THE SOCIO- ECONOMIC CONSEQUENCES OF ELEPHANT DESTRUCTIONS ON COMMUNITIES ADJACENT TO RUAHA NATIONAL PARK, TANZANIA

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A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN NATURAL RESOURCE ASSESSMENT AND MANAGEMENT OF THE OPEN UNIVERSITY OF TANZANIA

2019

CERTIFICATION

The undersigned certifies that, she has read and hereby recommends for acceptance by the Open University of Tanzania, a dissertation titled: "***The Socio- Economic Consequences of Elephant Destructions on Communities Adjacent to Ruaha National Park, Tanzania"*** in partial fulfillment of the requirements for the Degree of Master of Arts in Natural Resource Assessment and Management of the Open University of Tanzania.

……

Dr Susan Rugano Gwalema

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……

Date

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DECLARATION

I, **Agricola Roman Lihiru,** do hereby declare that this dissertation is my original work and it has not been submitted for a degree or any similar award to any other University.

…….

Signature

…….

Date

DEDICATION

I would like to dedicate this work to my wife Sabina John Kihata and my children; Jackline, Nestory, Kelvin and Winfrider for their support to me all the time I have been studying.

ACKNOWLEDGEMENT

The findings in this work have resulted from different people who helped me. I am indebted to Dr Susan Rugano Gwalema my brilliant supervisor who tirelessly guided me up to the completion of this work. I am also grateful to Felix Shayo and Queen Muhumbira for their active participation in data collection. I thank Chief Park Warden of Ruaha National Park and Management of Mahuninga, Tungamalenga and Idodi villages for granting permission to study in Ruaha National Park and Idodi ward villages.

For financial support I am grateful to Director General of Tanzania National Parks for having employed me, for part of my salary as TANAPA employee has been spent to further my knowledge in Natural Resource Assessment and Management, in the Department of Geography of the Open University of Tanzania.

The following individuals are acknowledged for their assistance with various aspects of the research: Jackson Nanyaro, Miraji I Mramba and Lomi Ole Meikasi.

ABSTRACT

The study aimed at documenting the socio- economic consequences of elephant destructions adjacent to Ruaha National Park. It looked at the effects of elephants on livelihoods in the study area, collected information on the presence of the effects and their magnitude and how local people overcome the problem. In addition, the study assessed the perceptions of the local communities towards elephant conservation in the study area. Social economic consequences of elephants on people's livelihood were noted to be on the increase. Elephants were increasingly destroying crops, infrastructure, blocking pass ways and sometimes injuring or putting at risk people's life. The efforts by villagers, and help from MBOMIPA VGS, KDU, Ruaha National Park and some few NGO's of giving education on how to co-exist with elephants and scaring them were said to be of little help. Crops and infrastructure destruction as well as destructing the environment and water sources continued to be among the most frequent problems. The community around is very much informed on the importance and the need to conserve elephants and the Ruaha National Park and it's ecosystems as a whole. The main challenge is poverty, for these rural communities which are often hardest hit by the consequences that are having limited livelihood opportunities. The government and the wildlife law enforcement agents including Ruaha National Park and KDU are recommended to react more quickly once issues of problem animals arise. In addition, the government should offer reasonable compensation for the losses resulting from the destructions in time.

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LIST OF ABBREVATIONS

GIS	Geographical Information Systems
HEC	Human Elephant Conflict
HWC	Human Wildlife Conflict
MNRT	Ministry of Natural Resources and Tourism
TANAPA	Tanzania National Parks
PAs	Protected Areas
WMAs	Wildlife Management Areas
RUNAPA	Ruaha National Park
KDU	Iringa Antipoaching Unit
WMA	Wildlife Management Area
WEO	Ward Executive Officer
MBOMIPA	Matumizi Bora ya Maliasili Idodi na Pawaga
NBS	National Bereau of Statistics

CHAPTER ONE

INTRODUCTION

1.1 Overview

1.2 Introduction to Research Problem

This study dealt with the socio- economic consequences of elephant destructions to communities adjacent to RUNAPA. Human interactions with wildlife are a defining experience of human existence. They have been increasing as human activities adjacent PAs have been increasing. These interactions can be positive or negative/conflicts. The conflict has led to the extinction and reduction of numerous species and uncountable human deaths and economic losses. Recent advances in our understanding of conflict led to a growing number of positive conservation and coexistence outcomes (Woodroffe, 2005). Like many areas in Africa, which are close to Protected Areas with elephants Idodi Division is facing the consequences of elephants destructions. The study explored types of human elephant conflicts (HEC), examined impacts on local communities and conservation, and different mitigation measures local communities employed to limit the destructions. Lastly, the suggestions on how best to manage the elephants were examined

1.3 Background to Research Problem

Elephants have been reported in Human Wildlife Conflicts (HWC) in many countries where man and elephants shared the same ecosystem. In addition to elephants, different species of primates, rodents, antelopes, buffaloes, hippopotamus, lions and bush pigs have been frequently reported too (Panda, 2007). Panda (2007) observed that elephants, which are big and powerful, have been reported to produce big damage

and losses, they have been observed to eat up to 450 kg of food per day and that they are messy eaters, uprooting and scattering as much as it is eaten. He further concluded that a single elephant makes light work of a hectare of crops in a very short time. The social economic consequences resulting from human elephants contact are together with human beings shifting willingly or unwillingly from areas close to protected areas to others, loss of life and injuries, threats to economic security, reduced food security and other livelihood opportunities (Lihiru 2013).

Messmer (2000) recognizes that with the increase in elephant's populations in response to protection, human–elephants conflicts also have increased. Rural residents, especially agricultural producers bear the brunt of wildlife damage. This means that the rural communities with limited livelihood opportunities are often hardest hit by these kinds of conflicts.

Efforts to conserve the Ruaha Rungwa ecosystem started long ago. In 1910, during German occupation the portion of the present park was made Saba Game Reserve. The British in 1946 declared the area Rungwa Game reserve. To upgrade conservation status of selected areas, in 1964 the southern portion of the reserve was declared the Ruaha National Park. Again in 1974 the smaller section to the south east of the Great Ruaha River was added something strengthened security and therefore high chance of elephant population to increase.

This is because a National Park is an area where resource protection is to the maximum and viewing of resources is the single most widely accepted form of use (IUCN, 2010). In 2008 the Park was extended to include Usangu wetlands for

conserving The Great Ruaha River. To date Ruaha National Park is among the few areas of Tanzania in Ruaha Rungwa ecosystem harboring a big number of elephants.

Increasing human activities and increasing elephant population is a big challenge. Tanzania has got the second largest population of African elephants (second to Botswana), has 17% of its land protected in areas where no human settlement is allowed (National park and Game reserves), 18% to protected areas where wildlife co-exist with humans (TEMP, 2009). In his speech at the end of 2012, president of the United Republic of Tanzania said Tanzanian population has increased from 34 million in 2002 to 44.9 million in 2012. In addition the majority of Tanzanians African elephant's populations are viable. Again the result of ground basses demographic survey during 2009-2010 confirm that elephant population has been increasing (TAWIRI), which means increasing HEC due to resources competition by the two stake holders.

Despite the challenges resulting from increasing population both of human beings and elephants, Tanzania Vision as shown in TEMP, 2009 is 'to be world leader in elephant conservation by ensuring populations and their habitats are secured and conserved in harmony with people for the benefit of present and future generations. The issue is how this can be done.

HEC happen mainly because of the loss, degradation and fragmentation of habitats through human activities such as logging, animal husbandry, agriculture expansion, and developmental projects, Idwasi et al (2006). HWCs are among the major threats to conservation in Africa.

Idwasi et al. (2006) recognized that, in tropical areas of the world, social-economic and political problems resulting from human elephant's interaction present strong challenges and conflicts to conservation. Such conflicts have existed for many years and they occur in different settings.

Chatterjee (2016) sheds more light on HEC by giving an experience from Panchet Forest Division of Bankura District in West Bengal, India- an area characterized by fragmented forested landscape modified by agriculture and settlement expansion. He pointed anthropogenic activities to resulting in the decline in quality and coverage of forests, loss of biodiversity and removal of forest corridors, which ultimately restrict or modify the movement of elephants causing a forceful change of their habitats, which bring consequences to communities adjacent to the forest.

Crop damage which increases in magnitude as one approach protected areas had been noted in both Kenya and Tanzania. KINAPA GMP (2016) shows that there were considerable spatial variation in crop damage with high percent damage within the forests (parks) edges around Kilimanjaro National Park in Tanzania and Tsavo East National Park of Kenya. According to Lihiru (2013) the same had been experienced in Mang'ula division, which is sharing a boarder with Udzungwa National.

Idodi Division in Iringa is among many Divisions in Tanzania sharing a boarder with a Protected Areas and are affected by the consequences from elephants. The RUNAPA was gazetted in 1964. Since then, HEC have been common in areas where there is no buffer zone or the buffer zone between the park and settled area is narrow. Although there are many species of animals posing problems to communities adjacent

to the park, Idodi Division stands out as the most often affected by elephants. Elephants have been causing big consequences to human beings in the Division. HEC is not always inevitable in all cultures and communities. In some communities and cultures, evidence of human-wildlife co evolution and cultural tolerance to wildlife may offer clues as to how co-existence can be achieved elsewhere (Kidegesho, 2008).

1.4 Statement of Research Problem

There have been increasing socio economic consequences of elephants in Idodi Division adjacent to Ruaha National Park. There are many evidences that the great dependence for the land by an increasing human population in Idodi for their survival, coupled with the increasing interactions with elephants leads to many types of socio economic consequences to people. For example, in 2012 in Idodi village (inside Idodi division) there were 1050 households while five years later the number reached 1070 households. This in turn creates increasing competition for land resources between humans and elephants in the area. This competition has led to Human-Elephant conflicts and ultimately increasing social and economic consequences on residents of Idodi ward. Idodi division is composed of ten (10) villages (Idodi Division Executive Officer –personal communication). These villages are close to Ruaha National Park, thus competing with wildlife for land resources.

Table 1.1: People Killed and Injured by Elephants in Five Villages in Idodi Division in Five Years Period (2014-2018)

Village	Injured	Killed
Mahuninga	3	-
Tungamalenga	3	2
Mapogoro	3	-
Kitisi	6	2
Idodi	4	2

Source: Idodi division executive secretary

Some residents of the division have been forced to live their residences due to destructions of their properties by elephants. The incidences of destructions are increasing in number and severity with time (Personal communication with Ruaha Park Ecologist).

Despite all these efforts, there has been little attempt to find out and document the socio economic consequences brought about by elephants' destruction on peoples' livelihoods around RUNAPA. There seems to be no proper management measures in place to solve the problem, despite of the fact that the park is increasingly being surrounded by anthropogenic activities.

1.5 Objectives of the Study

1.5.1 General Objective

The general objective of the study was to investigate the socio- economic consequences of elephant destructions on communities adjacent to National Parks.

1.5.2 Specific Objectives

The specific objectives of the study were:

(i) To examine the social cultural consequences resulting from human- elephants interaction in Idodi Division.

(ii) To examine the economic consequences resulting from destructions caused by elephants in Idodi Division.

(iii) To evaluate the intervention measures employed by local people to control Elephant destructions in Idodi Division.

1.6 Research Questions

(i) What are the social cultural consequences resulting from human- elephant's interaction in Idodi division?

(ii) What are the economic consequences resulting from destructions caused by elephants in Idodi division?

(iii) How intervention measures taken by Idodi people to control Elephant destructions effective in Idodi Division.

1.7 Significance of the Study

Natural resources are very much important for the social economic development of the communities' adjacent to protected areas. Their richness in terms of types and abundance are therefore among human beings pulling factor to these areas. Injuries and killing of human being, destruction of farms and others properties, denial of free movement by elephants are among the social economic consequences of elephants to the local communities living close to these PAs.

The main cause of the consequences by elephants is a limiting natural resources competition between elephants and human beings due to increasing human activities in the area. Good management of these natural resources is very important to help reducing social economic consequences of elephant's destructions to local communities. The study aim to document necessary information on which are the social economic consequences of elephants destructions to local communities adjacent to PAs, their magnitude and how best to coexist with these animals.

1.8 Scope of the Study

This study was conducted in three villages of Idodi division within Iringa district, which are adjacent to RUNAPA. Heads of the households was the target population. The study aimed to assess the social economic consequences of elephant's destructions to local communities living adjacent to RUNAPA and the mitigations to such kind of problems. Since RUNAPA is sharing a border with seventy one villages, selection of three villages was considered to be a reasonable representative sample of the population in the study area and this was mainly due to magnitude of work and budget constraints.

1.9 Organization of the Study

This dissertation is organized into five chapters. Chapter one contain the introduction, statement of the research problem, objectives of the study, research questions, significance of the study, scope of the study and organization of the study. Chapter two focuses on literature review that is a review of theories and models, empirical literature review, conceptual framework and research gap. The research methodology and the study area description is presented in chapter three. Chapter four shows the results and discussion of the findings. Chapter five presents the summary, conclusion and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents the definition of key terms, theoretical literature review, empirical literature review, conceptual framework and research gap.

2.2 Definitions of Key terms

2.2.1 Social

As far as Cambridge Advanced dictionary (1995) is concerned a definition of a word "social", is characterized by friendly companionship or relations which enhance the well-being or good quality of life

2.2.2 Economic

According to Bruce et al. (1961) when talking about underdeveloped economies he mentioned 40 to 60 per cent of the national income is produced in agriculture, and he went on saying 50 to 80 per cent of the labour force is engaged in agriculture production. If this is the case we should do something to control elephants and other problem animals to raise income of both poor rural households and our country as a whole. Economic is nothing but purchasing power, local farmers purchasing power can be raised by selling agriculture products or being employed and receiving reasonable amount of money.

2.2.3 Consequences

Again Cambridge Dictionary (1961) defines consequences as a result of a reaction or situation, often one that is bad or not convenient.

2.2.4 Socio-cultural and Economic Consequences of Elephant's Destruction are the Bad Results

These are bad results social culturally and economically from unfriendly relationship with elephants (Cambridge dictionary 1991). They included destruction of social services, insecurity due to lack of free movement to people because of presence of elephants and low income to people resulting from destruction of farms and other properties by elephants (Panda 2007).

2.3 Theoretical Review

This study is guided by Neo-Malthusian theory of population (Malthusian demographic theory of 1879) and Demographic Transition Theory (DTT). Generally one theory is discussing about the consequences of rapid increase in natural resources use which has been happening due to rapid increase of population growth (Malthusian) while the second one (DTT) which to great extent is seen on recommendation and conclusion part of this study is showing how controlling the human population and improvement in technology can lead to reduced HEC. The rapid population growth which by far is exceeding the carrying capacity of the resource like land and food is common in many of the world least developed countries and is the main course of poaching, environmental degradation, resources depletion and therefore poverty and unequal distribution of income. Transition from high birth rates and death rates to low birth and death rates as a result of improvement in economy and technology (Midgley et al, 2010)' can somehow be a solution in Idodi division. This is because both advancement in technology and controlled human population will led to reduced HEC over limited resources.

2.3.1 Malthusian Demographic Theory

Malthusian demographic theory of 1879 pointed out that, with increasing speed of human population growth, a time will be reached when the world (land and food production) cannot support life any more. Food will not be enough as food production increase arithmetically while human population increase geometrically, while at the same time the land is limited, (Midgley 2013). Therefore, both increasing speed of human population, increasing destruction by the elephants in a limited land could be a big threat to not only food production, but development in general.

High population density means an increase in demand for land causing conversion of wildlife habitats to other economic uses, such as agriculture and human settlements (Kideghesho, 2004). As human populations expand and natural habitats shrink, people and wildlife increasingly come into conflict over living space and food (WWF, 2010).

This goes with the expansion of cropland in order to meet food requirements to feed this population at the expense of wildlife habitats because an increasing food should be a priority. Increasing the number of people goes together with increasing number of livestock especially to those tribes used to keep livestock. Conflicts between wildlife managers and livestock keepers resulting from encroachment are common. A lot of problems are common nowadays in Tanzania as a result of rapid population increase. Encroachment into protected areas for farming and livestock grazing, blocking animals migratory and dispersal roots by increasing development activities are some of them. Fighting over land and water between farmers and livestock keepers have been common in Kilosa, Mvomero and other areas in Tanzania. Therefore Neo Malthusian theory is suited to this study.

2.3.2 Demographic Transition Theory

Demographic Transition Theory (DTT), which is about 'Demographic transition from high birth rates and death rates to low birth and death rates that occurs as a result of economic and social development of an area or a country from a traditional society to a modern post-industrial economy (Midgley et al, 2010)' can somehow be noted in Idodi division.

For nowadays Idodi division is not very far behind in development, it have got improved health services, clean and safe water supply and good schools, Only that the Division have to improve the road networking, the market for its products like rice, maize, water melons, and anions. Modern technology will lead to good farming method that is together with use of fertilizers therefore big yield in a small area, make use of family planning methods therefore controlled human populations, building good schools, modern dispensary and good settlements. In other words reduced birth rate and death rate, which usually come as a result of technological advancement can be a big solution to reducing HEC to communities adjacent to PAs.

2.4 Empirical Literature

Elephants are among the most intelligent of the creatures with which we share the planet, with complex consciousnesses that are capable of strong emotions'. Elephant maxima (*asian elephant*) found in Asia is noted for being very close to human beings and for its use as transport means (Warmer 2008). Warmer (2008) went on saying that across Africa, African elephants (*loxodonta africana*) have inspired respect from the people that share the landscape with them, giving them a strong cultural significance.

As icons of the continent elephants are magnets, attracting funding that helps protect wilderness areas. This is being seen in Serengeti –Masai- Mara Ecosystem, Ruaha-Rungwa Ecosystems, Selous and other areas with lots of these animals. Warmer (2008) adds that, 'elephants are also keystone species, playing an important role in maintaining the biodiversity of the ecosystems in which they live.

During the dry season, elephants use their tusks to dig for water. This not only allows the elephants to survive in dry environments when droughts strike, but also provide water for other animals that share harsh habitats. When elephants eat forest, they create gaps in the vegetation. These gaps allow new plants to grow and create pathways for other smaller animals to use. They are also one of the major ways in which trees disperse their seeds' (Panda 2007). Very common practice in Tarangire and Ruaha National Parks, and some species like *phoenix species,* which are seen in Ruaha ecosystem rely entirely upon elephants for seed dispersal.

Figure 2.1: A Kindergarten Classroom at Mang'ula A
Source: Author in 2013

Kidegesho (2009) adds that on the savannah, elephants feeding on tree sprouts and shrubs help to keep the plains open and able to support the plains game that inhabits these ecosystems. Wherever they live, elephants leave dung that is full of seeds from the many plants they eat. When this dung is deposited the seeds are sown and grow into new grasses, bushes and trees, boosting the health of the savannah ecosystem.

It was donated by tourists from Wistation Primary School England who came to visit Udzungwa National park. The Elephant is one of the important attractions to Udzungwa National Park. In other words elephants pull lot of forex to our country. But in addition to all these importance of elephants there are some socio economic consequences to the communities living adjacent to PAs as follows:

2.4.1 Socio Consequences Resulting from Human Elephant's Interaction

Human Wildlife Conflict (HWC) has always appeared where humans and wildlife co-existed (Hoare, 2000), however changes in the sizes of human and wildlife populations, and in land use patterns, have increased competition between humans and wildlife for space and as people encroach into natural habitats and as conservation efforts to restore wildlife to areas where they may have been absent for generations, contact between people and wild animals is growing (Woodruff et al. 2005).

Some species, even the beautiful and endangered, can have serious impacts on human life and livestock (Woodruff *et al.,* 2005). HWC is most intense when agriculture is involved particularly where cropland borders protected areas, Idwasi et al (2006). Crop raiding by wild animals gives rise to significant conflict between local

communities and wildlife conservation (Hanks, 2000). Park. In some occasions elephants had been injuring and killing people (Table 1.1).

2.4.2 Economic Consequences Resulting from Human Elephant's Interaction

As a result of efforts to restore KINAPA and Udzungwa National Parks, contact between people and elephants are increasing. According to Messmer (2000) HWC is now a major conservation issue threatening the future of wildlife especially outside protected areas. Human population in the study area (Idodi Division) has been increasing; therefore demand for more space and other wildlife resources, which means denying elephants the same. Wildlife tourism is among the main contributor in Tanzania foreign income, if the industry will be shaken by killing or removal of wildlife our county's economy will go down.

Conflict between people and wildlife today undoubtedly ranks among the main threats to conservation in Africa-alongside habitat destruction and motivated hunting of wildlife to satisfy the demand for trophy and represent a real challenge to local, national and regional governments (Barrow et al., 2000). These kinds of conflicts in other areas result in retaliation killing of elephants, something which can lead to local extinction of the species.

Land conflicts may be the greatest long-term threat to elephant conservation because as people and elephants inhabit the same areas and share scarce resources, there will be more pressure to encroach on elephant habitat for human uses, and this will lead to more consequences as human populations continue to grow. Lot of costs on local communities in cash and livelihood terms have been experienced. The opportunities

costs for alternative land uses, such as agriculture production and local resource utilizations, forgone or diminished by presence of elephant can load a heavy economical burden on communities (Kidegesho, 2008).

Idwasi, *et al.* (2006) recognized that, in tropical areas of the world economic problems resulting from human elephant's interaction present strong challenges to conservation. Such conflicts have existed for many years and they occur in different settings. There are many values associated with elephants worldwide that include direct and indirect utilization of elephant and elephant by products (Kidegesho, 2009). The contribution of elephants to economic growth of Tanzania locally and internationally is another reason that there must be very good elephant's management plans (TEMP 2010-2015).

2.4.3 Measures taken to Control Elephant's Destructions

Historically, people have been responding to threats like crop destruction by killing wildlife where possible, and this has led to the endangerment of many species that are difficult neighbours (Woodroff *et al.* 2005). Retaliation killing of three lions at Kitisi village (Idodi) in 2017 simply because the lions killed a cow (Carnivore project coordinator personal communication), is a sure sign of this kind of measures taken by Idodi people. International Union for the Conservation of Nature and Natural Resources (IUCN), listed African elephant (loxodonta africana) as vulnerable (Blanc, J. 2008).

Blanc explains a vulnerable species as a species of animals or plants, which is likely to become endangered unless something changes. This kind of categorizing help to

raise awareness to different people so that they can make efforts in protecting and conserving this species despite the complication of human-elephant conflict (HEC). HEC is not always inevitable in all cultures and communities.

In some communities and cultures, evidence of human-elephants co-evolution and cultural tolerance to wildlife may offer clues as to how co-existence can be achieved elsewhere (Kidegesho 2008). Something encouraging is in Tanzania the wildlife policy recognises the necessity of controlling wildlife, which pose or cause damage to human life and property and do offer compensation, though it does not explain the level of compensation, (Kaswamila, 2006). The following are some of the ways applied to some areas to enable co-existence.

Guarding

The simplest (and probably least expensive) way to deter elephants is for farmers to employ patrols to guard crops. In Asia, guards mounted on domesticated Asian Elephants (*elephant maxima*) patrol the perimeter roads of large plantations, using noise-makers, bright lights (at night) and other deterrents to drive away encroaching elephants (Warmer 2008).

The Buzzing of the Bees

In short, African elephants are known to avoid acacia trees occupied by honey bee. This has led to the invention of the "bee hive fence"— a regular fence strung with beehives made out of hollow logs. If an elephant tries to push through the fence, the hive swings, the bees become agitated, and the elephant flees, King et al (2007). At Mang'ula village there is a line where Udzungwa National Park is sharing a boundary

with Mang'ula village. A strip has been installed with beehives having African honey bee (*apis mellifera scutellata*)-Udzungwa park ecologist personal communication.

Figure 2.2: Bee Hives Fence at Njokamone area –Mang'ula where Udzungwa National Park Share a Boundary with Mang'ula Village
Source: Author in 2013

Noise It is a common practice both in Asia and Africa, to use loud noise to scare away intrusive elephants. Noisemakers include firecrackers, pipe cannons, vehicle horns, shouts, and rifle-shots. In almost all our protected areas including Serengeti National Park and Selous, this is a widely used method by the majority of villagers. Other methods are together with Electric fences, Alternative crops planting and Elephant Geo-fencing.

2.4.4 A Conceptual Framework for Management of Humans and Wildlife

The conceptual framework shows that social economic consequences of wildlife destruction on communities adjacent to PAs is a result of the type of management of human and wildlife. There should be good human and wildlife management and above all it should be continuous to come up with good and sustainable development. The policy makers for instance when putting policy about management of human and

wildlife (A) can come up with bad policy which will lead to improper management of human and wildlife (B) which will be a source for natural resource competition and depletion(C) which are the main source of socioeconomic consequences (C). Because once resources are becoming limited there must be a competition for resources to an extent that few areas with resources being village lands or PAs will be invaded and therefore conflicts.

On another hand good leaders will lead to coming up with effective measures to manage people and wildlife (H) to an extent that conflicts will be cubed and there will be a presence of social economic development (G). In such a situation people and wildlife will be flourishing in their habitats, which mean no HEC (F). For sustainable development, good management of human and wildlife should not be a short term issue. Good management of human and wildlife should be incorporated into our policies, land use plans and there should be monitoring and auditing of all the activities to avoid going back to the conflicts (E).

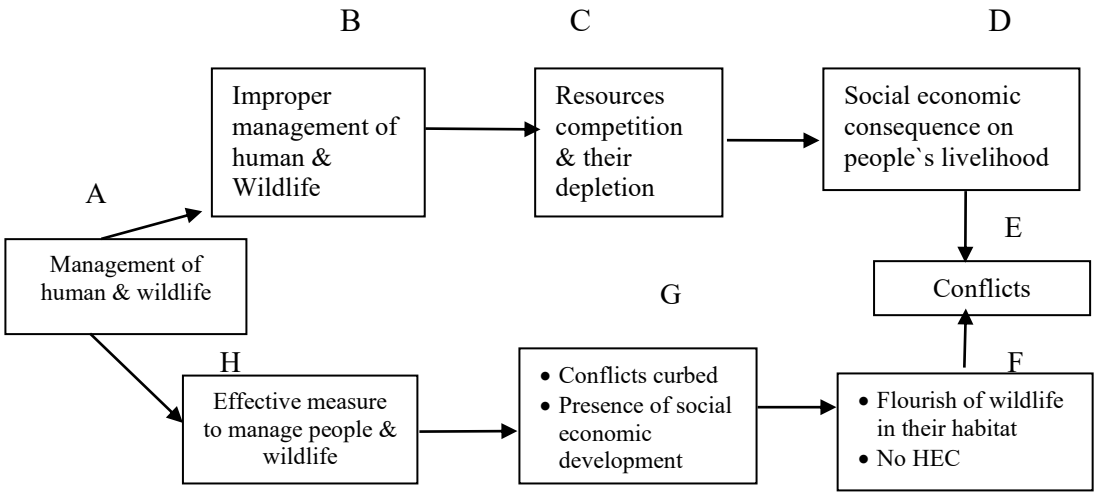


Figure 2.3: Conceptual Framework of the Study

Source: Author in 2018

2.5 Research Gap

Generally the study was aiming at contributing to bringing sustainable development to the people living adjacent to Ruaha National Park. In so doing it decided to deal with documenting socio-economic consequences of elephant destructions in Idodi Division adjacent to Ruaha National Park, which was not done before. The main reason being to raise awareness to people about the problem and its magnitude in addition it proposed workable measures to be undertaken for better management of the human and wildlife.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the procedures followed in conducting this study. It describes the research design, study area, , materials and methods of data collection. The chapter also describes the data collection methods, data analysis, interpretation and presentation.

3.2 Research Design

The study employed a case study design and it was mainly exploratory. This research design dealt with primary data collection in the selected villages in Idodi ward adjacent to Ruaha National Park. The research methods used included structured interview, focus group discussions and direct field observation. The questionnaires were filled, a research team was taking photos, tape recording and writing into the note books The case study was selected because, the selected villages were accessible, most of the households knew the elephants and were aware about consequences caused by human -elephant interactions going on.

In addition, different reports in the village offices and conservation agents' offices were passed through and some data taken. This was easy by presence of lot of data including demographic data in the village offices. The presence of some knowledgeable people who can download and translate satellite imagery which are useful was of great help. Through the findings it has been possible to provide

meaningful recommendations on how to deal with consequences of elephant's destruction in order to have health habitats for both wildlife and humans with no HEC.

3.3 The Study Area

The study area was Idodi Division on the eastern part of Ruaha National Park, is a combination of ten villages. The nine villages are among the villages, which set aside a portion of their land close to the Park as part of Wildlife Management Area-MBOMIPA. The division is within Iringa District in Iringa region. It lies between degrees: Latitudes 7°30'S to 7°47'S and longitudes 34°53'E to 35°20"E. It is almost seventy kilometers from Iringa town to a division headquarter (in Idodi village). Most of its people are farmers with few keeping cows. Three quarters of villages land is being used for agriculture.

The three villages in Idodi Division which were Mahuninga, Tungamalenga and Idodi adjacent to Ruaha National Park were the selected for this study. The criteria for the selection of these villages were the importance of their proximity to Ruaha National Park and chances of the villages being exposed to elephants incursion which could have been a main source of HEC arising.

The park is covering an area of 20,226 square kilometers. It is within the Ruaha Rungwa ecosystem that is known to have a high population of elephants in Tanzania. Because of its location and size Ruaha is in a unique position to continue to be uninterrupted as it has always been untouched, pristine ecosystem, which in today's world is something not only rare but very special. The villages are enjoying water from the Great Ruaha River flowing in the midst of Ruaha National Park. The major

park attractions are big heads of elephants, lesser and greater kudu, lions, big heads of buffalos, water birds and undisturbed forest.

As a result of increasing human population growth and agricultural expansion wild animal range has been reduced in Tanzania and Africa (TAWIRI). This has resulted into reduction on important resources for wild animals especially food and shelter ending up causing HWC due to conversion of habitat areas for the wild animals to human settlements and agricultural areas.

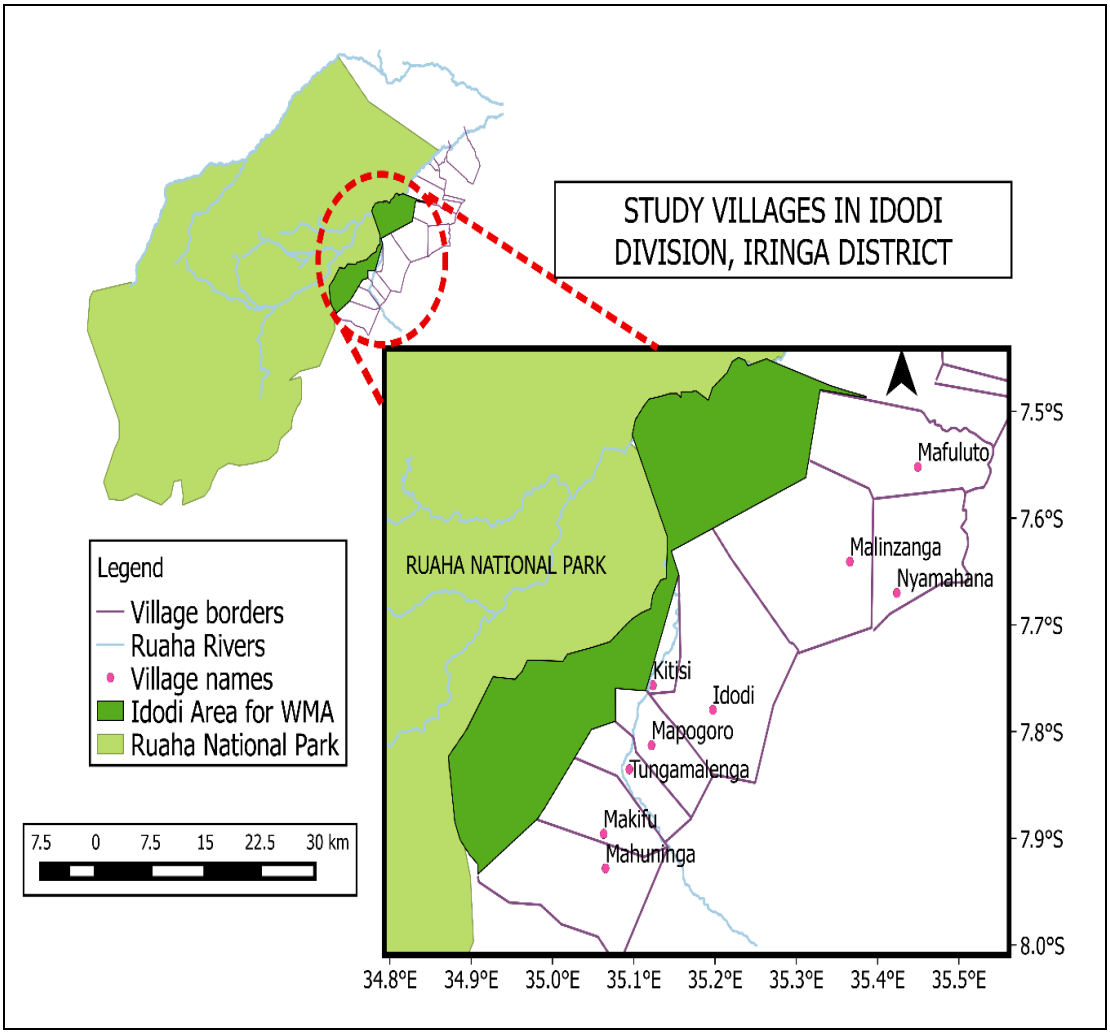


Figure 3.1: Study Villages in Idodi Division, Iringa District

Source: Tanzania National Parks (TANAPA), GIS Unit, 2018

3.4 Target Population

The target population was the people in the villages around Ruaha National Park. There are 70 villages around Ruaha National Park and the purposefully selected division has got a total of ten villages of which nine were adjacent/and sharing a boarder with the park. Sampled population was from three purposefully selected villages of Idodi, Tungamalenga and Mahuninga. The three villages represented the whole population around Ruaha National Park. The villages were selected based on the fact that they had been reporting elephants as problem animals more frequently.

3.5 Sample Size and Sampling Procedure

Unbiased and economical selection of elements from which the information will be collected is very important in research. Because it is costly and therefore, undesirable to collect data from a whole target group population, it has been noted that there must be an accurate sampling of the subset of the population (Burns, 2000).

Considering the comments by Burns (2000) above stratified and simple random sampling methods were of much help for the study, because of very minor biasness and good use of limited resources. The villages were the strata. Stratified sampling is used when individuals in a population can be split into distinct, non-overlapping groups in this study the villages. In stratified sampling, the number of participants sampled from each stratum is calculated proportionately to the total population.

Stratified sampling is beneficial when there are big differences between the strata, as they can give a more accurate representation in terms of the number of representatives per village or region. The three villages were not having equal number of people and

were found in different geographical areas. Most of the data were collected from the heads of households. Therefore, the method was a big help to getting a good and economical number of representatives from different strata, which were again proportional to village's population in the ward. Pervez (2005) insisted of getting equal representation. The households number in Idodi, Tungamalenga and Mahuninga were 1070, 830 and 600 respectively.

In this study 50 households were selected from a village with more households compared to others but how much were to be taken from the next two villages a ratio from the three village's households was an answer. The sample units were 50:39:28, meaning that 117 heads of households were interviewed. Here it was not only a question of ratios or percentages but due to limited amount of resources given i.e. money, time and man power and the workload ahead and that the sample size could lead to desired precision from the estimate.

Simple random sampling which is the simplest way to select participants from a population was explored while selecting sample units (heads of households and village environmental committee members). Using these methods means that each individual in the population had an equal chance of being selected for the sample. Again, for every one doing a research it should be born in mind that, there are no 'rules of thumb' when determining sample size for quantitative research like this, (Burns, 2000). It is not possible to say whether 10% of the population, for instance, would provide an adequate sample, as this will be affected by a number of factors. Pervez (2005) puts it clear that one should worry of sample plans in research or evaluations which suggest that, sample size can be calculated using a percentage of

the population without further clarification or rationale for this. He went on putting it very clear that determining sample size should if possible depend on desired precision from the estimate. Statisticians will calculate sample size using a range of different equations, each of which is appropriate for different research situations and contexts.

3.6 Types of Data

Both primary and secondary data were collected. Primary data were the data collected by the observer himself or his assistants during the study. Observing the activities and taking photos, direct interviewing and discussing with people and taking notes were the ways of collecting primary data.

Secondary data collection means passing through already collected data. The researcher passed through different copies, imageries and literatures by different people about the study topic. The data from books and other documents were collected in the village offices and government as well as NGO offices in the study area dealing with conservation of wildlife. Data was taped by reading and photocopying and taking photos from these documents. Secondary data were collected on elephant's populations, population trends of the people, and different methods used to control elephants. Again vegetation and natural resources distribution trend after every ten years from the year 1987 were examined after downloading satellite imageries.

3.7 Data Collection Methods and Tools

These are specific activities whose immediate result is the acquisition of body of data (information) for analysis. In this study the data collection methods were the

administration of questionnaires in a household survey, observation, personal interviews, Focus Group Discussion (FGD), documentary method and interpreting satellite imageries.

3.7.1 Questionnaire

A questionnaire was self- administered by heads of household in the three sample villages [Idodi, Tungamalenga and Mahuninga]. Among the advantages with self-administered survey, the respondent completed the questionnaires themselves with no influence from outside. Only for those who could not read or write questionnaires would not have worked.

Using this method the researcher was expected to objectively collect information about verifiable facts and events. There was a wide range of such information including description of people (sex, age, marital status, etc.), what people have done, what has happened to them, etc. The common feature was that the data to be given in the answers could be objectively verified.

Questionnaires using carefully constructed closed (forced choice) and open- ended (allow respondents to volunteer answers) questions were of good help to gather data from heads of households. Kiswahili, which is fluently spoken by many people in the three villages, was the language used to collect data. A total of 117 questionnaires were distributed and 112 were brought back having been filled.

3.7.2 Face-to-face Interview

Face to face interview is a survey method that was utilized when a specific target population was involved. It’s in a face-to-face interview where interviewer could

probe the answers of the respondents and at the same time observes the behavior of the respondents, either individually or as a group (Burn, 2000). The purpose of conducting a face-to-face interview survey was to explore the responses of the people to get more and deeper information on social and economic consequences of elephants in Idodi division as well as different measures used to control the consequences. Ruaha Park Ecologist, Ruaha Carnivore Research Coordinator, Idodi Division Executive Officer and Tungamalenga Ward Executive Officer were among the interviewed people.

3.7.3 Focus Group Discussions (FGD)

It is a discussion with few selected people who again represented a large population. The information was being collected from a group made up of randomly selected people. It was very clear to the researcher that, among the criticism to FGD was that group members may not be representative of a larger population because of both the small number and the idiosyncratic nature of the group discussion (Burn, 2000). This is a reason that although focus group research can produce quantitative data, was conducted with the collection of qualitative data as their primary purpose. In addition a group was selected without bias and a moderator made sure that discussions were interactive that is no one dominated (Pervez 2005).

Focus group produces very rich body of information expressed in the respondents own words and context. The researcher could read from people's voices, faces, emotions and came up with the true picture/answer. In a focal group discussion those who cannot read and write, those who cannot see or hear could have participated. The big disadvantage is that some people especially the powerful once (rich ones, politicians,

etc.) can dominate if a moderator is not careful enough because in most discussions many people are not challenging such people's ideas (Burn 2000). Six to four people from village environmental committee of the selected three villages were randomly selected for a group discussion (Pervez 2005).

3.7.4 Documentary Method

Various reports from the village offices and conservation agents' offices were red and some copies taken for the analysis. Satellite imageries were downloaded using a computer having the specific program for the intended work (Figure 3.2).

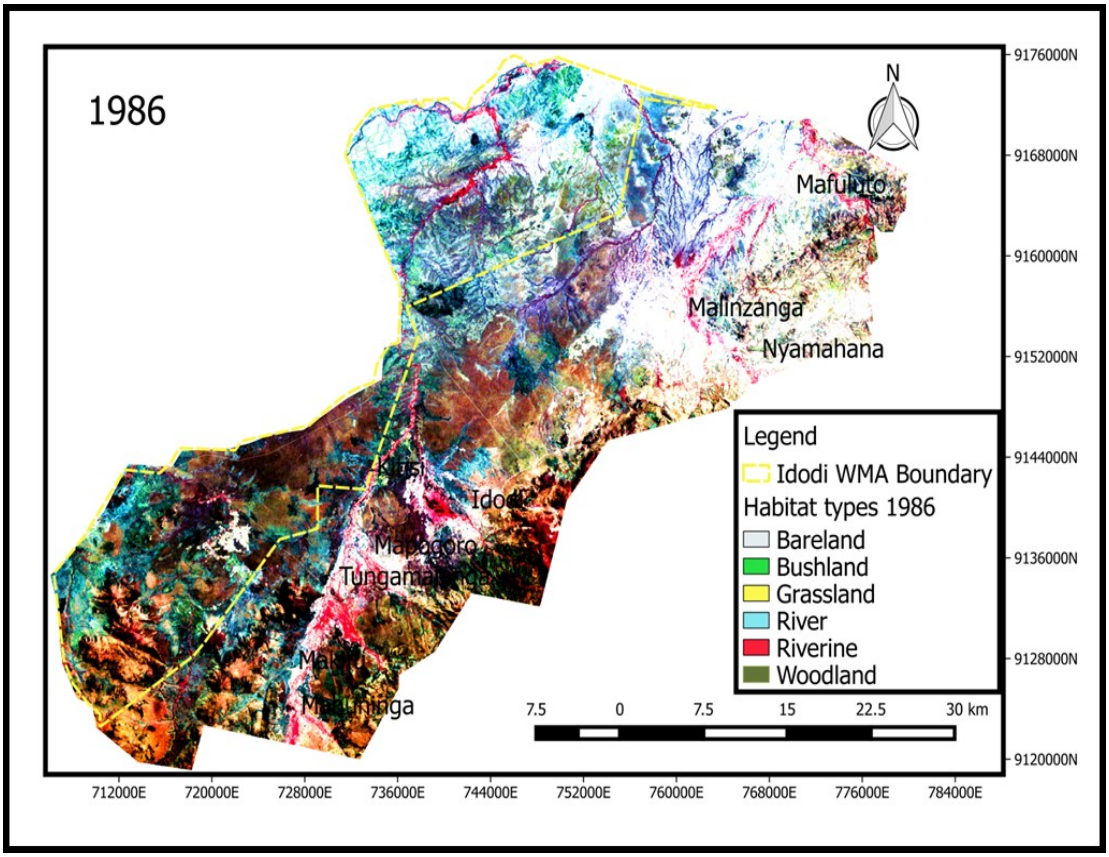


Figure 3.2: The Areal Habitat Coverage from the 1986 Satellite Map Interpretation

Source: Tanzania National Parks (TANAPA), GIS Unit, 2018

3.8 The Research Instruments

Two cameras, Geographical Positioning System (GPS), notebooks, pencils, pens, recorders, cell phones and questionnaires were the research instruments used. Questionnaires were distributed to the heads of households for them to fill. There were cameras for taking photos during FGD and personal interviews. In addition, there was a tape recorder to record the conversations. It enabled the interviewer to give the respondents his/her full attention during the interview and avoid the need to be constantly scribbling notes. It also enabled data to be left until such time as analysis can be applied more rigorously and in a more leisurely way. This is because not everyone likes to be taped therefore every time recording needed, permission was first sought. The Geographical Positioning System was being used for recording geographical positions, time, distances and compass directions.

3.9 Data Analysis

Data from face to face interviews and questionnaires were entered in the IBM Statistical Package for the Social Scientists (SPSS) program, which allows uses of different tests. The raw data were organized into classes or categories, which again were assigned numbers. Therefore, statistical analysis was applied to summarize and describe the data. Tables and graphs, summaries and imageries were translated to give the real picture about the problem under study. FGD and personal interview data and data from observation were collected and summarized.

3.10 Validity and Reliability

In a study the law data collected were organized into categories, which were assigned numbers, which anyone doing statistical analysis can understand and apply to

summarize and describe the data. The scores produced correlated with the variables, which were expected to be correlated with and not correlated with variables that were conceptually distinct. This in turn helped a researcher to come up with bar charts and pie charts, which gave the true picture of what had been observed in the field. Reliability is consistency across time (test-retest reliability), across items (internal consistency), and across researchers (interrater reliability). The data collection method and the type of measurements were selected based on the reason that in many studies where they have been used they showed good results. Lihiru (2013) and other researchers used the same research method and came up with good recommendations on how to solve human elephants conflicts adjacent PAs.

3.11 Ethical issues

Good norms or acceptable behavior in a research like Respect for Intellectual Property, Non Discrimination, Confidentiality, Objectivity, Carefulness, Openness and Legality were observed. This was important for coming up with good support in the field as well as adhering to the regulations.

Respect for Intellectual Property for instance included honoring copyrights, patents, and other forms of intellectual properties. Presence of a section on Bienne Convention on a copy right part, referencing, and giving proper acknowledgement or credit for all contribution to a research as well as never plagiarize were again about Respect for Intellectual Property adherence to.

Non Discrimination can be seen starting with Probability sampling method which was selected, that is every individual in a sample had a chance to be selected which means

no or reduced bias and therefore reduced or no discrimination. No one was selected based on his or her gender or tribe. Carefulness was among ethical issues observed when approaching people, talking to them and recording the data. No tape recording and photo taking was done by a researcher without asking for permission in advance.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introductin

The chapter presents what were the research findings followed by the discussions about the findings. The results were based on the analysis of information extracted from 112 filled questionnaires of households, focal group discussion with one groups of six people from each of the three villages, information from focal persons, which were Ruaha National Park Ecologist, Idodi Division Executive Officer and Tungamalenga Village Executive Officer. Other information was from field direct observation, documentaries and satellite imageries translations.

4.2 The Existing Situation

4.2.1 Livelihood Activities and People of the Area

The most dominant ethnic group of people staying in Idodi villages were the Hehe, followed by Bena. A study confirmed that of all the villagers 95% originated from Iringa region (Iringa district 88.5%and Mufindi district 6.5%) while the rest originated from Njombe 2.5% and Mbeya regions 2.5%.

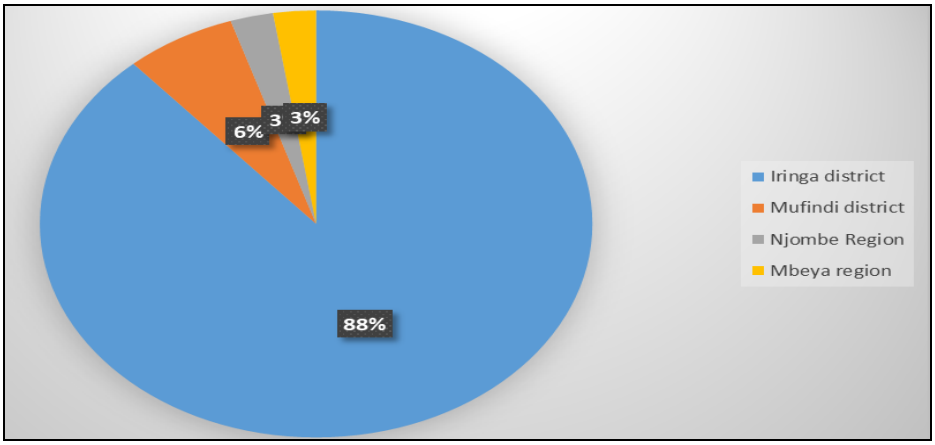


Figure 4.1: Origin of the People Living in Idodi Area
Source: Field data 2018

The activities done by most people are cultivation (94%), there were employee/workers (4%) in government institutions and lodges, keeping cattle and goats (3%) and business in agriculture products (1%) as given in Figure 4.2. Therefore, to a greater extent the villagers were practicing subsistence farming. An average a household had 6 members and owned only 2 acres of farms, which had been inherited. In other words 0.33 acres per person was the minimum.

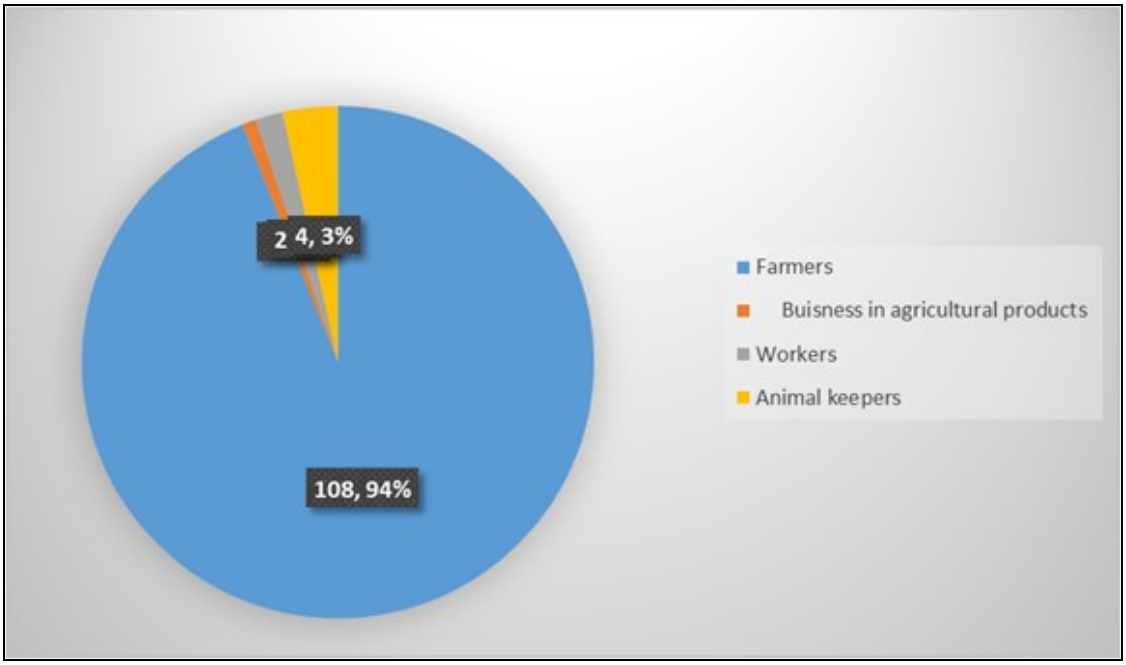


Figure 4.2: Occupation of the Villagers

Source: Field Data, 2018

Maize is being grown as a major crop. Other crops in the area included rice, sunflower, groundnuts, vegetables and watermelons. Excess maize and rice are usually sold to people dealing with business in agriculture products. Most of the employed people were either working in the government institutions or NGO's dealing with either conservation or tourism industry. Livestock kept by villages were cattle, goats and pigs.

The increasing human activities in Idodi area means an increasing demand for land and other natural resources which is again denying wild animals the same. An examination of the satellite imaginary showed a decrease in woodland vegetation cover during the 30 years period. Forest cover or woodland cover was decreasing due to increasing human activities in the area. Opening of forest for development like settlement, opening farms and cutting trees for timber and charcoal making as well as building poles were the land-use changes that caused vegetation decrease.

4.2.2 Problematic Animals

Living close or together with animals is sometimes costly. The villagers close to Ruaha National Park are very much disturbed by wild animals in different styles and magnitudes. Elephants, monkeys, kudu, and hyena are among the more problematic animal's destructing crops and causing injuries and death to human beings and domesticated animals (See Figure 4.3).

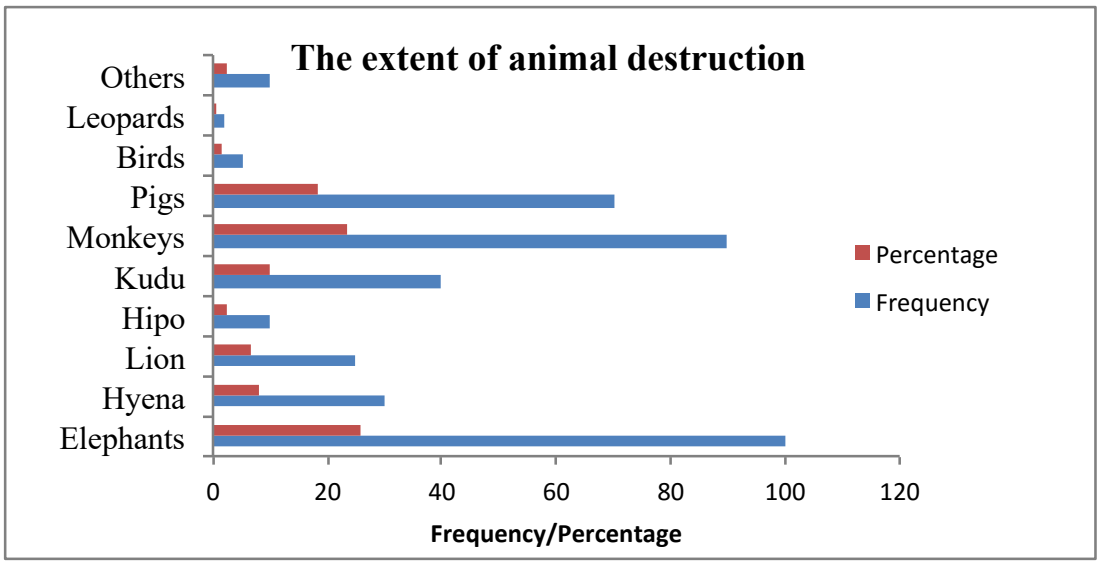


Figure 4.3: Problematic Animals

Source: Field Data 2018

Despite the fact that the elephant was the most problematic animal (Figure 4.3) to the extent that 26% of people saw no importance/ benefit of having elephants around completely, for most of the people pointed out the benefits attached to elephants as given in Figure 4.4. About 39% viewed elephants as important for earning forex from tourism, while 3% considered elephants important for meat when they are killed during scaring or retaliation.

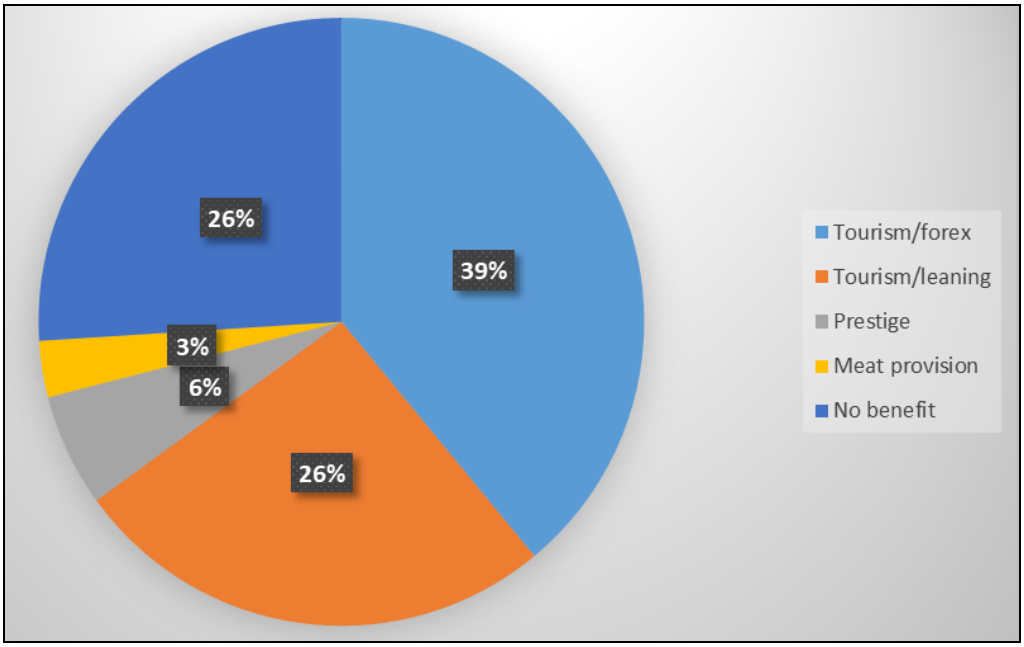


Figure 4.4: Benefits from Elephants
Source: Field Data, 2018

4.2.3 Social Consequences

As far as Cambridge Advanced leaner's English Dictionary (1995) is concerned a definition of a word "social" is characterized by friendly companionship or relations, which enhance the well-being or good quality of life. It further defines consequences as a result of a reaction or situation, often one that is bad or not convenient. In this research some of the kind of reaction or situations which were bad or not convenient resulting from unfriendly relationship with elephants was observed. They included

insecurity due to lack of free movement of people (Figure 4.6), injuries and deaths (Table 1.1), food insecurity resulting from crop raiding (Figure 4.8) and damaging of food store, lack of access to potable water after the destruction of water sources and infrastructure as well as blockage of path ways (Figure 4.6).

Figure 4.5: Agriculture Extension Officers (Left and Right) Inspecting a Farm Destructed by Elephants-Idodi Village

Source: Author in 2019

4.2.4 The Increasing Human Elephant Conflict

It has been confirmed that human elephant conflict over resources is a long term social consequence in the areas where humans share land with these wild animals. Social problems are more serious where human activities expanded, as more land had been used for agriculture (Figures 4.6 and 4.7). As a result, elephant habitats had been shrinking and becoming more and more fragmented, to the extent that villagers and elephants were increasingly coming into contact and conflicting with each other.

Elephants cause insecurity in Communities close to RUNAPA. A study confirmed that as a result of free movement of elephants they sometimes block pathways and it had been counted among the top causes of social problems. In so doing, sometimes they prevent farmers to go to their farms, students going to their respective schools, visiting friends and sometimes have been causing road traffic.

Figure 4.6: An Elephant has just Crossed a Road. Going back to Ruaha National Park, in Tungamalenga village

Source: Author in 2018

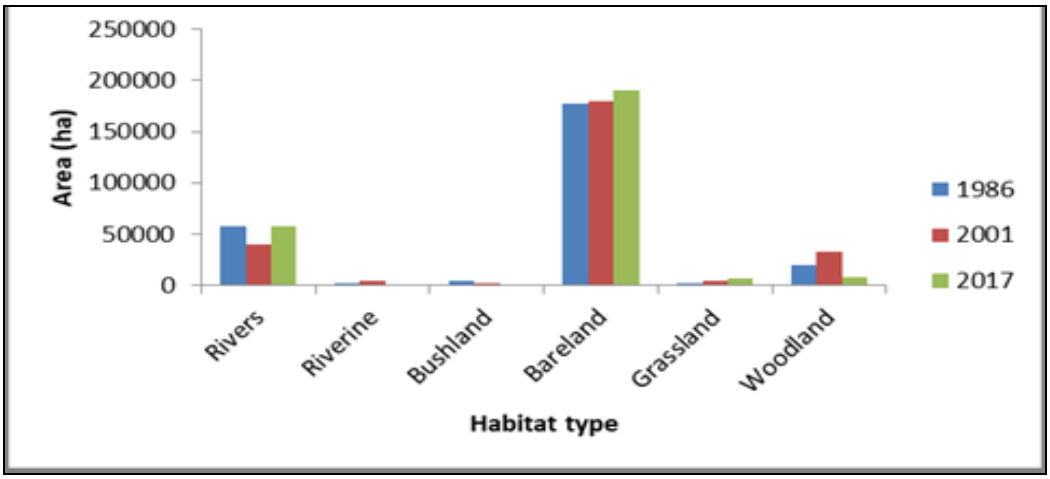


Figure 4.7: Habitat change for Elephants over the Past 30 Year
Source: Tanzania National Parks (TANAPA), GIS Unit, 2018

The results of habitat cover maps show that the area of bush land vegetation declined throughout the 30 years, while bare land and grassland increased. Both Rivers and Riverside vegetation showed a decrease between 1986 and 2001, but increased between 2001 and 2017. Woodland vegetation increased between 1986 and 2001, but decreased sharply between 2001 and 2017. The sharp decline of forest or woodland was due to increasing human activities including clearing areas for farms, charcoal burning, lumbering and new settlements. Population trend projections shows that in the year 2012 Idodi ward alone had an estimate of 11,899 people while in 2018 the number was 11,899 (NBS 2016), the increase of almost 1,697 people. This is equivalent to an increase of 282 households in a six years period. These increases go well together with increased use of natural resources including clearing land for farms as well as cutting trees for timber and charcoal.

Western *et al.* (2016) put it very clear that, “Human Wildlife Conflict occurs when the needs of human populations encroach on those of wildlife or the needs of wildlife encroach upon those of human populations”.

4.2.5 Economic Consequences

The people in the study area were poor rural small scale farmers owning an average of two acres of land per household (0.33 acre a person). In addition, they were keeping some few animals. The raiding of crops and domestic animals by problematic animals was an economic setback for the small farmers some of whom fail to buy food or take children to school. Subsistence production which in many African countries represents a substantial proportion of total output relies entirely on the continued productivity of biological resources for the daily survival of rural households'.

According to Bruce et al (1961) when talking about underdeveloped economies he mentioned 40 to 60 per cent of the national income is produced in agriculture, and he went on saying 50 to 80 per cent of the labourforce is engaged in agriculture production. If this is the case we should do something to control elephants and other problem animals to raise income of both poor rural households and our country as a whole.

Controlling elephants will be a kind of assurance of both food and employment to small scale farmers, and if this will be reached, local rural households will have been empowered economically, our country will enjoy foreign currency after selling the excess and therefore to be in position to do many other important development activities like building roads and industries. Crop destruction by elephants is among the biggest economic setback to Idodi Division. Rice and maize which were both the main food crops and the main cash crops were the most wanted by the elephants (Figure 4.8).

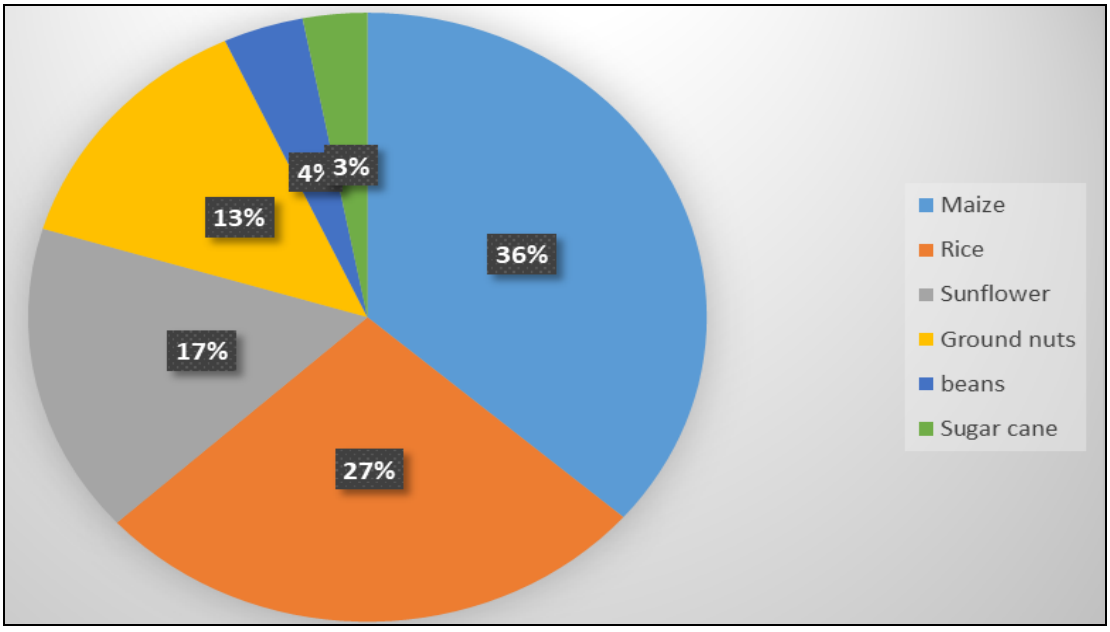


Figure 4.8: Crop Destruction by Elephants
Source: Field Data 2018

4.2.6 Measures taken by People in Idodi Division to Control Elephants

Crop raiding by elephants is the most prevalent form of human–elephant conflict and can result in devastating economic losses for farmers, loss of human lives and the killing or capture of elephant (Waters et al. 2016.). In Idodi Division elephants account for 26% of all the destructions by wild animals, which means the most destructive animals compared (Figure 4.8). Therefore the use of a number of positive conservation and coexistence techniques are of great importance to crops, security of people in the area and to the elephant's life.

Guarding using traditional tools (e.g. noise-makers and lighting fire), chasing the crop raiding elephants by the help of rangers, use of modern conservation friendly techniques like bee hives and Chilly fencing (Chili -based elephant deterrents) and planting non preferred crops have been noted to be a solution to elephants raiding crops in Idodi.

4.2.6.1 Guarding

The simplest and mostly applied way to deter elephants is for farmers to patrol or to guard crops using traditional methods of making noise and lighting fire. In so doing different styles of noise making as well as fire lighting had been performed to drive away encroaching Elephants'.

(a) Noise

The farmers patrol the perimeter roads of farms, using noise-makers like shouting, biting drums, blowing whistles and making other types of noises to drive away encroaching elephants. It had been experienced that most of the encroachment was during the night time. The activity is dangerous because it is being done at night when it is dark. To be safer it needs lots of people at once but it's very difficult to organize many farmers at a time as they cultivate different crops having different growing and harvesting time, and some in isolation therefore less effective. It is among the practices which coast farmers' life in Kitisi village in 2017 (Kitisi village chairman personal communication).

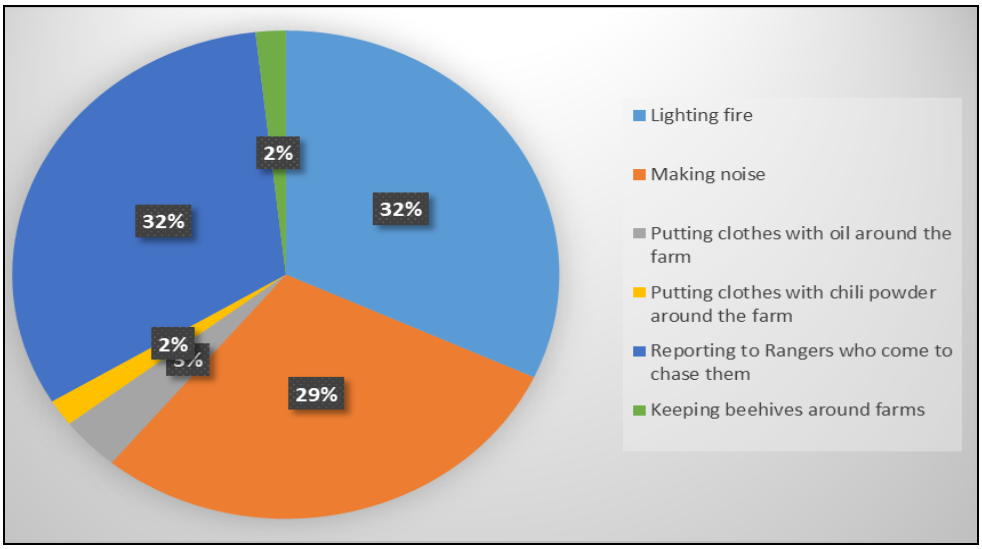


Figure 4.9: Protection of Crops

Source: Field Data 2018

(b) Lighting Fire

Some farmers patrol the perimeter roads of farms lighting fire. This has been found to be effective in driving away invasive elephants. The technique was seen to be of great help with some limitations. For instance, it should be perfumed during the night time when it is dark. So, it is difficult to see elephants and other animals like lions from a distance. Another problem behind the practice was that, a lot of trees were cut down for fire making. This caused deforestation. In addition, when it is raining, lighting fire is impossible.

(c) Chasing the crop raiding Elephants by the help of Ranger

Sometimes the village's leadership report to rangers about the problem elephants. Ruaha national park, KDU and MBOMIPA rangers are the groups helping chasing the elephants when they were into the farms or about to encroached. The rangers move in vehicles and they are chasing elephants by firing bullets in the air. The method is more effective as the elephants would here from a distance and run to the forests.

4.2.6.2 Bee Hives and Chili Fencing

The modern and more positive conservation and coexistence techniques used are together with bee hives and chili fences.

(a) Keeping bee hives around the farms

There were farms fenced with bee hives (See Figure 4.10). It's said when an elephant is approaching bee hives it will hear noise made by bees, something they don't like. If they touch the bee hives, the bees will be alert and sting them. Thus, elephants will avoid from coming close to the bee hives fence. The bee hives in Idodi division are

found at Tungamalenga, Kitisi and Mafuruto villages. The bee hives in those three villages were donated by an NGO called wildlife connection (Figure 4.10).

Figure 4.10: Bee Hives Fence along a Maize Farm at Tungamalenga Village
Source: Author in 2019

The technique is more positive for conservation and coexistence because it does not involve burning the trees (fire lighting) or cause noise. The elephants go back to the forest safely. The crops are being spared from being raided, at the same, time farmers will harvest honey in addition to crops.

(b) Keeping chilli powder around the farms

Some farms had been fenced with pieces o f wire or clothes deepened in chilli powder (making chilli grease), when the elephant shakes a piece of cloth or wire, powder will drop on an elephant and disturb it. In response, the elephant will go back to the forest. This is again more positive conservation. Nonetheless, this method is less used by villagers because it was less efficient. It requires a lot of money to buy the required amount of chilli.

4.2.6.3 Planting Non-Preferred Crops

Crops like cassava, okra, chilli, tomatoes and groundnuts have been noted to do very well in the division. These crops were rarely grown due to different reasons one being difficult to some people to accept changes. That they are not used to growing these crops. Tomatoes for example are doing very well in the area but for small scale farmers with limited resources it is very difficult to cultivate it, for one needs to have enough capital in terms of money to support irrigation system, buying insect seeds and taking care of the farm (Figure 4.11).

In addition, there should be a sure market for according to the nature of tomatoes it's difficult to store for long after harvesting. The same applies to okra and chilli (Figures 4.12-4.15).

Figure 4.11: Tomatoes Farm doing Very Well in Tungamalenga Village
Source: Author in 2019

Figure 4.12: Chilli Farm, another Crop doing Very Well and it's not Prefered by the Elephants

Source: Author in 2019

Figure 4.13: Bambara Groundnuts (Njugu mawe) Farm

Source: Author in 2019

Figure 4.14: Okra in the Midst of Chilli and Tomatoes- It was doing Very Well

Source: Author in 2019

Figure 4.15: Groundnuts together with Maize. Elephants don't Eat Groundnuts

Source: Author in 2019

4.3 Summary

The study observed that as human populations increased and people occupied new land together with some other natural resources the number and the level of socio economic consequences from elephants were increasing. To be more specific, the level of consequences had been increasing due to increasing competition for resources mainly land and food by human being and elephants. Malthusian demographic theory of 1879, “With increasing speed of human population growth a time will be reached when the world (land and food) can’t support life any more’’ (Midgley, 2013) could have been applied if there would have been no use of technology. Use of technology like guarding the crops, introduction of non preferred crops to elephants prone areas, switching to other types of income generating projects rather than make use of natural resources, improving crop guiding techniques, controlling populations of both human being and elephants, investing more on research and education as well as make use of good land use plan as noted in Tungamalenga and Idodi villages seems to be a solution.

The Demographic Transition Theory (DTT) which is about demographic transition from high birth rates and death rates to low birth rates and death rates that occurs as a result of economic and social development of a country from a traditional agrarian to a modern post-industrial economy as stated by Midgley (2013) shades more light on what Idodi people should do to overcome the consequences of elephants destructions. A theory made clear that in an area which is developing/with improved economic and social services there will be a high chance of reducing competition for natural resources and this is because human population will be controlled in addition

improved and modern technologies will be applied. The lesson from DTT is that Idodi should improve some of its social services and technology so as to reduce HEC. A researcher saw a good health centre (Idodi Health Centre) therefore good health services offered including family planning, he further noted increasing good quality secondary schools being built. Idodi Secondary school being one of them therefore good education offered. With human population control, use of improved and modern technology competition for natural resources will be reduced. But still a Division has a long way to go, for its road network systems, water supply services, and electricity supply services are not in good order. Most of its people are not applying modern agriculture practices and there is no good land use plan in many villages in the division.

Moreover, the study found out that human population growth will not be a threat when there will be technological advancement which will make sure that the needs of wildlife are not encroached on and vice versa. For with technology human population will not need to depend much on subsistence farming.

CHAPTER FIVE

SUMMARY, CONCLUSSION AND RECOMMENDATIONS

5.1 Introduction

The chapter presents summary, conclusion and the recommendations.

5.2 Summary of the Study

The study found socio economic consequences of elephants destruction to the communities adjacent to Ruaha National Park, human activities was rapidly increasing to an extent that elephants were denied dispersal area and therefore competing for the same. The primary data as well as secondary data collected confirmed that after analysis. The study then came up with conclusion followed by recommendation on how best to co exist with the elephants.

5.3 Conclusion

The study concluded that to great extent the economy of Idodi division depends on agriculture where by most of the people are small scale farmers. Maize and rice were the main food and cash crops. Other activities were- keeping few cattle and goats. Very few villagers have been employed in tourism industry.

It addition it concluded that socio- economic development in the area including opening areas for settlement, agriculture and other development activities denied animal's dispersal areas, migratory routes and dry season refuge areas. The animals are therefore confined in small refugee areas, which can not satisfy their needs. In a process of fulfilling their needs the elephants are ending up bringing lot of consequences.

Fuelled by living next to a protected area with lot of elephants, social problems like insecurity due to lack of free movement of people, injuries, deaths, food insecurity due to crop raid and food store damage were common. Economic consequences like low income due to damages caused by problem animals were common too. The elephant which can damage a big area at a time was mentioned to be the most destructive animal to the poor small scale farmers in Idodi division. To great extent it has been concluded that, the social economic consequences caused by elephants in Idodi division are many. The main root courses being on one hand, humans encroach on wildlife land resources while on the other hand wild animals raid crops grown by humans adjacent the National Park.

Again it was concluded that the farmers have been using traditional methods like guarding while making noise and lighting fire to protect crops and other properties and this was being carried during night hours something which was dangerous and therefore of little help. Nowadays, modern methods like use of bee hives and chili powdered fence started to show good results.

The introduction of crops not preferred by problem animals such as cassava, tomatoes, groundnuts, okra and chilies somehow reduces social economic consequences of animal destructions on communities adjacent to protected areas. The only problem is that it is difficult to store these crops for a long time.

A research noted that elephants play a very important role in boosting life in the wildlife ecosystems (keystone species) as well as improving social and economic status of the people living around Ruaha National Park. Accordingly, they should be

well conserved. Okello (2005) pointed out that if sustainably managed, wildlife will give continuous nutrition and income and contribute to great extent to the alleviation of poverty as well as to safeguarding human and environmental health.

5.4 Recommendations

(i) The government should invest more in conservation education to the local communities especially on the importance of elephants in Ruaha- Rungwa ecosystem and Tanzania Tourism industry at large. This in turn will help the villagers to look on elephants not as enemies but as a very important resource.

(ii) As a mitigation measure to crop raiding by elephants, the government should support the villager's by providing them with bee hives. Already there are some NGOs like Wildlife Connection which provides some villagers with bee hives to put into their farms. Putting the bee hives around the fields is not only protecting the crops from elephants but also an income generating source after selling honey and wax.

(iii) Rangers from Ruaha National Park, KDU and MBOMIPA should react more quickly once called in response to problem animals. An equipped patrol group with vehicles should be stationed in elephant's problem prone villages to control elephants.

(iv) The government should put a straight forward policy on compensation for damages by elephants.

(v) Researches to be carried out to improve the techniques used to control the elephants and explore new ones.

(vi) More effort should be directed to cultivating crops, which are not preferred by elephants. Cassava, groundnuts, chili, Bambara peas, groundnuts and okra are some of the crops doing very well around Ruaha National park and not preferred by elephants.

(vii) The government and NGOs should help the villagers by looking for market for these crops. Different from maize and rice it is very difficult to store these crops for long once harvested.

5.5 Suggestions for Future Study/Research

On the basis of the outcomes from this study, it is being recommended that similar studies be conducted in other areas adjacent protected areas with similar consequences from elephants so as to correlate the findings.

REFERENCES

Blanc, J. (2008). Loxodonta Africana. The IUCN Red List of Threatened Species 2008: e.T12392A3339343. Retrieved on 7th January 2019 from: http://dx. doi.org/10.2305/IUCN.UK.2008.RLTS.T12392A3339343.en.

Burns, R. B. (2000). *To Research Methods (fourth edition).* London: Sage Publication.

Byers, B. A. (2000). *Understanding and Influencing behaviors: A guide, Prepared for Biodiversity Support Program.* Washington, DC: Oxford University Press.

Cambridge dictionary, (1991). *Cambridge Dictionary.* London: Cambridge University Press.

Cambridge Advanced dictionary, (1995). *Cambridge Advanced Dictionary.* London: Cambridge University Press.

Chatterjee. D. (2016). *Man-elephant conflict, a case study from a forest in west Bengal, India 1st Edition.* Geneva: Springer International Publishing.

Hanks, J. (2006). Mitigation of Human–Elephant Conflict in the Kavango–Zambezi Transfrontier Conservation Area Through Community Based Problem Animal Control, With Particular Reference to the Use of Chilli Peppers. Final Report. December 2006. Conservation International, Washington, DC: USA.

Hoare, R. E. (2000). Projects of the Human Elephant conflict Task force results and recommendations. *Pachyderm. 28(2),* 73-77.

Idwasi, E. (2006). Wildlife human conflict in Kenya: Lessons Learned from AWF's African Heartlands. AWF working papers, Nairobi, Kenya.

IUCN, (2010). The IUCN Red List of Threatened Species. Retrieved on 11th May 2018 from: https://www.iucnredlist.org/.

James, M., and Amy, C. (2010). *Social work and social development: Theories and skills for developmental work.* London: Oxford University Press.

James, M. (2013). *Theory and Practice.* Berkeley: University of California Press.

Kaswamila, A. (2006). Impact of Game on Household Food Security and income in northeastern Tanzania. *An International Journal Human Dimensions of Wildlife,* 12(6), 391-404.

Kenya Wildlife Service, (1996). Human wildlife conflicts, sources, solutions and issues. Retrieved on 1st March 2018 from> [www document] available at: http// www.safariweb.com/kwild/wildlife.

Kidegesho, J. (2008). Co-existence between the traditional society and wildlife in western Serengeti, Tanzania: its relevance in contemporary wildlife conservation effort. *Biodiversity Conserve, 17(4),* 1861-1881.

Kideghesho, J., Jafari, K., Julius, W., Nyahongo2b , Shombe N. Hassan1c, Thadeo C.Tarimo1d & Nsajigwa E.. Mbije 1e (2004)). Factors and Ecological Impacts of Wildlife Habitat Destruction in the Serengeti Ecosystem in Northen Tanzania. *Biodiversity and Conservation, 16(7),* 2213-2230.

KINAPA GMP, (2016). Kilimanjaro National Park General Management Plan of 2016. Retrieved on 6th January 2018 from: http://www.google.com/search? client=safari&rls=en&q=KINAPA+GMP+(2016)-Kilimanjaro+National +Park+General+Management+Plan+of+2016&ie=UTF-8&oe=UTF-8.

King, L. E. I., Douglas, H., and Vallarta, F. (2007). "African elephants run from the sound of disturbed bees." *Current Biology 17(19*), 832 – 839.

Kioko, J., Muruthi, P., Omondi, P., Chiyo, I., and Cumming, G. (2008). "The performance of electric fences as elephant barriers in Amboseli, Kenya." *South African Journal of Wildlife Research 38(1*), 52-58.

Lihiru, A. R. (2013). The Negative Effect of Elephant on livelihood in selected areas around Udzungwa National Park, A Research paper submitted for the award of Degree in of Wildlife Management, SUA. Morogoro, Tanzania.

Messmer, T. (2000). The emergence of human–wildlife conflict management: turning challenges into opportunities. *International Biodeterioration & Biodegradation, 45(3),* 79-102.

Midgley, G. F. (2010). Beyond bioclimatic envelops: dynamic species" range and abundance modeling in the context of climate change. *Ecography Journal, 33,* 621-626.

Midgley, J. (2013). *Social Development: Theory and Practice-https://books google.com.* London: Sage Publications Inc.

Okello, M. M. (2005). An assessment of large mammals component of the proposed wildlife sanctuary site in Maasai Kuku Group Ranch near Amboseli Kenya. Retrieved on 21st May 2018 from: https://www.researchgate.net › publication › 237300623.

Panda (Panda WWF), (2007). Human-animal conflict. Internet document. Retrieved on 2nd July 2817 from: `www.panda.org/about_wwf/what_we_do/species/ problems/human_animal_conflict/index.cfm.

Pervez, G., and Kjell, G. (2005). *Research Methods in Business Studies, 4th Edition.* London: Prentice Hall.

TEMP, (2010-2015). URT, Tanzania Elephants Management Plan. Retrieved on 5th March, 2019 from: https://www.researchgate.net/publication/265336134_ Tanzania_ Elephant_Management_Plan.

Transfortier Conservation Area, with particular reference to the use of chili peppers, a document prepared for conservation international, www.conservation-southernafrica.org.

Warmer, M. Z. (2008). *Examining Human-Elephant Conflict in Southern Africa: Causes and Options for Coexistence,* Washington, DC: University of Pennsylvania Scholarly Com.

Waters, C. N.Zalasiewicz, J., Summerhayes, C., Barnosky, A. D., and Poirier C. (2016). *Cambridge Advanced Learner's Dictionary.* Cambridge: Cambridge University Press.

Western, D., Russels, S., and Cuthil, I. (2009). The status of wildlife in protected areas compared to non-protected areas of Kenya. *PLoS ONE 4(7): e6 1 40. doi: 10.1371/journal .pone.0006140*

Woodroffe, R., Thirgood, S., and Rabinowitz, A. (eds). (2005). *People and Wildlife: Conflict or Coexistence?* Cambridge: Cambridge University Press.

APPENDICES

Appendix I: Questions to be administered to the Heads of Households in Idodi Ward (Idodi, Tungamalenga and Mahuninga Villages)

PART A: RESPONDENT'S PERSONAL PARTICULARS

A: PERSONAL PARTICULARS (General information)

District……..…Division……..Ward……Village

Name of respondent…….., Age…….

Sex: Male/Female……..

Occupation……

Marital status: Single/ married/divorced/widow……..

Education level……

Family size…….

PART B: DEMORGRAPHIC INFORMATION

What is your place of birth?

Village…….Ward……..District……..Region……

For how long have you been living in this village (years)

Reason for living in this village (v)

1=agriculture

2=employment

3=availability of land

4=livestock keeping

5=timber business

6=hunting

7=charcoal making

8=others (mention)……

If you farm, what crops do you grow? (according to priority)

a/……..,b/…….c/……d/……

How many hectares do you farm in total? (i) less than a hectare (ii) 1-2, (iii) 3-4, (iv) 5-7, (v) 8 and more (vi) do not have land to farm

How was farm land acquired: (i) inherited, (ii) cleared bushland, (iii) bought land, (iv) rented

PART C: HUMAN-ELEPHANT CONFLICTS

Are there human-wildlife conflicts in your village? Yes/ No

If yes mention these conflicts

……

……

……

Which animal species are more often causing problems (in order of frequencies)

a/…….b/…….c/…….d/……

Which losses did you get last year as a result of problematic animals?

a/ Loss of crops (acres)…….

b/ Loss of livestock (number)……..

c/ others specify……

Mention other problems caused by wild animals in your village……

……

……

……

What kind of mitigation do you apply to solve these problems?

……

……

What has been done and by who to solve problems caused by elephants

……

……

What should be done, by whom, to solve problems caused by elephants

……

……

……

How do you perceive conservation in your village?

a/ Good…….. b/ bad…… c/ I don't understand……..

What are your views pertaining to issues of elephants destruction in your village?

……

……

……

Appendix II: Issues to be Discussed with Focus Group

1. What are your daily activities in the village (in %)

a/ agriculture……....

b/ livestock keeping…..…

c/ business……..…..

d/ employee……..

Which among the following are the main sources of conflict in this area? (according to priorities)

(Problem animals, drought, little education, diseases)

Mention the types of plants you grow into you farms

……

……

……

……

……

……

Which plants are mostly preferred/destructed by elephants?

(Arrange according to elephants priority)

.....

.....

.....

.....

How do people perceive elephant's issues?

a/ neglected b/ little support to help people against problem animals

c/ elephants bring no problems d/ elephants should be protected

i) Are the elephants important? (Yes/No-in %)

ii) Why are they Important? (Give scores)

a/ Tourist attraction

b/ Provide meat

c/ Prestige/Heritage

d/ Scientific study

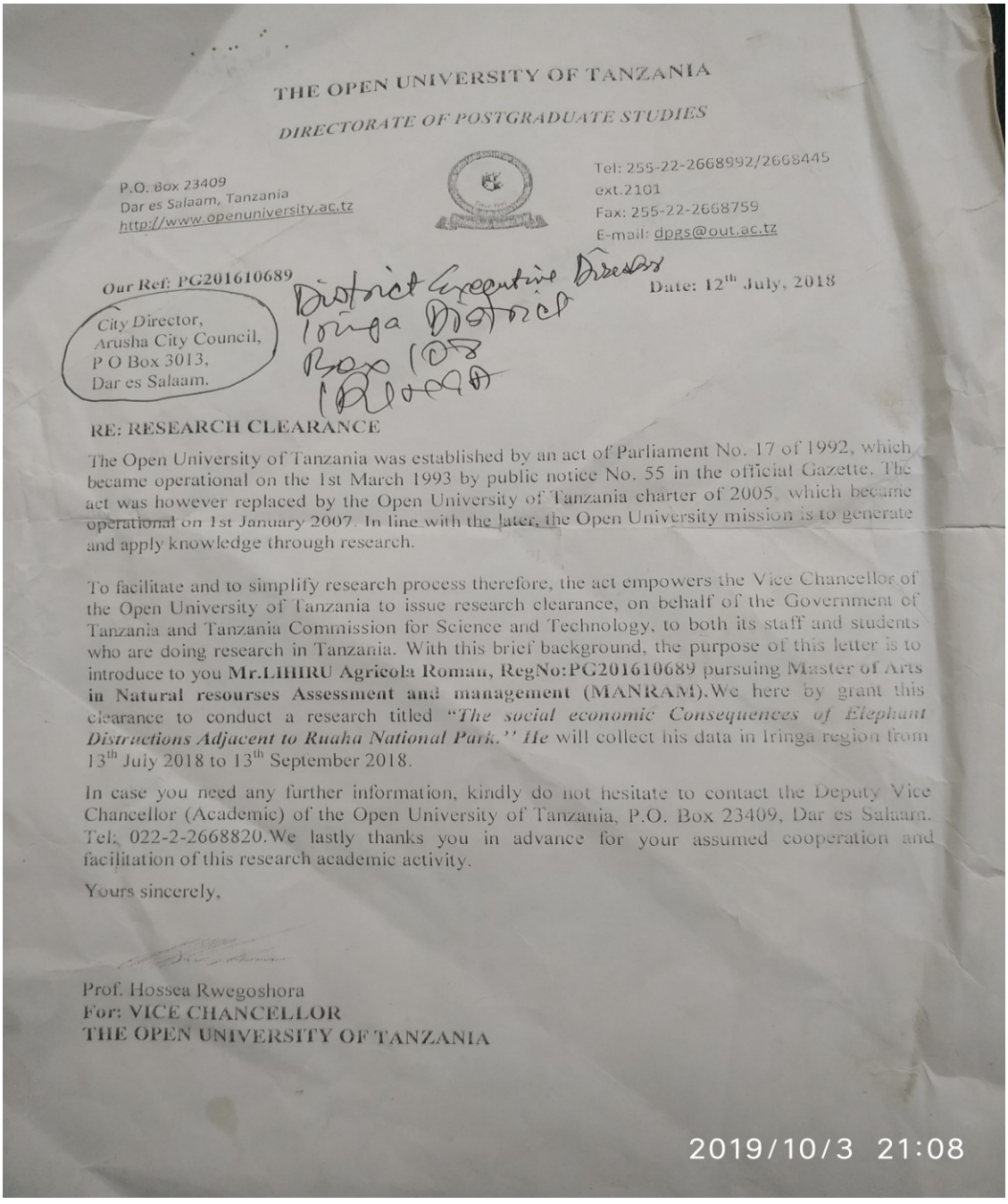
e/ Key stone species

Who are your partners dealing with problem animals?

a/……b/…….c/…….d/…….

Appendix III A Research clearance letter

Though by mistake a clearance to conduct a research tittled "The sosio economic Consequences of Elephants Distruction Adjacent to Ruaha National Park was addressed to City Director Arusha, Iringa district people understood that it was a human error and gave full support to a research in their areas (Idodi Division)



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Our Ref: PG201610689

District Executive Director
Iringa District
Box 108
IRINGA

Date: 12th July, 2018

City Director,
Arusha City Council,
P O Box 3013,
Dar es Salaam.

RE: RESEARCH CLEARANCE

The Open University of Tanzania was established by an act of Parliament No. 17 of 1992, which became operational on the 1st March 1993 by public notice No. 55 in the official Gazette. The act was however replaced by the Open University of Tanzania charter of 2005, which became operational on 1st January 2007. In line with the later, the Open University mission is to generate and apply knowledge through research.

To facilitate and to simplify research process therefore, the act empowers the Vice Chancellor of the Open University of Tanzania to issue research clearance, on behalf of the Government of Tanzania and Tanzania Commission for Science and Technology, to both its staff and students who are doing research in Tanzania. With this brief background, the purpose of this letter is to introduce to you **Mr.LIHIRU Agricola Roman, RegNo:PG201610689** pursuing **Master of Arts in Natural resourses Assessment and management (MANRAM).**We here by grant this clearance to conduct a research titled ***"The social economic Consequences of Elephant Distructions Adjacent to Ruaha National Park."*** ***He*** will collect his data in Iringa region from 13th July 2018 to 13th September 2018.

In case you need any further information, kindly do not hesitate to contact the Deputy Vice Chancellor (Academic) of the Open University of Tanzania, P.O. Box 23409, Dar es Salaam. Tel; 022-2-2668820.We lastly thanks you in advance for your assumed cooperation and facilitation of this research academic activity.

Yours sincerely,

Prof. Hossea Rwegoshora
For: VICE CHANCELLOR
THE OPEN UNIVERSITY OF TANZANIA

2019/10/3 21:08