons like getting game meat for sale and smuggling some valuable animal trophies.(Elephant tusks). They anonymously agreed that, poaching is often reported on daily bases. This was also supported by Hackel 1999, Loibooki *et al.*, 2002, Kideghesho *et al.*, 2005, Wittemyer *et al.*, 2008).in their study conducted in Serengeti National Park.

### **5.3 Land use activities practiced near Maswa game reserve:**

Crop cultivation is under practice and they grow crops like maize and sorghum around the reserve and the practice is important for households' survival and the type of agriculture practiced is both subsistence and commercial.

Livestock grazing is the order of the day, and there are some households with large heads of livestock reaching even above 200. Livestock is a major threat to the reserve and Serengeti ecosystem because it is causing overgrazing and there is competition between livestock and wild animals for pastures. Charcoal burning and firewood collection are other land uses under practice and wood and charcoal are the main sources of energy and some are harvesting wood and charcoal for selling. This has resulted in

deforestation and destruction of ecosystem. (Campbell *et al.*,2001, Loibooki *et al.*,2002,Kideghesho *et al.*,2005).

Hunting is under practice among some people from the local villages and the hunting is illegal because it is not allowed by Wildlife Division and this illegal hunting has resulted in serious poaching.Lodging is also available in and around the reserve and some lodges are used by tourist and some locals have constructed lodges accommodating local people and tourists. Lodging provides income for some few households.

#### **5.4 Problems associated with the land use activities around Maswa game reserve:**

Desertification due to charcoal and firewood collection and this pose a direct threat to wildlife. It also causes overgrazing due to the low carrying capacity of pastures. The large number of livestock owned by households is a threat and a major cause of over grazing.It also causes loss of habitat and destruction of ecosystem is another problem caused directly by the land use activities around Maswa game reserve. The destruction of ecosystem limits animal movement and welfare.Not only these, but also it causes land degradation/soil erosion due to overgrazing and deforestation because people are cultivating close to the reserve. It also causes diseases which are associated with zoos and game reserves ( zoonotic diseases such as Rinder pest, and Ecf(east coast fever) (Rija2009). These diseases affect both human beings and wild animals so there is a need to stop interference between human beings and wildlife.

People acknowledged that they used to see Rhinos frequently but it is now difficult to see them in these current days. The wild animals always migrate if their welfare is under threat.

Land use activities close to the reserve cause human wildlife conflict because some wildlife attack and kill livestock and that situation triggers conflict between people and wildlife. Poaching is also a problem because people are staying too close to the reserve and because they want income to survive some are resorting to poaching. (Loibooki et al., 2002, Kideghesho et al., 2005).

### **5.5 Possible suggestions to the problems associated with practicing land use near**

#### **Maswa game reserve:**

Local Authority should introduce Bylaws which will prohibit local people from practicing human activities (Agriculture, Settlement, Live stock grazing etc.) at least 1km from the boundary of the reserve. Also to control the number of livestock per household leaving close to the reserve. Management of Maswa game reserve should conduct regular patrols in and around the reserve in order to combat poaching and finally to introduce cheap and alternative energy so that people can reduce cutting of trees. (URT2003).

### **5.6 Conclusion**

The study has shown that, people around Maswa game reserve have a negative effect towards the existence of the reserve and the increase of population and cultivation close to the reserve are major threats to the existence of Maswa game reserve. However,

serious research should be done to get the actual statistical figures about people living around Maswa game reserve.

### **5.7 Recommendations**

Basing on the suggestions given by the respondents, the responsible authorities should consider the following recommendations:

Local Authority should introduce Bylaws which will prohibit local people from practicing human activities (Agriculture, Settlement, live stock grazing etc.) at least 1km from the reserve. To control the number of livestock per household for families leaving close to Maswa game reserve and this will go a long way addressing the problem of overgrazing .There is a need for livestock to meet the carrying capacity of the local areas. Also Management of Maswa game reserve should conduct regular ant poaching patrols in and areas around the reserve in order to combat poaching. Land use planning programmes should be in place. One way of addressing issues of competing land uses in legislation is to envisage compensation to land owners for damage caused by wildlife.

Another approach is to increase the involvement of local populations in economic activities related to wild life. A significant portion of the deriving revenues remains at the local level and provides benefits to local people as a compensation of the presence of wild animals. To introduce cheap and alternative energy so that people can reduce cutting of trees however, it may be a hard task because alternative sources of energy may be expensive for villagers.

Also deliberate measures are needed to address about poverty of local communities around the reserve. The area has various economic potentials which could be used by poverty alleviation programmes hence reducing dependency to natural resources in the reserve. Among these potentials include ecological, cultural tourism and beekeeping.

Local communities should be sensitized on the role of conservation through extension services that will restrain shifting cultivation and charcoal making observed in the area and reduce pressure in the reserve.

Lastly, Local Authority should introduce land use planning programmes in order to use village land sustainably.

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## APPENDICES

## Appendix iii: Field data collection form for participant observation.

## VILLAGE TRANSECT ( 3 KM TRANSECT)

NO.	LEFT 100 KM WIDTH Village A. (Butuli)	RIGHT 100 KM WIDTH Village A. (Butuli)
1.	House.....1	Cotton farm.....03Acres
2.	Maize farm..... .. 05Acres	Maize farm.....04Acres
3.	Cotton farm..... ..10Acres	Maize farm.....05Acres
4.	House..... ..02	House.....04
5.	Cattle..... ..45	Cotton farm.....03Acres
6.	House..... ..03	House .....02
7.	House..... ..17	Sunflower farm.....04
8.	Cotton farm..... .10Acres	Sweet potatoes.....01
9.	Sunflower..... 05Acres	Maize farm.....05Acres
10.	House..... ..04	Maize farm.....03Acres
11.	School..... ..01	Hut.....03
12.	Dispensary..... ..01	Houses.....03
13.	Cattle..... ..70	Houses.....08
14.	House..... ..08	Houses.....40
15.	Maize..... 15Acres	Maize farm.....05
16.	Cotton farm..... ..10Acres	Cotton farm.....10Acres
17.	House..... ..02	Maize.....05Acres
18.	Millet farm..... ..5Acres	Cotton farm.....04Acres
19.	Sunflower farm..... ..5Acres	Cotton farm.....06Acres
20.	Mango trees..... ..10	Maize farm.....02Acres

21.	Millet farm..... .04Acres	Maize farm.....03Acres
22.	Cotton.....10Acres	Houses .....02
23.	Sunflower.....05Acres	Maize farm.....010Acres
24.	Sunflower.....05Acres	Maize farm.....02 Acres
25.		House.....02
26.		House.....05
27.		Human being(men)..02
28.		Maize farm.....04Acres
29.		Maize farm.....05Acres
30.		Maize farm.....05Acres
31.		Maize farm.....07Acres
32.		Cotton farm.....010Acres

**OPPOSITE TRANSECT (RESERVE TRANSECT)**

<b>NO.</b>	<b>LEFT 100 KM WIDTH Village (Butuli)</b>	<b>RIGHT 100 KM WIDTH Village (Butuli)</b>
1.	Defforestation	Defforestation
2.	Over grazed patch	Over grazed patch
3.	Several animal tracks	Several animal tracks
4.	Tramped patch	Tramped patch
5.	Soil erosion	Soil erosion
6.	Giraffe.....10	Impala.....30
7.	Common duiker 02	Secretary bird.....02
8.	Warthog.....05	Cattle.....200
9.	Buffaloes.....20	Goat.....50
10.	Impala.....20	Sheep.....80
11.	Cattle.....100	Thomson gazel....200
12.	Sheep.....70	Elephant.....05
13.	Human being...(Men 05)	
14.	Abandoned bomas near the	

	reserve(03)	
15	Goats.....(90)	
16	Jackal.....(03)	

**VILLAGE TRANSECT( 3 KM TRANSECT)**

<b>NO.</b>	<b>LEFT 100 KM WIDTH Village A. (Makao)</b>	<b>RIGHT 100 KM WIDTH Village A. (Makao)</b>
	House.....4	Cotton farm.....07Acres
	Maize farm..... .10Acres	Maize farm.....05Acres
	Cotton farm.....10Acres	Maize farm.....05Acres
	House..... .05	House.....09
	Cattle..... .100	Cotton farm.....05Acres
	House..... .05	House .....05
	House..... .11	Cotton farm..... 03Acres
	Cotton farm..... .5Acres	Millet farm..... 05Acres
	Sunflower..... .10Acres	Maize farm.....05Acres
	House..... .03	Millet farm.....03Acres
	School..... .02	Hut.....03
	Police post..... .01	Houses.....03
	Goat..... .70	Cotton..... .04
	House.....08	Houses.....10
	Cotton farm.....05Acres	Sun flower farm.....07Acres
	Cotton farm.....10Acres	Cotton farm.....05Acres
	House.....02	Cotton...farm.....10Acres
	Millet farm.....05Acres	Cotton farm.....05Acres
	Sunflower farm.....05Acres	Cotton farm.....06Acres
	Livestock grazing.....200	Millet farm.....02Acres
	Sunflowerfarm.....02Acres	Maize farm.....03Acres
	Cotton.....2Acres	Houses .....05
	Sunflower.....03Acres	Maize farm.....05Acres

	Sunflower.....05Acres	Maize farm.....04 Acres
	House.....10	House.....06
	-	House..... ..03
	-	Human being(men).....02
	Sunflower farm 03Acres	Maize farm.....04Acres
	-	Live stock .....150
	-	Maize farm.....05Acres
	Goat 20	Goat ..... ..70
	Cotton farm 04 AcresAcres	Cotton farm.....010Acres

**OPPOSITE TRANSECT (RESERVE TRANSECT)**

<b>NO.</b>	<b>LEFT 100 KM WIDTH Village (Makao)</b>	<b>RIGHT 100 KM WIDTH Village (Makao)</b>
17	Deforestation	Deforestation
18	Over grazed patch 05	Over grazed patch 05
19	Buffalo 02	Cattle 100
20	Tramped patch	Tramped patch
21	Soil erosion	Soil erosion
22	Impala.....10	Impala.....30
23	Warthog 02	Secretary bird.....02
24	Bare ground.....	Cattle.....200
25	Water back.....02	Goat.....50
26	Impala.....20	Sheep.....80
27	Cattle.....100	Thomson gazel....20
28	Sheep.....20	-
29	Women.....03	-
30	Goat.....50	-
31	Goats.....40	-

31	Jackal.....02	-
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**VILLAGE TRANSECT (DAMIDAMI)**

<b>NO.</b>	<b>LEFT 100 KM WIDTH</b>	<b>RIGHT 100 KM WIDTH</b>
1.	Cotton farm 10 Acres	Cotton farm 05Acres
2.	Cotton farm 05 Acres	Maize 03Acres
3.	farm 03 Acres	Maize 04Acres
4.	Maize farm 05Acres	Sun flower 05Acres
5.	Cotton farm 10 Acres	Sun flower 02Acres
6.	Cotton farm 05Acres	Cattle 100Acres
7.	Maize farm 05Acres	Goat 50
8.	Cattle 70 Acres	Millet farm 03 Acres
9.	Millet farm 05Acres	Maize farm 06Acres
10.	Millet farm 10Acres	Maize farm 04Acres
11.	Cotton farm 05Acres	Cotton farm 05 Acres
12.	Cotton farm 06Acres	Goat 50
13.	Millet farm 05Acres	Goat 20
14.	Millet farm 02Acres	Human being (men) 04
15.	Sunflower 02Acres	Sun flower 02Acres
16.	Cattle 100	Maize farm 03 Acres
17.	Cassava 01	House 10
18.	Cattle 100	House 05
19.	Cassava 01Acres	Mill farm 05Acres

20.	Sunflower	02Acres	Sun flower	02Acres
21.	Cotton	02Acres	Cotton	05 Acres
22.	Maize	05Acres	Maize farm	02 Acres
23.	Sunflower	03Acres	House farm	03 Acres
24.	House	10	House	05
25.	Primary school	01	Cattle	60
26.	Dam	01	Donkey	05

#### OPPOSITE TRANSECT (RESERVE TRANSECT)

NO.	LEFT 100 KM WIDTH	RIGHT 100 KM WIDTH
1.	Tramped patch	Tramped patch
2.	Soil erosion	Soil erosion
3.	Over grazed patch	Over grazed patch
4.	Live stock	200
5.	Open grassland	Live stock
6.	Thomson gazelle	50
7.	Goat	10
8.	Sheep	20
9.	Cattle	150
10.	Tramped patch	100
11.	Over grazed patch	Goat
12.	Soil erosion	60
13.	Jackal (Golden backed)	Tramped patch
14.	Goat	Over grazed patch
15.	Cow	Soil erosion
		03
		20
		50
		Fire
		Warthog
		02

16.	Goat	40	Thomson gazelle 10
17.	Impala	05	Fire
18.	Acacia wood land		Acacia wood land
19.	Topi	06	Jackal(Golden backed) 01
20.	Buffalo	02	Buffalo 01
21.	Cow	100	Cow 50
22.	Jackal (Golden backed)	02	-
23.	Impala	15	-
24.	Open grassland		Open grassland
25.	Goat	50	Goat 20
26.	Cow 100		-

### Appendix 1: Questionnaire for Household Based Interview

Questionnaire number .....

Date ..... 2015

Interviewee's

Name:.....

Location:

- a) Village: ..... b) Ward: .....
- b) Division: .....d) District:.....

**Demographic Data**

Respondent's age(years)

Respondents Sex:

Male: ..... b)Female: .....

Marital Status:

- a) Single: .....
- b) Married: .....
- c) Widowed: .....
- d) Separated: .....
- e) Divorced: .....

House hold size(number of people in the household)

How many are below 15 years old(including the head of the household)

1. Education Status:

- a) None.....
- b) Primary Education
- c) Secondary Education
- d) Tertiary Education

2. Major economic activity:

- a) Farming.....
- b) Livestock.....
- c) Charcoal burning....
- d) Hunting.....
- e) Logging.....
- f) Lumbering.....
- g) Employed.....
- h) Business.....
- I) Other(please specify).....

3. Residential status

a) Nature .....

b) Immigrant .....

4. If you are an immigrant how long have you been in this area (years).....

5. What is your tribe? .....

**Conservation Awareness**

Do you know what protected area is?.....

a) Yes .....

b) No.....

What is the status/use of the protected area in the past, before gazettelement?

.....  
.....  
.....  
.....

Do you think people are now practicing different Land use systems around this area than in the past?

a) Yes .....

b) No.....

How many farms do you have?.....

How far is the furthest farm?(km).....

How far is the nearest farm?(km).....

**Human – Wildlife Interaction**

Do you see Wild animals or their signs in the area?(please specify)

a) .....

b) .....

What animals currently not seen but used to be seen.....

In which season of the year normally has high population of wild animals in the area.

a) Dry season .....

b) Wet season.....

c) Both seasons .....

Reasons .....

**Human Activities,**

What are the land use systems carried out around the reserve?

- a) Cultivation .....
- b) Livestock grazing .....
- c) Charcoal burning .....
- d) Hunting .....
- e) Logging.....
- f) Lumbering .....
- g) Fire wood.....
- h) Others (specify) .....

Do you think that the grazing land is adequate for you? yes.....No.....

If no why and what should be done to ensure that you have enough grazing land?

23. What are the cultural activities carried out in the village, and where are they specifically performed (forests, reserve)

- a) Ritual.....
- b) Medicinal.....
- c) Others (Specify).....

24. How many livestock species do you own?

- a) Cattle.....(number)
- b) Goat.....
- c) Sheep.....
- d) Chicken .....etc

25. Do you think it is important to let the area (Maswa Game Reserve) to wildlife rather than livestock?

- (a)Yes.....
- (b)No.....

26. Support your answer(s) above.

.....

**Appendix ii Checklist for key Informants**

1. What is the conservation status of the protected area.
2. Is there any policy or law or regulation that protects the reserve?

3. What is land use systems carried out along the reserve?
4. What is the extent of land use practices along the reserve?
5. How these activities do affect the conservation strategies of wild animals?
6. What are the consequences of those activities to the integrity of the reserve?
7. What are possible measures for remedy?
8. What are wild animals that are inside the reserve?
9. What were the common wild animals that were inside the reserve?
10. What are wild animals that are using the reserve as a migratory route?
11. What were the common wild animals that were using the reserve as a migratory route?
12. What conservation activities are currently undertaken?
13. What do you think should be done in order that conservation of natural a resource in the reserve becomes successful?
14. What is the current integrity status of the protected area?
  - a) Excellent.....
  - b) Good.....
  - c) Fair.....
  - d) Bad.....
15. What are the activities that hamper /threat the integrity of the reserve? List them according to their importance in conservation activities.
  - a).....
  - b).....
  - c).....
16. What are the consequences of these activities to
  - a) Wild animals conservation.....
  - b) Habitat.....
17. Are you aware about the consequences of human activities around the reserve?
  - a)Yes.....b).....Elaborate.....
18. Do you know movement of wild animals in different seasons of the year?

19. What is their direction during their movement?
- From Maswa game reserve to Serengeti N. Park?
  - From Maswa GR to Makao Wildlife Management Area (WMA)
  - From both direction.....
  - No idea.....
20. Do these activities carried out legally?
- Yes.....
  - No.....
  - No idea.....
21. What is your comment on the trend of animals?
- Buffalo
    - Increasing.....
    - Decreasing.....
    - No idea.....
  - Zebra
    - Increasing.....
    - Decreasing.....
    - No idea.....
  - Elephant
    - Increasing.....
    - Decreasing.....
    - No idea.....
  - Wilde beast
    - Increasing.....
    - Decreasing.....
    - No idea.....
22. Why do people prefer to take economic activities along the reserve rather than in other areas?
- .....
  - .....

23. What is the extent of people dependency to the reserve?
- (a) Very high.....
  - (b) High.....
  - (c) Fair.....
  - (d) Low.....
  - (e) Very low.....
  - (f) No idea.....
24. Is there any traditional method of conservation?
- (a) Yes.....
  - (b) No.....
25. If yes what is (are) the method (s)
- (a).....
  - (b).....
26. What is the effectiveness of these methods to the conservation activities?
27. What do you think should be done in order that conservation of natural resources in the reserve becomes successful?