Community perceptions and attitudes towards integrated wildlife/livestock land-uses: The case of greater-Giyani rural communities, Limpopo province

by

Vutomi Arone Baloi

MINI-DISSERTATION

Submitted in partial fulfilment of the requirements for the degree of

Master of Science

in

Agriculture (Agricultural Economics)

in the

FACULTY OF SCIENCE AND AGRICULTURE

(School of Agricultural and Environmental Sciences)

at the

UNIVERSITY OF LIMPOPO

SUPERVISOR: DR P CHAMINUKA (UNIVERSITY OF LIMPOPO)

2016

DECLARATION

I declare that the mini-dissertation hereby submitted to the University of Limpopo, for the degree of Master of Science in Agriculture (Agricultural Economics) has not previously been submitted by me for the degree at this or any other university; that it is my own work in design and execution, and all material contained herein, has been duly acknowledged.

…….. ……

Surname, Initials (title) Date

DEDICATION

I dedicate my dissertation work to my family and many friends. A special feeling of gratitude to my lovely mom (N`wa-Mkhatini) who always told me that good preparation is the predictor of success, my late father (Mikia) and 3 sisters (Thandi, Audrey and Makhanani), your memory will forever live in me. Precilla, Poulina and Conny have never left my side and are very special, thank you sisters. I dedicate this work and give special thanks to my friend J. Hazel Mathebula who always encouraged me to work hard with him and my wonderful Son Hlulo for being there for me throughout the entire Master's program. I love you all!!!

ACKNOWLEDGEMENTS

The beginning of wisdom is to fear the LORD, and acknowledging the Holy One is understanding (Proverbs 9:10). First of all, I need to acknowledge the wisdom, guidance and protection I received from Almighty God.

And secondly, I would like to take this opportunity to convey my acknowledgement to my understanding and knowledgeable supervisor, Dr P. Chaminuka. Coming to this point was not an easy way but I would like to appreciate your patience and support that you gave me in all areas. You were the only supervisor of my mini-dissertation and with the responsibility to supervise other students, but you managed all that. You are simply the best.

I am grateful to be part of the Department of Agricultural Economics and Animal Production team, and would like to thank all the staff members in this Department for their guidance, motivation and most notably the training that they gave to me directly or indirectly over my stay at the University of Limpopo.

This study would not have been possible without the research ideas and financial support from the Department of Agriculture, Forestry and Fisheries (DAFF) through their Zero Hunger Project, your role was huge.

Finally, I want to extend my acknowledgement to the Greater-Giyani Local Municipality for allowing me to conduct my study in their area. Much thanks to the traditional leaders (Tihosi) from 9 villages where the study was conducted (i.e. Thomo, Muyexe, Mhlava-Vhelem, Gawula, Khakhala, Mahlathi, Ndindani, Hlomela and Vuhehli). This study would not have been possible without the interest of community members (households) themselves to let me steal their time and talk to them during the surveys. “Ndzi ri xandla e henhla ka xin`wani Va-Aka Tiko”.

ABSTRACT

Livestock production in communal areas is faced by a myriad of challenges such as environmental degradation, poor markets, stock theft and disease. This has drawn interest towards wildlife-based land-use practices as an alternative or complement to livestock production. Wildlife-based land-uses have potential to generate incomes and create employment in wildlife rich areas. On the other hand, several problems such as human-wildlife conflict have been identified in wildlife rich areas. This study investigated perceptions of rural households in areas adjacent to the Kruger National Park (KNP) regarding integrated wildlife/livestock land-use practices. Data were collected from 130 households in nine villages alongside KNP in Giyani. Respondents were stratified into cattle owning households and non-cattle owning households, to determine differences in perception towards wildlife.

Chi-square and Cramer`s V tests were used to test if there is an association and relationship between the households` opinion and cattle ownership. For empirical analysis, factor analysis and multinomial logistic regression models were run with SPSS. Attitudes and perceptions were analysed by the Likert-scale numbered from 1 to 4. High scores (i.e. 3 and 4) indicated negative attitudes and low scores (i.e. 1 and 2) indicated positive attitudes. The factor analysis managed to reduce the number of attitude variables fitted into the model from 29 to 9 factors (components), that were used in the multinomial logit model analysis. Results from the multinomial regression indicated that demographic factors such as age, gender, education, occupation, marital status, monthly income and cattle ownership had a significant impact in distinguishing between pairs of groups and the contribution which they make to change the odds of being in one dependent variable group rather than the other. Results from factor analysis (component variables or factors) also had a significant impact on the dependent variables when applied to multinomial logit regression.

About 59% of the sampled households showed positive attitudes towards integrated wildlife-based land-use practices, and indicated willingness to participate in it. Those who had negative attitudes and were not likely to participate were 13%; and those who were uncertain on whether or not to participate were 28%. Looking at the results of the empirical analysis derived from regression analysis through multinomial logit, several factors were found to have influenced whether or not households were likely

to participate in the integrated wildlife/livestock land-uses. Variables: damages caused by wild animals on crops and vegetables; giving land and stopping farming to allow for wildlife conservation; roles and opportunities of wildlife in the community; roles and opportunities of livestock in the community; age of household head; occupation of household head; gender of household head; cattle ownership; Access to market, income earned from sale of livestock, and state of grazing area, were found to be significant (at different significant levels 1%, 5% and 10%) in determining whether or not households were likely to participate in the integrated wildlife/livestock land-uses. However, variables: Government support and the number of people benefiting from livestock, Interest in wildlife protection, Relationship between wildlife, human and domestic animals and land ownership were found to be insignificant in determining whether or not households were likely to participate in the integrated wildlife/livestock land-uses. Most of the households showed interest in participating in wildlife-based land-uses irrespective of whether or not they own cattle. Some households indicated dislike of the proposed land-use practice, mainly those who practiced cattle and crop production, as they perceived wild animals as a high risk to their stock. However, this negative attitude can be managed if benefits to households and community are clearly defined and compensation for loses from wildlife are made a priority. Cooperation of all stakeholders (for example, community, government, conservationists and foreign donor' agencies) is recommended for implementation of wildlife-based land-uses.

THE DAFF ZERO HUNGER PROGRAMME

This research was conducted under the auspices of the Zero Hunger Programme in South Africa. The vision of the Zero Hunger Programme is to attain universal physical, social and economic access to sufficient, safe and nutritious food by all South African at all times to meet their dietary and food preferences for an active and healthy life (DAFF, 2012). The strategic goal is to improve South Africa's adequacy and stability of access to safe and nutritious food at both national and household level. Key to this goal is the alleviation of hunger and poverty in South Africa.

The Zero Hunger Programme was implemented through an integrated approach, which entrenches public, private and civil society partnerships with focus on household food security. In ensuring that poor and vulnerable members of the South African society have access to food and improve food production capacity of households and poor resource farmers; universities must provide recommendations to the Department on policy coordination and research analysis matters as well as undertaking objective research. This should be done in order to inform policy that focuses on issues of greatest concern for agricultural development in the rural areas. The University of Limpopo is one of the organizations partnering with DAFF on this project. This study provides recommendations to the Department (DAFF) on land use and integrated rural development.

TABLE OF CONTENTS PAGE

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ABET	Adult Based Education and Training
ABSA	Amalgamated Banks of South Africa
CBNRM	Community-Based Natural Resources Management
CNPPA	Commission on National Parks and Protected Areas
CH	Cattle owning households
DAFF	Department of Agriculture, Forestry and Fisheries
DCAs	Damage-Causing Animals
EFA	Explanatory Factor Analysis
HF	Hlanganani Forum
ICDPs	Integrated Conservation and Development Projects
IUCN	International Union for Conservation of Nature
KNP	Kruger National Park
NCH	Non-cattle owning households
PAs	Protected Areas
PCA	Principal Component Analysis
SPSS	Statistical Package for Social Science
STATSA	Statistic South Africa

CHAPTER 1

INTRODUCTION

1.1 Introduction and background

Livestock production is the primary land-use option in many rural areas of Limpopo Province and contributes to livelihoods of households in several ways. Cattle are used for many purposes and are considered an important part of day to day lives of the people and their culture (Dovie *et al*., 2006). Many people in rural areas use cattle for multiple purposes. These include sale and consumption of meat and milk, manure for crops, and for cultural purposes. Most livestock, particularly cattle, depends on communal grazing system which is on land legally owned by the state, and administered by the traditional authorities. Despite much of the land in rural areas being made available for livestock grazing, several challenges hamper the improvement of smallholder livestock systems in rural areas. These challenges include limited market access, cases of livestock theft, increasing costs of controlling livestock diseases and the poor state of most grazing areas (ABSA, 2003; Chaminuka et al., 2012). In addition, most areas of Limpopo Province are prone to droughts, and cattle farmers can suffer considerable losses of stock in drought years. Under such highly variable environmental conditions and numerous challenges, wildlife-based land-uses such as game farming can complement livestock farming or serve as an alternative land-use, because wildlife is better adapted to harsh conditions than livestock (Barnes, 1998).

In South Africa, wildlife farming is becoming one of the most prominent alternative land-uses to livestock production (ABSA, 2003). Wildlife farming also has the capacity to generate incomes, create employment and improve household food security in areas where agriculture has limited potential. There is however, limited information on whether wildlife farming could be socio-economically viable as an alternative or a complement to existing extensive livestock production (ABSA, 2003). Wildlife conservation and tourism development provide options for developing land with limited agricultural potential, and stimulating growth of the local economy in some areas in Sub-Saharan Africa. There is an increasing tendency for large-scale livestock farmers to shift towards wildlife land-uses, and there is an increasing

interest amongst rural communities in wildlife and tourism operations (Ashely and Elliot, 2003). A study conducted by ABSA (2003) showed that wildlife farming can be an economically sound alternative to cattle farming in Savannah areas predominant in the Limpopo Province, especially where rainfall varies from 300 to 600mm per annum. The study however, was mostly conducted within the context of large-scale farming operations, and not specifically considering the socio-economic context of smallholder rural areas in Limpopo Province.

Apart from being an economically sound land-use option, wildlife farming can also enhance biodiversity conservation goals in rural areas (Munthali, 2007). Several challenges are however associated with integrated wildlife/livestock farming. These challenges include among others, risk of diseases transmission and damages caused by wildlife to agricultural activity. Human safety is also threatened. Administering wildlife land-uses is problematic as this would be owned jointly by the community unlike livestock which is privately owned (Kreuter and Workman, 1996; Chaminuka, 2012). In addition, depending on institutional environment and rights to land and other natural resources, wildlife can present opportunities for realizing local economic development. It can also be a threat towards agricultural based livelihoods. However, limited information exists in Limpopo Province on the possible opportunities and challenges that could be faced by rural communities who intend to consider wildlife farming or integrated wildlife/livestock farming as land-use option. The wildlife/livestock interface can be defined as an area where wildlife and livestock are living together (Grootenhuis and Olubayo, 1993). This means that wildlife and livestock frequently interact.

1.2 Problem statement

Livestock production is the primary land-use option in many rural areas of Limpopo Province and contributes to livelihoods of households in several ways. Although most people in rural areas use land for livestock grazing, several challenges result from the application of this land-use option. These challenges include limited market access, droughts, increasing cases of livestock theft, increasing costs of controlling livestock diseases, and the poor state of most grazing areas. Wildlife-based land-uses are increasingly being considered as an alternative land-use option, particularly in the large-scale farm sector.

There are several social and economic opportunities (e.g. employment creation, income generation, biodiversity conservation) that come with wildlife land-uses. Therefore, there are increasing calls for rural communities to consider wildlife-based conservation programs where they are possible as a land-use option, particularly for wildlife rich areas. However, success of wildlife-based land-uses depends on community cooperation and positive attitudes towards wildlife conservation (Mabunda, 2004). Attitudes and perceptions might differ according to households' characteristics such as their sources of livelihood and the current land-uses. There is limited information on perceptions and attitudes of local people towards having wildlife in rural areas. Previous studies (e.g. ABSA, 2003) considered wildlife farming in large commercial farms whilst studies such as Anthony *et al*., (2011) and Chaminuka *et al*., (2011) were conducted in different locations. Chaminuka et al., 2012 considered the costs and benefits of wildlife land-uses but did not analyse the extent to which cattle farmers and others in rural areas were willing to give up part of their land. Although Mopani District is a wildlife rich area, there are no studies done on this topic for the district. Therefore, this study aimed to fill this knowledge gap because it is not clear whether or not people in Mopani would support the idea of wildlife-based land-uses on communal grazing.

1.3 Research questions

This study intends to answer the following questions:

i. What are the socio-economic characteristics of households living at the wildlife/livestock interface?
ii. What are the perceptions and attitudes of the local community regarding integrated wildlife/livestock land-use option in rural areas?
iii. Do perceptions and attitudes differ between non-cattle and cattle farmers?
iv. What are the factors influencing rural households` interest to participate in integrated wildlife/livestock farming practices in rural areas?

1.4 Research objectives

The overall objective of the study was to identify socio-economic opportunities and challenges for integrated wildlife/livestock farming practices in rural areas of Limpopo province for improved livelihoods. Specific objectives of the study were the following:

i. To describe socio-economic characteristics of households living at the wildlife/livestock interface.
ii. To analyse local community perceptions and attitudes regarding integrated wildlife/livestock as a possible land-use option in rural areas.
iii. To compare perceptions and attitudes of non-cattle and cattle owning households towards integrated land-uses.
iv. To determine factors influencing households` participation in integrated wildlife/livestock farming in rural communities.

1.5 Hypothesis

The hypotheses to be tested are:

i. Perceptions and attitudes of the local community regarding integrated wildlife/livestock land-use option in rural areas are negative.
ii. There are no perception and attitudinal difference between non-cattle and cattle owning households.
iii. There are no significant socio-economic factors influencing rural households` participation in integrated wildlife/livestock farming practices.

1.6 Justification of the study

Understanding perceptions and attitudes of rural households towards integrated wildlife/livestock land-uses is important to improve the relationship between local residents and the management of conservation areas. The findings of this study will assist rural households to realize positive benefits associated with wildlife conservation practice in terms of food security, income generation, asset building, reduced household vulnerability and sustainable natural resources use. The outcome of the study will also inform poverty alleviation through income generation and employment creation through diversified land-uses. Apart from being an economically sound land-use option, wildlife farming can also enhance biodiversity conservation goals in many rural areas, and stimulate growth of the local economy in Mopani district and most notably Greater-Giyani Municipality. Generally, understanding local community`s perceptions and attitudes from conservation areas will make possible the creation of strategic, place-based management strategies that build on local community`s positive perceptions and mitigate their negative

perceptions. The study will contribute to literature on the value of community participation and the impact that wildlife management organizations such as Kruger National Park (KNP) could have on the community as, presently, little empirical research has been done on this topic.

1.7 Outline of the study

The study is organised as follows. Chapter one has given the background on the subject and the purpose and justification of the study. An outline of the problem statement, research hypothesis, research questions, and research objectives guiding this study are also presented in this chapter. The second chapter discusses the literature review of rural households on wildlife conservation, their behaviour and interaction with wildlife, and the potential costs and benefits of wildlife land-use. In the third chapter, the methodology is presented. The study area is described and data collection procedures, methods used in data analysis and the variables considered are explained. Justification and limitations for the selection of the research approach is also given. Chapter four presents the descriptive analysis of key variables and the sample, and chapter five gives the results of the empirical analysis. In chapter six, the findings are summarised and major conclusions and policy implications are drawn out.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This section defines the key concepts used in the study and reviews literature on perceptions of wildlife-based land-uses. The key concepts in the study were defined as follows: Wildlife/livestock interface: is defined as an area where both wildlife and livestock are common (Grootenhuis and Olubayo, 1993). This means that wildlife and livestock cohabitate frequently. Usually, livestock and wildlife are the only forms of land-use suitable for the arid and semi-arid lands. In South Africa these areas are usually located on the borders of national parks such as Kruger National Park.

Integrated wildlife/livestock land-uses: These are land-uses whereby wildlife share land with livestock with intent to design strategies that will not only ensure the long-term viability of species and ecosystems but also will be politically and economically acceptable to local communities and governments. One approach that has gained considerable attention in recent years is the integrated conservation and development project (ICDP), which attempts to link the conservation of biological diversity within a protected area to social and economic development outside that protected area (Newmark and Hough, 2000). In ICDPs, incentives are typically provided to local communities in the form of shared decision-making authority, employment, revenue sharing, limited harvesting of plant and animal species, or provision of community facilities, such as dispensaries, schools, boreholes, roads, and woodlots, in exchange for the community's support for conservation (Barrett and Arcese, 1995).

Another approach is Community-Based Natural Resources Management (CBNRM) which differs from the ICDP approach in that, instead of offering development services in exchange for conservation, it devolves management responsibility for natural resources to local communities (Grootenhuis and Olubayo, 1993). Its success depends on communities seeing more value in managing their wildlife on a long-term sustainable basis than in pursuing short-term exploitation or alternative land-uses. When wildlife and livestock come together, conflicts arise. Murphree (1993) indicated that considerable success in generating compatible land-use

regimes around protected areas has been claimed in Zambia, Zimbabwe, and Namibia using CBNRM. Wildlife is in conflict with livestock in three obvious ways: through competition for the same natural resources in space and food, as a disease reservoir for livestock and through predation (Grootenhuis and Olubayo, 1993).

Perception refers to an opinion formed about a matter or attribute on reception of a stimulus (Schiff, 1970). Every stimulus leads to formation of perception. Now once perception is formed about that matter or attribute, households tend to learn more about the matter of attribute. Once learning comes up to the desired level, households form attitude. In a nutshell, households first perceive, learn from perception/s (on account of single or multiple stimuli depending on their need for cognition) and then form attitudes, which dictate their participation decisions towards integrated wildlife/livestock land-uses.

Allport (1935) defined an attitude as a mental or neutral state of readiness, organized through experience, exerting a directive or dynamic influence on the individual`s response to all objects and situations to which it is related. In another way attitude is a mindset or a tendency to act in a particular way due to both and individual`s experience and temperament, and when we refer to a person`s attitude we are trying to explain his or her behavior. Therefore, in this study perception and attitude were used together (complementary) in explaining households` behaviour and opinions.

Protected area: is an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and natural associated cultural resources, and managed through legal or other effective means (IUCN, 1994). South Africa has some 403 protected areas, ranging from the massive and world-renowned Kruger National Park (established in 1898, it is the size of Wales and one of the oldest and best managed nature reserves in Africa), to the tiny and little-known Mkambati Nature Reserve in the Eastern Cape (South Africa Protected Areas, 2014).

2.2 Community attitudes towards wildlife conservation

The ways in which the conservation area management and the local community work together results in the community having a certain behaviour (perceptions and attitudes) towards adapting wildlife conservation. Their perceptions can be negative or positive. The decision is based on the sharing of both costs and benefits of the

conservation regime in question. A positive attitude towards wildlife conservation is a key indicator of conservation success (Struhsaker *et al.,* 2005). It is critical to understand the perceptions of people since this will improve the relationship between local residents and the conservation area, thus developing positive attitudes towards conservation. Allendorf *et al.,* (2006) argued that a focus on conflicts to understand people`s attitudes towards conservation areas may undervalue positive attitudes that people hold. Understanding local residents' perceptions of protected areas (PAs) makes possible the creation of strategic, place-based management strategies that build on people's positive perceptions and mitigate their negative perceptions.

Chaminuka *et al*., (2014) investigated the livelihood roles of cattle and prospects for alternative land-uses at the wildlife/livestock interface in South Africa. In their findings, they indicated that cattle farmers viewed wildlife as an unsuitable alternative land-use because they thought it posed a threat to livestock and crop production. They believed that wildlife could cause problems such as disease transmission, livestock depredation, crop destruction, and possible competition for land. In order for rural communities to commit land for wildlife uses (conservation), they need to have positive attitude towards wildlife conservation (Chaminuka, 2012). Although cattle farmers agreed that wildlife had the potential to generate income, they argued that there was no guarantee that these benefits would accrue to their own families. On the other hand, youth people with small businesses agreed that there was an opportunity for wildlife-based land-uses without eliminating cattle production. They argued that livestock production was important but could only sustain a few households due to its low incomes and limited opportunities to create jobs.

In other findings, Anthony (2006) and Chaminuka *et al*., (2012) revealed that the perception by livestock farmers that wildlife was a threat could be the result of lack of proper benefits from wildlife and lack of compensations to households who suffer wildlife damages. Studies conducted by Lepp (2007) on perception towards tourism in Uganda and Campbell-Smith *et al.,* (2010) on local attitudes and perceptions towards crop raiding in Indonesia found that residents' attitudes towards conservation were positive since they believed that it created community development through opportunities for earning income and improved agricultural markets. The benefits, however, partially benefited the people, as they were not sustainable. Lepp and Holland (2006) argued that unless compensation was made a

priority and an insurance program for crop and livestock loss was considered for those farmers residing alongside KNP, positive attitudes would rarely be realised. Low participation in conservation programs, past experience of human-wildlife conflict, increased number of crop farmers and illiteracy were found to be the negative determinants of attitudes and perceptions on resources use in Kenya (Shibia, 2010).

Anthony *et al*., (2011) found that communities adjacent to KNP ranked protected forest and wild animals as least important, though they were a main concern for conservation agencies. When asked, the communities indicated that they need employment and health facilities the most. However, when asked if they needed nature or see it as important to their lives they indicated that they need nature for different needs such as construction materials, clean air, drawing tourists and educating the younger generation. Anthony (2007) argued that the dual nature of many protected areas (e.g. KNP) could produce mixed perceptions from neighbouring communities. Those who profit from PAs benefits that directly meet community needs, mainly in the form of employment opportunities, can result in favourable attitudes towards those PAs, and extension of these benefits to locally relevant education, may have the greatest potential in shaping attitudes towards conservation. However, lack of interaction, poor communication, and unfulfilled promises in terms of financial compensation, costs and disadvantages of PAs with regard to damage-causing animals (DCAs) can cause confusion and wariness with respect to the purposes of a PA and its alleged commitment to improve relationships with its neighbours. Anthony and Moldovan (2008) defined DCAs as “wild animals that; kill, injure or chase humans or livestock, damage property and destroy crops.”

2.3 Determinants of households` attitude on wildlife conservation

Mankin *et al.,* (1999) pointed out that conservation education played a significant role in determining the attitudes of households. Local communities that lacked conservation education would yield positive attitudes when provided with conservation information. Conservation knowledge should be strengthened and the links between all stakeholders (i.e. communities, state, and natural resource agencies) should be reinforced. This would help members of the public to make sound and informed decisions on natural resources issues. Wildlife development

programmes in some areas were likely to fail unless local people adopted a change in approach (Parrya and Campbella, 1992). It was recommended that the negative impact of wildlife be reduced by for example; fencing of agricultural land, improved control of problematic animals and adequate compensation schemes.

On their study, Anthony and Moldovan (2008) indicated that in Romania most respondents (75.1%) approved of Macin Mountains National Park`s forest protection policy. This positive attitude came because of environmental services which forests provided, including clean air, fuel-wood, wildlife habitat, beauty/landscape value, and value for future generations. However, those who had negative attitude most often identified the restriction of access to fuel-wood as the main reason behind their attitude.

In some communities, gender was among the most important demographic factors in describing the attitudes of households towards wildlife conservation (Gilligan, 1982; Kellert and Berry, 1982). Females were likely to have negative attitudes than males because they believed that wild animals were objects of negative affection, and women were concerned about the consumptive exploitation of wildlife (i.e. woman were assumed to be the ones who depended heavily on forest resources). Contrary to other findings (Gilligan, 1982; Kellert and Berry, 1982), Shibia (2010) argued that gender had no effect on the attitudes and perceptions of the respondents. Negative attitudes might also have been associated with the restrictions imposed on wildlife resources; therefore, conservation area management should not totally restrict communities from accessing wildlife resources. Because rural communities were presumed to have informal rights of tenure, they were likely to retaliate from their loss by destroying wildlife (e.g. poaching).

Perceptions of communities who are poor and have the history of conflicts with wildlife are heavily influenced through economic and cultural factors (Anthony, 2006). If neighbouring communities cannot perceive economic and cultural benefits or advantages from the proposed arrangement with the conservation area, they are likely not to participate in that proposal. Emerton and Mfunda (1999) argued that in Tanzania wildlife conservation was unlikely to become economically desirable for most landholders if the amount of money or compensation allocated to benefit sharing was low, and the form in which benefits were received as indirect

development activities failed to compensate for the direct losses caused by wildlife. If benefits and costs are unequally distributed between groups, the direct economic impact of wildlife was felt largely by the community as a cost. Normally landholders were not satisfied by indirect benefits such as limited rural development activities implemented through government, but rather needed real tangible benefits such as cash. As long as the gap between wildlife benefits and costs still exists (or the imbalance between costs and benefits), wildlife was unlikely to succeed in rural communities.

2.4 Households potential benefits and costs of wildlife conservation

Anthony (2006), pointed out that five major functions of social ecology namely; community facilitation; economic empowerment; environmental education; cultural resource heritage management; and research and monitoring were set by the KNP to benefit the neighbouring communities. These were done possible by the implementation of that Hlanganani Forum (HF) which represented a certain number of communities alongside the KNP. According to Anthony (2007), the most often-cited and serious complaint from local community members regarding KNP was related to damage caused by DCAs and lack of compensation for this damage. With many reporting that financial compensation had been promised by both KNP. These aspects of DCAs and their control threatened, and therefore, prevented the pursuit of sustaining or enhancing livelihoods through agricultural practices.

Evidence of costs and benefits of conserving wildlife have been well assessed and documented. The benefits are known to range from the ecosystem services protected within the forest area, to direct and indirect benefits from conservation management. Roe *et al.,* (2011) argued the statement that biodiversity conservation benefits the poor, saying that many rural people depend directly on biodiversity for their livelihoods. Any action of conserving biodiversity would mean that the poor are made worse off because of resource restriction. This is a true reflection in areas where conservation is done on local land and resource rights are not clearly defined and where bans on resource use are high. If these together with appropriate safeguards (to ensure that people are not made worse off) are not clearly defined, then the benefits of biodiversity conservation are unlikely to be realised by rural people.

Ashley and LaFranchi (1997) emphasised that commercial wildlife activities on communal land in Windhoek (Namibia) contribute much needed cash and are complementary to other land-use strategies such as livestock keeping and crop production, this is supported by ABSA (2003). Economic analysis of alternative land-use options showed that commercial wildlife farming could be an economically sound alternative to cattle farming. The analysis was however confined to large-scale farming and not communal areas.

Emerton and Mfunda (1999) argued that the presence of wildlife provides a number of indirect benefits to landholders from government-controlled tourism to hunting activities. Two schemes in Tanzania (i.e. Serengeti National Park, Grumeti and Ikorongo Game Reserves with villages in the Western Serengeti area) shared wildlife revenues generated by government. Both, by allocating a proportion of tourist and hunting revenues to rural development activities mainly the construction, rehabilitation and maintenance of infrastructure such as schools, bridges, roads, dispensaries and water supplies; but also including some support to small enterprise development which aimed to ensure that some level of community benefit were accrued from wildlife.

According to Adedayo (2003) people residing next to Kainji Lake National Park in Nigeria were employed as park attendants, security guards, cleaners, messengers, labourers and other intermediate technical positions such as park guards, park wardens, park superintendents, and park rangers. There was evidence of development near the park particularly of infrastructure, off-farm employment, environmental education, and awareness. These could result in positive attitudes, mainly if local people were involved in the national development and management.

The study conducted by Boyd *et al*., (1999) about reconciling interests among wildlife, livestock and people in Kenya, argued that households owning cattle and those who did not own cattle benefited in integrated wildlife and cattle farming where animals such as zebras grazed together with cattle. It was found that positive benefits such as food security, cash income generation, and reduced household vulnerability were evident.

2.5 Human-wildlife interaction

If conservation benefits are not seen, there exists a human-wildlife conflict regarding wildlife conservation. However, this knowledge of conflicts between rural people and conservation areas is needed for planning of suitable and sustainable conservation strategies critical for the management of most protected areas.

On the study investigating the causes of conflicts between local people and wildlife conservation in Cameroon, Weladji and Martin (2003) indicated that the damage to agricultural activities, the involvement of local people in illegal activities (e.g. poaching), and lack of access to natural resources were some of the major causes of conflicts. The authors recommended that conflicts would be resolved only if damages caused by wildlife were accounted for through animal searing and controlled shooting, and if wildlife was managed by all stakeholders, and tangible benefits to local people were promoted. If benefits were not seen and not sustainable enough, the conflicts were likely to occur, and if damages caused were not accounted for, local people were more likely to retaliate by involving themselves in illegal activities that would cost the wildlife management as a way of trying to settle for their forgone benefits.

Lewis (2005) studied synergies between animal husbandry and wildlife conservation in Kalomo Distict (Zambia). Livestock numbers declined over decades due to the epidemic outbreak of Bovine diseases. This resulted in rural communities poaching the wild animals in the adjacent protected areas. During drought years, cattle provided a critical source of cash needed for food and other uses (and served as a safety net against crop failure). Therefore, when such diseases affected cattle, people were left with no option than wildlife poaching. Due to poverty, people were unable to afford the cost of drugs and preventive treatments. However, if local residents were trained as barefoot vets, to administer treatments and vaccinations while promoting public awareness that disease control and prevention was supported by wildlife-generating revenues, the poaching problem would have declined.

Le Bel *et al.,* (2012) concluded that as long as the population of some species (elephants) was increasing and the demand for agricultural land was increasing, the

conflicts would exist. If this situation was not addressed so that human and wildlife coexist, wildlife as a natural resource will be condemned only to survive in fenced protected areas (Seberwal *et al.,* 1994). It was the responsibility of the conservation area management to make sure that wildlife conservation was sustainable, and that benefits were shared equally in a sustainable manner not on the expense of local people. Large animals were typically the vehicles of conflicts in local communities because they required large home ranges and more food resources to sustain a viable population. As a result they extended their range beyond the limits of the small protected area into the neighbouring land thereby causing damages which in turn resulted into conflicts.

Treves and Karath (2003) revealed that there were two categories of problems caused by wildlife to local communities adjacent to protected areas namely; damages to agricultural activities (i.e. crop raiding and livestock predation) and threats to human life and diseases transmission. These were the major causes of conflicts between protected areas and local communities. All these conflicts could be resolved by effectively promoting dialogue between managers of protected areas and local communities, involving affected stakeholders in protected-area project planning and implementation, identifying areas of common interest between protected areas and local communities, and including community representatives on advisory management boards for protected (Hough 1988; Lewis 1996). These programs were attractive not only because they were relatively easy to implement but also because they were not very expensive (Newmak and Hough, 2000). These resolution initiatives would greatly reduce tensions between local communities and park authorities. Newmark and Hough (2000) also concluded that the development of scholarships, courses, exchange programs, training manuals, and technical assistance that focus on ecological and social monitoring, conflict resolution, park planning, and modern law enforcement techniques would greatly enhance the capacity of protected-area institutions to address many of the protected-area–local community conflicts.

2.6 Summary of key studies consulted.

Table 2.1 summarises all the key studies that have been consulted when constructing the literature review.

Table 2.1: Summary of key studies consulted

Studies consulted	Location	Methodology approach used
ANTHONY, B and MOLDOVAN, D. 2008. Poised for engagement? Local communities and Macin Mountains National Park	Romania	Community attitude index (CAI)
ANTHONY, B.P. 2006. A view from the other side of the fence: Tsonga communities and the Kruger National Park	South Africa	Toolbox approach, Pebble distribution method, Threat reduction assessment, Questionnaires
ANTHONY, B. 2007. The dual nature of parks: attitudes of neighbouring communities towards Kruger National Park	South Africa	single community attitude index, Linear regression, Questionnaires
CHAMINUKA, P., MCCRINDLE, C.M.E and UDO, H.M.J. 2012. Cattle farming at the wildlife/livestock interface: assessment of costs and benefits adjacent to Kruger National Park	South Africa	Net benefits of coexistence, Pearson's chi-squared, Weighted ranking, Questionnaires
CHAMINUKA, P., UDO, H.M.J., EILERS K.C.A.M and VAN DER ZIJPP, A. 2014. Livelihood roles of cattle and prospects for alternative land-uses at the wildlife/livestock interface in South Africa	South Africa	Livelihoods analysis framework, monetary valuation approaches, Questionnaires
CHAMINUKA, P. 2012. Evaluating land-use options at the wildlife/livestock interface: an integrated spatial land-use analysis, environmental and natural resource economics group	South Africa	A Choice Experiment Approach, Sensitivity analyses, Questionnaires
STRUHSAKER, T., STRUHSAKER, P and SIEX, K. 2005. Conserving Africa's rain forests: problems in protected areas and possible solutions	Tanzania	Pearson product–moment correlation coefficients, Questionnaires
ALLENDORF, T.D., SMITH, J.L.D and ANDERSON, D.H. 2007. Residents' perception of Royal Bardia National Park	Myanmar	Logistic regression models, Questionnaires
LEPP, A. 2007. Residents' attitudes towards tourism in Bigodi village	Uganda	NUDIST, Questionnaires
CAMPBELL-SMITH, G., SIMANJORANG, H.V.P., LEADER-WILLIAMS, L and LINKIE, M. 2010. Local attitudes and perceptions toward crop-raiding by orangutans (Pongo Abelii) and other nonhuman primates in Northern Sumatra	Indonesia	Logistic regression models, Questionnaires
LEPP, A. 2007. Residents' attitudes towards tourism in Bigodi village	Uganda	NUDIST, Questionnaires
SHIBIA, M.G. 2010. Determinants of attitudes and perceptions on resource use and management of Marsabit National Reserve	Kenya	Cross tabulations, Pearson Chi-square test, Questionnaires

ANTHONY, B.P., ABONYI, S., TERBLANCHE, P and WATT, A. 2011. Towards bridging worldviews in biodiversity conservation: Exploring the Tsonga concept of *ntumbuloko* in South Africa	South Africa	Face-to-face questionnaires, Interviews, Chi-square and correlation tests
MANKIN, P.C., WARNER, R and ANDERSON, W.L. 1999. Wildlife and the Illinois public: a benchmark study of attitudes and perceptions	USA	Loglinear analysis, Questionnaires
PARRY, D and CAMPBELLA, B. 1992. Attitudes of rural communities to animal wildlife and its utilization in Chobe enclave and Mababe depression	Botswana	Case studies reviews
GILLIGAN, C. 1982. In a different voice	Cambridge	Book review.
KELLERT, S.R and BERRY, J.K. 1982. Knowledge and behaviours toward wildlife as affected by gender	USA	Multiple classification analysis, Questionnaires
EMERTON L and MFUNDA, I. 1999. Making wildlife economically viable for communities living around the Western Serengeti	Tanzania	Working paper, case study reviews
ROE, D., THOMAS, D., SMITH, J., WALPOLE, M and ELLIOTT, J. 2011. Biodiversity and poverty: ten frequently asked questions- ten policy implications. Key highlights in sustainable agriculture and natural resource management	UK	Discussion paper, case study reviews
ASHLEY, C and LAFRANCHI, C. 1997. Livelihood strategies of rural households in Caprivi: implications for conservancies and natural resource management	Namibia	Discussion paper, case study reviews
BOYD, C., BLENCH, R., BOURN, D., DRAKE, L and STEVENSON, P. 1999. Reconciling interests among wildlife, livestock and people in Eastern Africa	East Africa	Case studies review
WELADJI, R.B and TCHAMBA, M.N. 2003. Conflict between people and protected areas within the Bénoué Wildlife Conservation Area	Cameroon	Case studies review
LEWIS, D. 2005. Synergies between animal husbandry and wildlife conservation perspectives from Zambia	Zambia	Case studies review
LEWIS, C. 1996. Managing conflicts in protected areas	Switzerland	Case studies review
LE BEL, S., MURWIRA, A., MUKAMURI, B., CZUDEK, R., TAYLOR, R., and LA GRANGE, M. (2011). Human Wildlife Conflicts in Southern Africa: riding the whirlwind in Mozambique and in Zimbabwe	Mozambique and Zimbabwe	Multiple correlation, Questionnaires
SEBERWAL, V.K., GIBBS, J.P., CHELLAM, R., and JOHNSINGH, A.J.T. (1994). Lion-human conflict in the Gir forest	India	Multiple classification analysis, Questionnaires
TREVES, A and KARANTH, K.U. 2003. Human-carnivore conflict and perspectives on carnivore management world-wide	USA	Case studies review

2.7 Summary

Studies have been conducted in South Africa and outside regarding wildlife conservation and its attributes in rural communities. Different results from different locations have been documented. Some previous studies (e.g. Anthony, 2006 and Chaminuka, 2014) consider wildlife conservation as an option that sustains livelihoods of rural households as it serves as a source of income in these areas, while others (e.g. Roe *et al*., 2011) show that wildlife conservation is a factor that will leave the poorest of the poor worse off. The extent to which these negative and positive results are realised depends upon the protection status, management strategies and the mechanisms of benefit sharing through management structures, and involvement of the community in governance. Therefore, it is important to understand the perceptions of rural households towards wildlife conservation before any action of implementation to improve the relationship between local residents and the conservation area management.

Conservationists in the recent years view local peoples' support for protected areas management as an important element of biodiversity conservation. This is often linked to the direct benefits, which local communities get from the protected areas. These benefits could be in the form of biomass resources, park funds diverted to local villages by state agencies and revenue from wildlife tourism. There are a very few studies which have attempted to study the direct relationship between benefits from wildlife tourism and local support for conservation. Several studies have concluded that costs associated with conservation such as wildlife depredation of crops and livestock have negative effects on local attitudes, whilst benefits from conservation may have positive effects.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter reviews the research methods used in collecting and analysing variables that were considered to be influencing rural households in Limpopo to participate in the integrated wildlife/livestock land-use option. The chapter is intended to indicate where and how the study was conducted using research tools. It starts by explaining the study site, sampling techniques, data collection, and data analysis. The reasons why specific models were used to analyse data in this study and the biasness of the selected models are also presented.

3.2 Description of study site

The study was conducted in rural communities under Xiviti tribal authority of Greater-Giyani Local Municipality in Mopani district of Limpopo province (South Africa). Greater Giyani Municipality is one of five (5) local municipalities falling within Mopani District Municipality. The town is located +/- 155km from Polokwane, +/- 100km from Thohoyandou and +/- 550km from Tshwane. The municipality covers an area of approximately 2967, 27km^2 with the only urban area being Giyani. The municipality is demarcated into 30 wards consisting of ninety one (91) villages and urban area of Giyani (CRDP, 2012). The town of Giyani is the largest centre of population concentration, employment opportunities, shopping and recreational facilities. Greater Giyani local municipality's population has increased from 217,454 in 1999 to 237,433 in 2001 (CRDP, 2012). The economic activities that mostly take place in Greater Giyani, both formal and informal are small-scale agriculture, services, transport, and retail development. There are however, a number of factors negatively influencing the economic growth such as geographical location (distance to markets), shortage of skills, poor infrastructure, climatic conditions, and diseases (HIV and malaria). According to CRDP (2012), the municipality has potential for tourism and conservation development due to the existing natural heritage sites through the area, mining, abandoned farming schemes, processing of natural products (Mopani worm and marula fruit). Most of the communities in this study are

in the extreme end of the district forming the central part of the northern region of KNP. The communities concerned in this study form part of the communities that are situated alongside the northern part of the KNP some of which are also members of the Hlanganani Forum (HF). Hlanganani forum refers to the forum representing the thirty-eight (38) settlements alongside the Kruger National Park within the borders of Vhembe and Mopani district municipalities. Villages involved in this study are: (1) Hlomela, (2) Ndindani, (3) Vuhehli, (4) Mahlathi, (5) Gaula, (6) Khakhala, (7) Thomo, (8) Mhlava-Vhelem, (9) Muyexe. The area on the right of the map is the KNP. The bush is the primary source of forest products for local communities. Communities adjacent to the KNP usually go to extract fuel-wood and minor forest products such as thatch grass, sand and building poles to list but a few. The majority of the households practice subsistence livestock and crop production (which is mainly seasonal).

3.3 Data collection

Data collection was done using a structured questionnaire which was pre-tested using a convenient sample of 10 households (5 with cattle and 5 without cattle) in Hlomela village. Perception and attitudinal questions (opinion questions) were asked to the sampled households, which covered both open-ended and close-ended questions in the survey. Data collection was done between December 2013 and February 2014, with each interview allocated at least 20 minutes. Questionnaires were designed in English and were translated to Xitsonga since it was the local language in Greater Giyani. In this study, opinion questions (items) were allocated scores; 1, 2, 3, and 4; and grouped in 4 scales namely: agreement- disagreement, satisfaction-dissatisfaction, interested-uninterested and concerned-unconcerned. High scores indicated negative perception and attitudes (i.e. that is households who would not participate in integrated wildlife-based land-use practices). These scores were used to measure perceptions and attitudes of rural households towards integrated wildlife/livestock land-use, by indicating if households` perceptions were positive, negative or uncertain and recorded verbatim responses to open-ended questions.

The purpose of the survey was to source the information that would give an insight in the following: Socio-economic opportunities and challenges for integrated

wildlife/livestock; local community perceptions and attitudes regarding integrated wildlife/livestock; socio-economic characteristics influencing households' participation in integrated wildlife/livestock land-use option. In order to achieve the objectives above and make inferences to a bigger population, it was important that the sample of households that was interviewed in the survey was as representative as possible of the different sub-groups of households in the Greater-Giyani area (mainly areas which were close to the KNP).

However, during the data collection process; challenges such as identifying cattle households, privacy when conducting interview (in some cases where you interview a wife, a husband would be sitting next to her though he would not answer any question), extremely hot weather and difficulty for finding transport money at times.

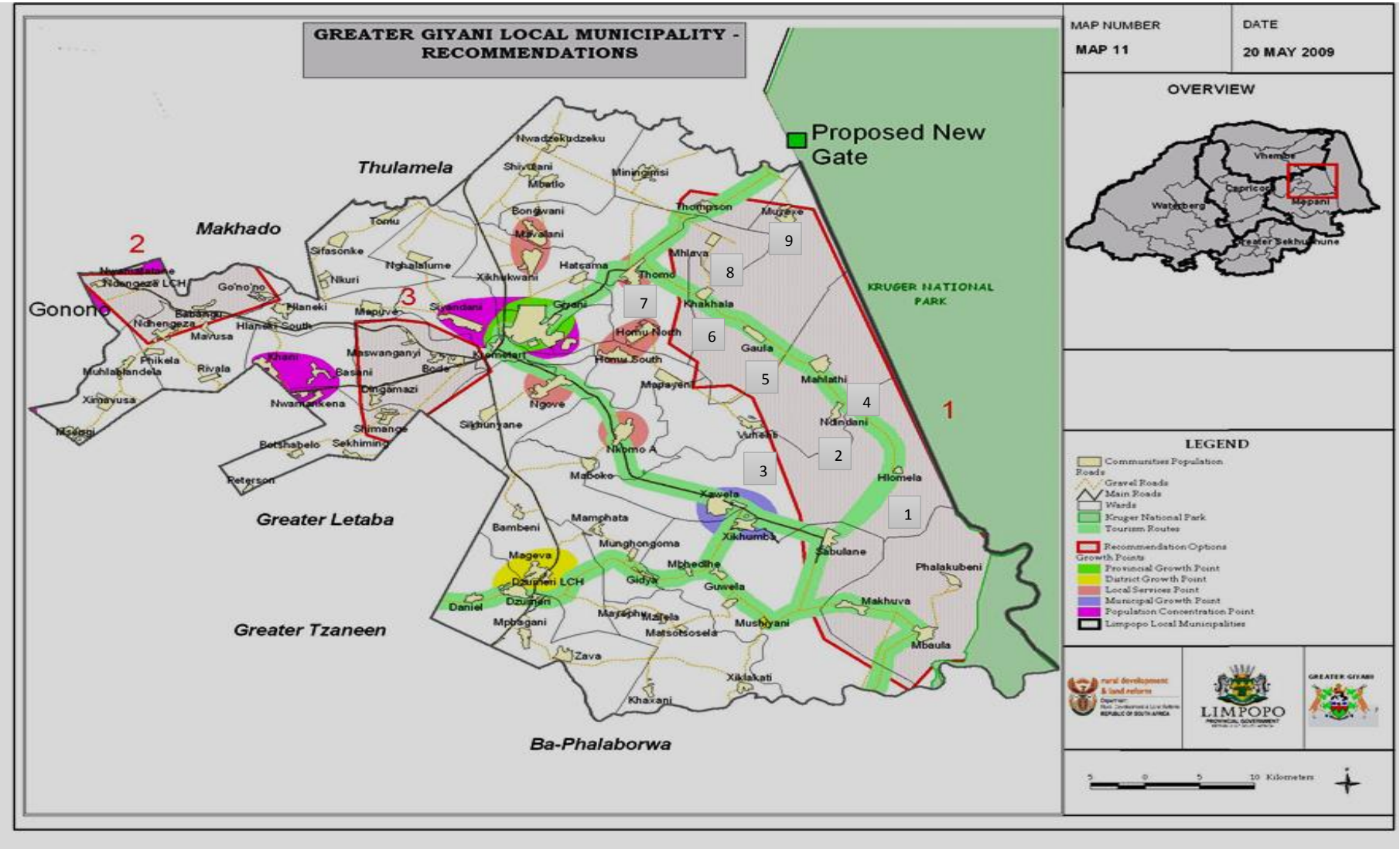

Figure 3.1: Map of Greater-Giyani Local Municipality

3.4 Data sampling

The municipality had 30 wards grouped into 5 clusters. Most wards had a population exceeding 5000. However, for the purpose of this survey, only three wards (17, 18 and 19) adjacent to the KNP were surveyed since the purpose was to interview those communities that were close to the KNP.

3.4.1 Sampling frame

The population in this study was defined as all households that were under the three targeted wards of the Greater-Giyani area found in Xiviti Traditional Area. Our unit of analysis was the household, which was defined in this survey as 'a group of people that ate from the same pot, with a common source of income. These people had common housekeeping and shared at least one meal a day.' Statistics available at statistics South Africa (STATSA, 2012) showed that the total population in these wards was about 22587 people (see table 3.1)

Table 3.1: Population Statistics of study area

Wards and villages	**Population**	**Cattle households**	**Non-cattle households**
Ward 17 (Thomo and Mhlava Vhelem)	7931	23	23
Ward 18 (Muyexe, Gawula, and Khakhala)	4800	14	14
Ward 19 (Mahlathi, Vuhehli, Hlomela and Ndindani)	9856	28	28
Total	22587	65	65

A combination of multistage and stratified sampling approaches was used. The three wards mentioned above had nine villages falling under them with each village having a Headman. From each of the selected villages, households were stratified into two main groups called strata, namely livestock farming households and non-livestock farming households. From each stratum, households were randomly selected to make up the required sample sizes. The lists of households with cattle and households without cattle were obtained from the Headmen of the villages concerned. The anticipated sample size for this survey was 130 households (i.e. 5% of the targeted three wards in Greater-Giyani). Therefore, to find what percentage to sample in each ward, the population of each ward was divided by the total population of the 3 wards; for example, the population for ward 17 was 7931, so it was divided

by 22587 to get 35%. The same applied to ward 18 and 19. In order to get the total number of households to sample in each ward, the sample size was multiplied by the required sampling percentage from each ward. That is, ward 17, 130x35%= 46; 130x21%= 28; 130x44%= 56. In order to have a representative sample of the population, the number of households in each ward was divided into two, those with cattle (cattle owning households) and those without cattle (non-cattle owning households), that is, in ward 17, 46/2=23, there were 23 households with cattle and 23 without cattle. The same applied at wards 18 and 19. At village level, the two main groups relevant to this study were considered, namely; cattle owning households and non-cattle owning households. Consequently a multistage sampling exercise was applied followed by stratified random sampling at village level (see figure 3.2).

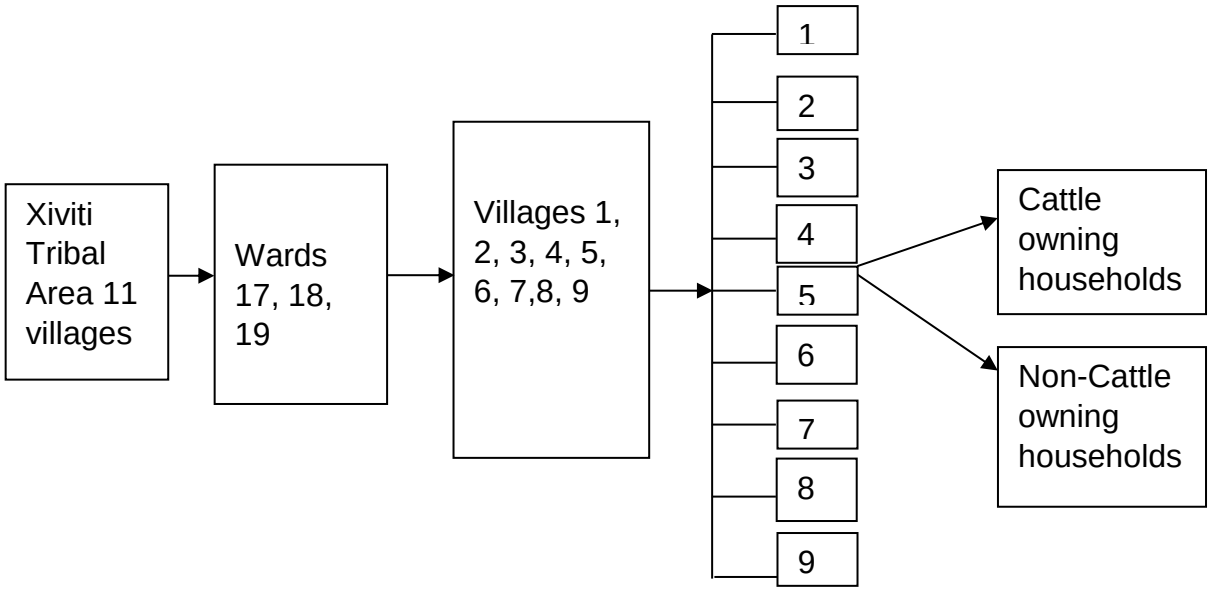

Figure 3.2: Multistage and stratified Sampling

3.5 Data analysis

3.5.1 Motivation of the models

The data collected in this study was first grouped or arranged using Factor Analysis, and then analysis of perceptions and socio-economic factors influencing participation was done with the use of multinomial logit model. Since there were a number of variables in the data, it was critical to do a factor analysis first, in order to reduce the

number of variables and group them by looking at the interrelationships between variables.

Multinomial logit model was selected over other multivariate analysis techniques because for example, in order to use ordered probit model, response data should be ordered and the distance between them (e.g. from this study, distance between PART and UNCERTAIN had to be equal to the distance between UNCERTAIN and NOT PART) had to be equal (Greene, 2002). Most of multivariate analysis techniques require the basic assumptions of normality and continuous data, involving independent and/or dependent variables. This requirement is noticeable also in the application of multinomial logit model data collection and measurement steps in perception analysis, but to varying degrees. Hence, though much stronger interval and ratio scales provide a good basis for a more comprehensive multivariate analysis. Commonly used perception measurement scales such as five-point Likert, ordinal, and nominal scales are usually considered unsuitable for multivariate analysis techniques, due to various assumptions such as normality of independent variables, linearity of relationships, multicollinearity among independent variables, and equal dispersion matrices for discriminant analysis. For this reason, multinomial logistic model was used where the above assumptions tend to be violated. This is evident in one main way in MLR analysis. Thus, it has alternative data distribution assumptions, suggesting that it generates more appropriate and correct findings in terms of model fit and correctness of the analysis regardless of any assumption (Bayaga, 2010).

Unlike in linear regression models where the response variables are normally distributed with the t- or F-test statistics used for testing significance of explanatory variables; the response variables are Bernoulli distributed, meaning that a perception analyst has to use different test statistics, which exact distributions are unknown. Therefore, in this study, details about test statistics were not described, but more focus was given on interpreting the results of multinomial logit model analysis (i.e. methodology, results and discussion of results). Because of this, two different types of test statistics, the (log) likelihood ratio statistic (often referred to as the -2log or deviance) and the Wald were used. The model is written somewhat differently in some software (e.g. SPSS and SAS) than the usual mathematical approach. In

some software (e.g. SAS), the sign is a plus, suggesting that increases in predictor values leads to an increase of probability in the lower-numbered response categories (Bayaga, 2010). The opposite is true for software such as SPSS with a minus sign between the intercept and all the regression. This is a convention ensuring that for positive beta coefficients, increases in predictor values leads to an increase of probability in the higher-numbered response categories. In general, the likelihood statistic is superior to the Wald statistic (in the sense that it gives more reliable results), so this study had concentrated on the likelihood ratio statistic (the reason for considering the Wald statistic too, is that it was computationally easy and was given automatically in the output of most statistical computer packages, e.g. SPSS).

According to Tabachnick *et al*., (2001), multinomial logistic regression technique has a number of major advantages. These include (1) it is more robust to violations of assumptions of multivariate normality and equal variance-covariance matrices across groups; (2) it is similar to linear regression, but more easily interpretable diagnostic statistics; (3) most importantly, multinomial logit model does not assume a linear relationship between the dependent and independent variables; (4) independent variables need not be interval; (5) multinomial logit model does not require that the independents be unbounded; and lastly (6) normally distributed error terms are not assumed.

Therefore, multinomial logit model was then preferred over ordered probit model. IBM SPSS Statistics 22 was used to analyse the data using models mentioned above. Descriptive statistics including mean, minimum, maximum, frequencies, and standard deviations were computed.

3.5.2 Factor analysis model

The first econometric model used in this study is factor analysis (FA). FA reduces a large number of variables to a more manageable set of factors that can be used for further analysis (Knafl, 2006). According to Hair *et al*., (1995), the purpose of FA is to describe the covariance relationships among many variables in terms of a few underlying, but unobservable, random quantities called factors, interpreted through weights of the variable called factor loadings organized in a matrix of factor loadings. The FA model is organised in such a way that all variables within a particular group

are highly correlated among themselves, but have relatively small correlations with variables in another group (Makhura *et al*., 1997). Normally, factors used for further analysis should contain unique variables.

Mathematical model expression of factor analysis model:

$$\mathbf{x = \Lambda f + e} \qquad \mathbf{(1)}$$

In equation (1), x is the vector of *n* observable variables, *f* is the vector of m unobservable factors, Λ is called the loading matrix of the order *nfm,* and *e* is the error vector of *nx1*.

The aim of the factor analysis is to account for the correlation of the covariance between the response variable in terms of a smaller number of factors. In order to determine the number of factors that have to be retained, the study uses the Kaiser criterion of retaining Eigen values greater than one (>1), and also selects factors with high factor loadings scores ±0.4 or greater.

3.5.3 Multinomial logistic regression

Multinomial logit is a regression model that generalizes logistic regression by allowing more than two discrete outcomes. It is used to predict the probabilities of the different possible outcomes of a categorically distributed dependent variable, given a set of independent variables (which may be real-valued, binary-valued, categorical-valued, etc.). Therefore, it should be kept in mind that the actual goal of the multinomial logistic model is to predict categorical data (Greene, 2002).

Multinomial logit regression is used when the dependent variable in question is nominal (equivalently categorical, meaning that it falls into any one of a set of categories which cannot be ordered in any meaningful way) and for which there are more than two categories. The following are the assumptions of the multinomial logit model: The Multinomial logit model assumes that data are case specific; that is, each independent variable has a single value for each case. It also assumes that the dependent variable cannot be perfectly predicted from the independent variables for any case. Compared with other types of regression, there is no need for the independent variables to be statistically independent from each other; however, collinearity is assumed to be relatively low as it becomes difficult to differentiate

between the impacts of several variables if they are highly correlated (Greene, 2002).

Multinomial logistic regression allows each category of an unordered response variable to be compared to a reference category, providing a number of logistic regression models. For the case of this study, to model which of three opinion answers (there are three categories in the unordered response variable) is likely to be chosen by a household, two logit models are computed; one comparing not participating (NOT PARTC) with the reference category (participating, PARTC) and one comparing uncertain (UNCERTAIN) with the reference category (participating, PARTC). The model of perception behaviour between three opinions can therefore be represented using two (i.e., j -1) logit models.

$$\log \frac{Pr(Y=NOT\ PARTC)}{Pr\ (Y=PARTC)} = \alpha+\beta_1X_1+\beta_2X_2+\ldots+\beta_kX_k \quad (2)$$

$$\log \frac{Pr(Y=UNCERTAIN)}{Pr\ (Y=PARTC)} = \alpha+\beta_1X_1+\beta_2X_2+\ldots+\beta_kX_k \quad (3)$$

This is useful information as the effect of the explanatory variables (X_k) can be assessed for each logit model (i.e., the effect of X_1 on the choice between NOT PARTC and PARTC and the effect of X_1 on the choice between UNCERTAIN and PARTC); and also for the model as a whole (i.e., the effect of X_1 across all response options in the sample). It is also useful to interpret a single parameter for each explanatory variable in order to derive a single parsimonious model of the response variable.

The multinomial logistic regression model allows the effects of the explanatory variables to be assessed across all the logit models and provides estimates of the overall significance (i.e., for all comparisons rather than each individual comparison). The general specified multinomial logistic regression model is shown in equation 4:

$$\log \frac{Pr(Y=j)}{Pr\ (Y=j')} = \alpha+\beta_1GEND+\beta_2AGE+\beta_3EDUS+\beta_4OCCP+\beta_5MINC+\beta_6MRST+\beta_7LAND+\beta_8CATLE+\beta_9RKLV+\beta_{10}FAC1\_1+\beta_{11}FAC2\_1+\beta_{12}FAC3\_1+\beta_{13}FAC1\_2+\beta_{14}FAC2\_2+\beta_{15}FAC3\_2+\beta_{16}FAC1\_3+\beta_{17}FAC2\_3+\beta_{18}FAC1\_4 \quad (4)$$

In equation (4), j is the identified outcome and j' is the reference outcome.

3.5.4 Variables in the multinomial logit model

Multinomial logit is a regression model that generalizes logistic regression by allowing more than two discrete outcomes. It is used to predict the probabilities of the different possible outcomes of a categorically distributed dependent variable, given a set of independent variables (which may be real-valued, binary-valued, categorical-valued, etc.).

Dependent variable- Participation in integrated wildlife land-use practices.

Table 3.2: Dependent variable classified by three categories

Category	Description
1	I would participate in integrated wildlife-based land-use practices
2	I would not participate in integrated wildlife-based land-use practices
3	I`m uncertain

The dependent variable outcomes, 1, 2 and 3 in table 3.2 were found by comparing the scores of opinion questions (i.e. satisfaction, interest, agreement and concern) towards integrated wildlife/livestock land-use practices. These opinion questions were assigned scores 1 to 4 with 1 and 2 scores indicating a positive attitude (i.e. will participate) towards integrated wildlife/livestock based land-use practices. On the other hand the scores of 3 and 4 indicated a negative attitude (i.e. will not participate), but when the scores of 1 and 2 were equal to the scores of 3 and 4, the household was called to be uncertain. The aggregated scores were calculated from questions 23 to 51 in the questionnaire. The following describe independent variables as predictors of the outcome variables: Independent variables as predictors of the household decision to participate in integrated wildlife-based land-uses included demographic variables (e.g. age, gender, marital status, education, occupation, income, source of income, land owning, cattle owning and reasons to own cattle), opinion variables (e.g., level of satisfaction from livestock production, level of interest towards wildlife-based practices given their benefits, level of agreement towards issues attached to wildlife-based land-uses and level of concern that existed between wildlife and humans). A description of independent variables hypothesized as affecting the perception of rural households to participate in integrated wildlife/livestock based land-uses was provided in table 3.3.

Table 3.3: Variable names and description of variables used in the analysis

Variable	Description	Unit	Expected sign
Independent variables (Socio-economic)			
GEND, X1	Gender of household head, coded 0= Female, 1= Male	Dummy	+
AGEH, X2	Age of household head, continuous variable	Continuous	+
EDUS, X3	Education status, coded 0= otherwise, 1= matric and above	Dummy	+
OCCP, X4	Occupation, coded 0= otherwise, 1= formal employment	Dummy	+
MINC, X5	Monthly income, coded 0= otherwise, 1= R1500 and below	Dummy	+
MRST, X6	Marital status, coded 0= otherwise, 1= married	Dummy	+
LAND, X7	Land ownership, coded 0= don't own land, 1= own land	Dummy	_
CATLE,X8	Cattle ownership, coded 0= don't own cattle, 1= own cattle	Dummy	_
RKLV, X9	Reason(s) for keeping cattle, coded 0= otherwise, 1= culture/security purposes	Dummy	_
Independent variables (Opinion)			
FAC1_1, X10	Level of satisfaction, coded 1 to 4: 1= very dissatisfied, 4= very satisfied	Categorical	_
FAC2_1, X11	Level of satisfaction, coded 1 to 4: 1= very dissatisfied, 4= very satisfied	Categorical	+
FAC3_1, X12	Level of satisfaction, coded 1 to 4: 1= very dissatisfied, 4= very satisfied	Categorical	+
FAC1_2, X13	Level of interest, coded 1 to 4: 1= Extremely interested, 4= Not at all interested	Categorical	+
FAC2_2, X14	Level of interest, coded 1 to 4: 1= Extremely interested, 4= Not at all interested	Categorical	+
FAC3_2, X15	Level of interest, coded 1 to 4: 1= Extremely interested, 4= Not at all interested	Categorical	+
FAC1_3, X16	Level of agreement, coded 1 to 4: 1= strongly agree, 4= strongly disagree	Categorical	+
FAC2_3, X17	Level of agreement, coded 1 to 4: 1= strongly agree, 4= strongly disagree	Categorical	+
FAC1_4, X18	Level of concern, coded 1 to 4: 1= unconcerned, 4= concerned	Categorical	-

3.5.5 Biasness (response and nonresponsive bias)

Researchers have split response bias into two broad categories: response style and response set (Paulhus, 1991). Response style is the tendency to distort responses in a particular direction, more or less regardless of the content of the stimulus. Response set is the conscious or unconscious desire on the part of the respondent to answer in such a way as to produce a certain picture of oneself. Researchers have suggested that responding in a desirable way is a response set, which is a

situational and temporary response pattern. In contrast, response style is a more long-term trait-like quality that is assumed to remain similar across different questionnaires (Eyal and Eyal, 2011).

The literature details several examples of response sets. Random responding is a response set where participants answer questions with little pattern or thought (Osborne and Blanchard, 2011); Malingering refers to participants falsifying their answers in order to present themselves in more negative light (Osborne and Blanchard, 2011); Dissimulation refers to participants altering their answers in order to achieve certain goals, for example social desirability conforming to social norms in order to "look good" (e.g. Bardwell *et al*., 2001; McKelvie, 2004; Sullivan *et al*., 2003). Two of the proposed methods to reduce the effect of response bias, whether response set or response style, include scrambling the questions' order (e.g. Ruble and Stout, 1991), and reversing the scale of some questions such that high-scale values reflect a low value in the measured attribute (Tibbles *et al*., 1998). These methods were applied in this study.

3.6 Ethical consideration

This study followed the prescribed standards of the ethics of the University of Limpopo Turfloop Research Ethics Committee. Since the study used primary data, the researcher had ensured that (based on prescribed standards) the data collection procedure was relevant to the needs and interest of the communities in the study area, and that the enumerators had understood the purpose of the study before the study could be conducted. All households who were willing to participate had been fairly and equally selected with their confidentiality being respected.

3.7 Limitations of the study and analysis

Although this research was carefully prepared, it has same limitations and shortcomings. First, the research was conducted in only nine villages of Greater-Giyani Municipality that are adjacent to the KNP. Therefore, the results might not represent the perceptions of households who stay in communities adjacent to KNP in other areas other than Greater-Giyani and other parks in other areas. It would be better if it was done in all the communities which are adjacent to the KNP. Secondly, the population of the sampled group is small because of time limit and budget

available (only 130 households), and might not represent the majority of the households in the study area. Therefore, to generalise the results for larger groups, the study should have involved more participants at different levels. Third, since the questionnaire designed to measure the households' perception and attitude towards integrated wildlife/livestock land-uses, might give useful information on the decisions of households on whether or not to participate in the integrated wildlife/livestock land-uses; the findings might not provide the households` actual attitude and perception since the questionnaire that guides their answers was prepared without observing their environment. Therefore, it would be better if questions were prepared after carefully observations households` environment or with some people from the study area.

In terms of the analysis, factor analysis was used first before multinomial logit could be used and its aim was to reduce the number of variables under investigation. This resulted in some of the variables reduced or cut out from the analysis even if they were giving relevant information about households 'opinions. Factor analysis can tell which variables in the dataset "go together" in ways that aren't always obvious. But interpreting what those sets of variables actually represent is up to the analyst; therefore, there is some level of subjectiveness in it. Because the multinomial logit was used to model choices, it relied on the assumption of independence of irrelevant alternatives (IIA), which is not always desirable. The IIA states that the odds of preferring one option over another do not depend on the presence or absence of other "irrelevant" alternatives. For example, the relative probabilities of eating beef do not change if pork is added as an additional possibility. This allowed the choice of *K* alternatives to be modeled as a set of *K*-1 independent binary choices, in which one alternative was chosen as a "pivot" and the other *K*-1 compared against it, one at a time. According to Green (1993), the IIA hypothesis is a core hypothesis in rational choice theory; however numerous studies in psychology show that individuals often violate this assumption when making choices. If the multinomial logit is used to model choices, it may in some situations impose too much constraint on the relative preferences between the different alternatives. This point is especially important to take into account if the analysis aims to predict how choices would change if one alternative was to disappear. However, other models such as the

nested logit or the multinomial probit may be used in such cases as they need not violate the IIA.

3.8 Summary

The aim of this chapter was to give an overview of the study site and to explain the methods used in data collection and sampling, the research methodology and model specifications with hypothesized variables that are used in this study. This study used factor analysis in order to reduce the number of variables into smaller manageable factors to be analyzed in the multinomial logistic regression. Conclusions in the study were made based on the multinomial logistic regression model. The study intended to identify the significant factors that influence the preference and attitude of households to participate in the integrated wildlife/livestock based land-use practices in Greater-Giyani area.

CHAPTER 4

DESCRIPTIVE STATISTICS

4.1 Introduction

The purpose of this chapter is to describe the socio-economic characteristics of the households sampled in Greater-Giyani Local Municipality. Descriptive statistics such as mean, mode, standard deviation, maximum and minimum values, and frequencies are used to describe the sample.

4.2 Sample description

The study used a sample of 130 households in Greater-Giyani Local Municipality. In the Greater-Giyani Local Municipality, a significant number of households were involved in crop and livestock production. A large number of households who participated in the survey practiced cattle production and sold them locally to the community and to Makhoma (well-known butchery company in Giyani area). Others who were involved in crop produced maize and very few were producing cash crops. The sample was divided into households who owned cattle and those who did not own cattle, and comparisons were made based on these two groups of households. About 45% of the sample had cattle and 55% did not have cattle.

4.3 Household demographic characteristics

Characteristics of the households are explained through the households` demographics and their socio-economic characteristics. It was hypothesized that socio-economic characteristics of households could influence the perception and attitude of households towards a decision to participate in the wildlife/livestock land-use practice in rural areas. Therefore, it is important to describe households' demographic characteristics first, before analysing factors influencing households` decisions to participate in the wildlife/livestock land-use practices. Figure 4.1 indicates a column chart of households in Greater-Giyani area distributed by gender of the household head. From the total sample, 59% of the respondents were females and 41% were males. From those households who did not have cattle, 65% were females and 35% were males. On the other hand, 53% and 47% of households with cattle were females and males respectively. Kellert and Berry (1982) emphasized

that gender was among the most important demographic factors in describing the attitudes of households towards wildlife conservation. They found that females were more likely to have negative attitudes than males.

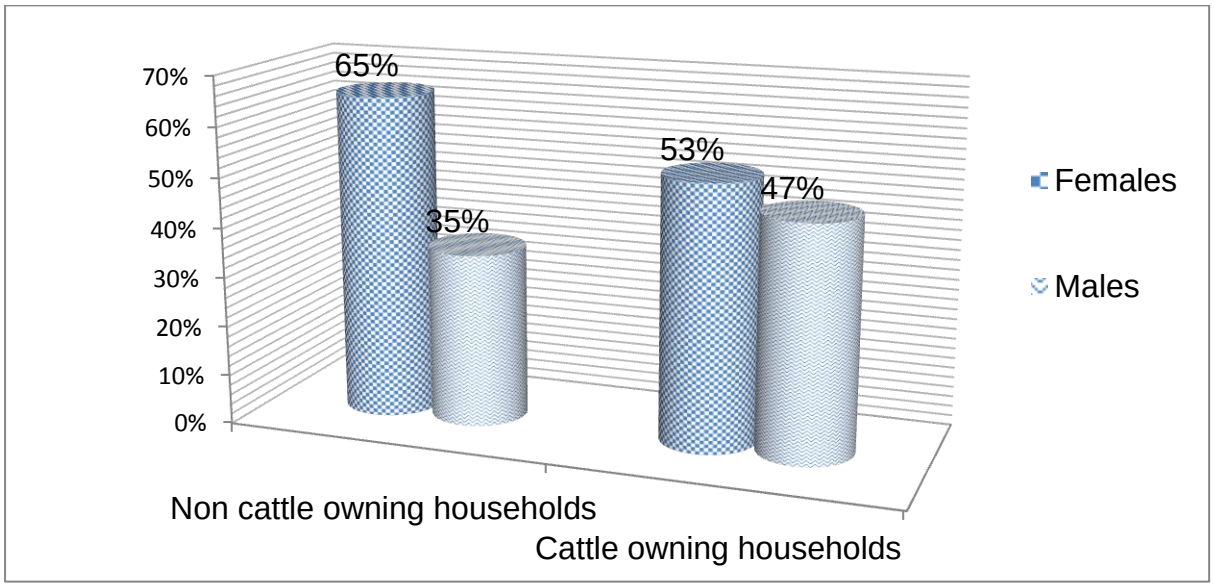

Figure 4.1: Gender of household head

From those households who did not have cattle 6%, 18%, and 76% of respondents stayed in a particular village for 0 to 10 years, 11 to 20 years and over 20 years respectively. From those households with cattle, 17% and 83% of respondents stayed in a village for 11 to 20 years and over 20 years respectively (see figure 4.2). The importance of an individual staying a certain number of years in a particular village was that he or she could develop certain values and norms attached to that village, which influences their opinions in answering particular questions. Past experiences and cognitive biases could also have an influence on decision making; also, future decision making could be based on past decisions, as well as levels of satisfaction or regret by households.

Figure 4.3 presents the column chart of households distributed according to education status of household head. Looking at the figure, most household heads had secondary education (43%) and only 6% had a diploma or degree. About 12% did not have any education. From those households who did not have cattle, 10% had no education, 44% had secondary education and only 5% had acquired a degree or diploma. From those who had cattle, 15% had no education, 42% obtained secondary education and about 7% had a diploma or degree. Only 10% in each category had tertiary education. Based on the literature, households with little or no

education are more likely to have negative attitude towards wildlife conservation (Bruin *et al*., 2007).

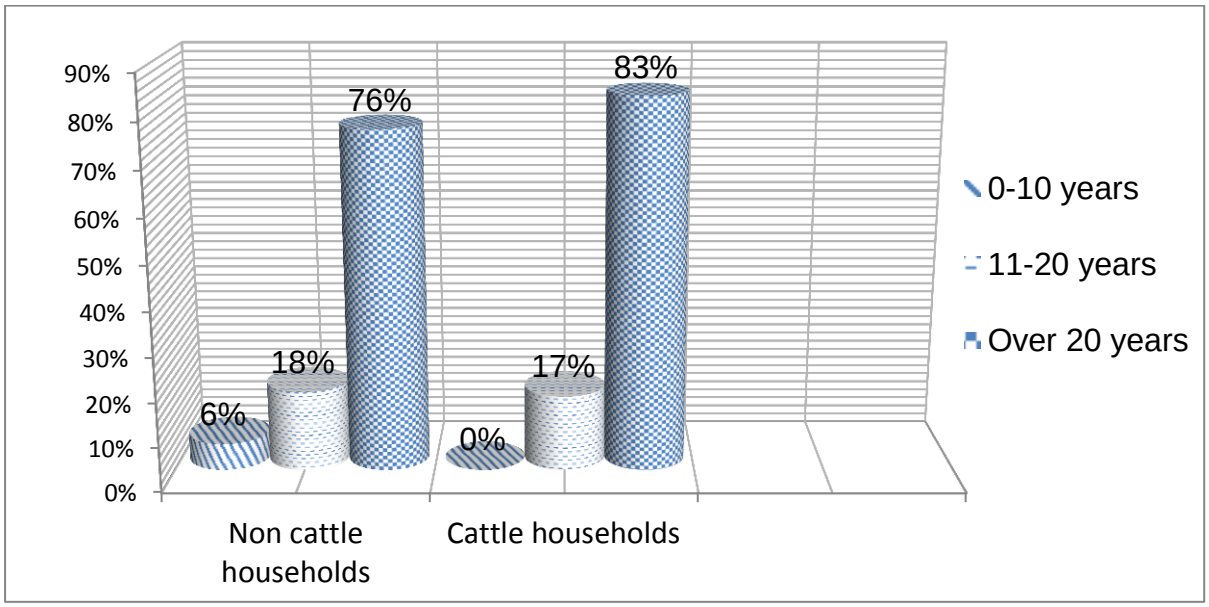

Figure 4.2: Households number of years staying in village

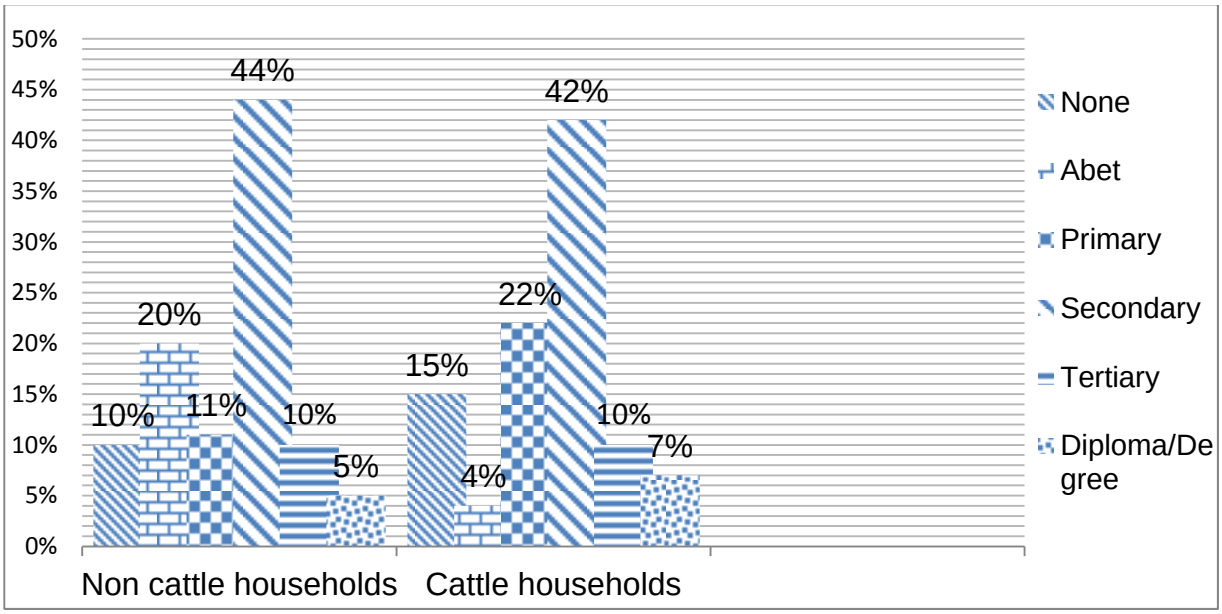

Figure 4.3: Education status of household head

Occupations of household heads are indicated in table 4.1, with about 50% of the total sample being unemployed, which means that about half of the sampled households did not have jobs. About 15% and 13% were having small businesses and pensioners respectively. From those households who did not have cattle, a significant proportion of households (62%) were unemployed. Also, in those

households who had cattle, 37% were unemployed. In both categories of households, the second highest proportion was small/medium businesses with those without cattle making 11% and those with cattle making 19%. These results may imply that households could have positive attitude towards wildlife conservation, since most of them were unemployed. This is because households might view wildlife as an opportunity for them to generate income and seek employment therein.

Households were also distributed in terms of age of the household head and the size of the household. The statistics in table 4.2 shows that the average age of sampled households was 45 years with the younger household head being 18 years old and the older being 76 years old.

Table 4.1: Occupation of household head

Type of household	**Occupations**					
	Unemployed	**Farmer**	**Pensioner**	**Civil servant**	**Private company**	**Small business**
Cattle owning households	37%	12%	15%	12%	5%	19%
Non-cattle owning households	62%	2%	11%	6%	8%	11%
Total average	50%	7%	13%	9%	6%	15%

The average number of people in a household was about six (5.87); the larger household had thirteen people. Household sizes were less variable because the standard deviation is small (2.284), this means that many household sizes were concentrated around the mean 5.87. On the other side, there was a lot of variation in the age of household heads (standard deviation is 15.447). This means that many household head ages were further away from the average age 45.

Table 4.2: Age of household head and size of household

Variable	**Minimum**	**Maximum**	**Mean**	**Standard deviation**
Age of household head	18	76	45.03	15.447
Size of household	2	13	5.87	2.284

Figure 4.4 depicts the monthly incomes distribution for the households. Looking at the results, it is clear that many households in both categories had incomes below R1500 (i.e. 66% of households without cattle and 59% of those with cattle). Only 4% from each category of households had incomes more than R10000. Looking at the

statistics it is clear that the proportion of incomes decreased with an increase scale of income. Households were asked about their main sources of income, and most of them indicated that they had more than one source of income (e.g. some received income from livestock, crop farming and from social grant at the same time).

Since many households in the sample were unemployed, the major source of income presented in table 4.3 is in the form of remittances, with about 53.5% of non-cattle owning households and 37.3% of cattle owning households (making a total average of 45.4% of the total sample).

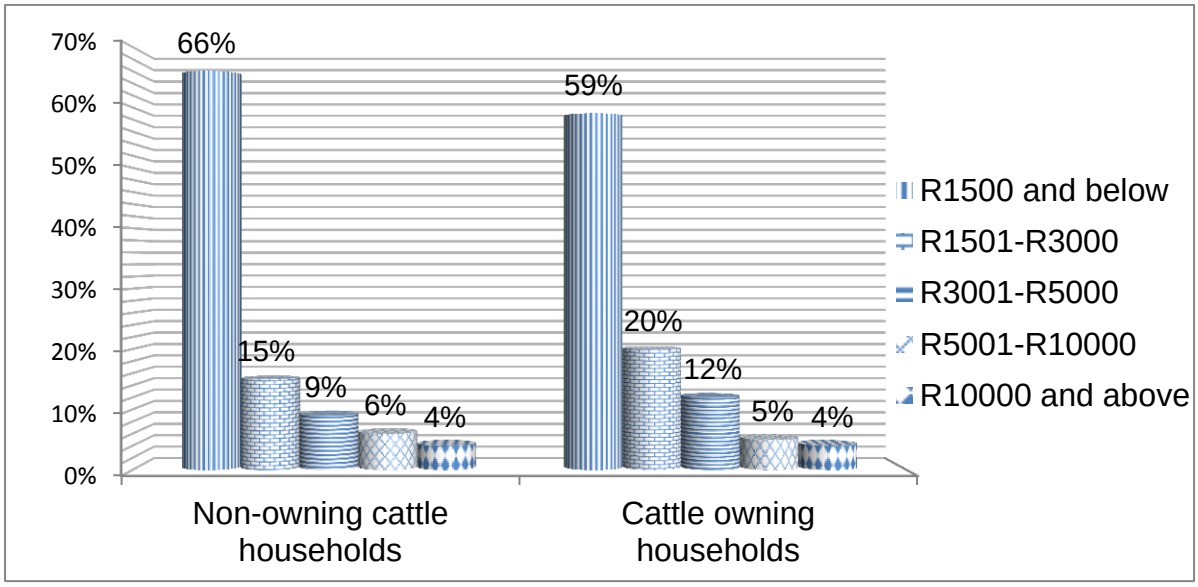

Figure 4.4: Monthly income of household

Salaries (23.7% cattle owning households) and old age grant (22% cattle owning households) were second and third sources of incomes received by households respectively. Old age and child grants from non-cattle owning households were with percentages 16.9% each. Though many of the respondents were involved in farming, in open-ended discussion they indicated that they did not do farming for income but for food security instead (most of them had land or owned land). Only 8.4% received income from livestock farming and 6.4% from crop farming. Non-cattle owning households who were receiving income from pension were not found, whereas 5.1% of cattle owning households received income from pension.

Table 4.3: Main sources of income of household

Source of income	Non-cattle owning households %	Cattle owning households%	Total average %
Salary	22.5%	23.7%	23.1%
Livestock farming	2.8%	13.6%	8.2%
Crop farming	4.2%	8.5%	6.4%
Old age grant	16.9%	22%	19.6%
Child grant	16.9%	15.3%	15.8%
Pension	0%	5.1%	2.6%
Remittances	53.5%	37.3%	45.4%

4.4 Characteristics of current land-use practices

Greater-Giyani households like any other rural communities, practice livestock (mainly cattle), and crop (mainly maize) production as their primary land-use options. Looking at Table, the average size of land for cropping that the households had was 5.55ha with 30ha being the maximum land size owned. About two households indicated that they had land size of about 30ha. On the other side, the average number of cattle that households owned was about 16 with 48 being the maximum number of cattle owned. The average years for ownership of cattle were 23 with 50 years being the maximum of cattle ownership. The standard deviation for number of cattle owned and years of cattle farming were 10.697 and 12.207. These values are further away from means 16.59 and 23.02 respectively, meaning that the data sets were more variable and were not concentrated around the means. These factors, land, number of cattle owned, and number of years in cattle owning are very critical for households in deciding on whether or not to adopt wildlife/livestock farming practice in rural areas.

Table 4.4: Number of cattle owned, years of cattle farming, land owned

Variable	Minimum	Maximum	Mean	Standard deviation
Number of cattle owned	3	48	16.59	10.697
Years of cattle farming	1	50	23.02	12.207
Land owned	1	30	5.55	4.975

Table 4.5 shows that many households in areas adjacent to KNP owned different types of livestock (including cattle). In both categories of households, chicken, goats and donkeys were the three types of livestock owned when ranked from high to low (with cattle not included since it is the reference).

Table 4.5: Types of livestock kept

Type of livestock	Non-cattle owning households %	Cattle owning households %	Total averages%
Cattle	0%	100%	50%
Chicken	34.3%	35%	34.7%
Goats	8.6%	31.7%	20.2%
Donkeys	4.3%	18.3%	11.3%
Pigs	4.3%	8.3%	6.3%
Dogs	1.4%	8.3%	4.9%

About 35% cattle owning households and 34.3% non-cattle owning households kept chicken. When asked, households indicated that they kept chicken for food as meat and that it saved their money to buy meat. Cattle owning households and non-cattle owning households keeping goats were 31.7% and 8.6% respectively. When comparing the two household categories, it was clear that cattle owning households were the ones keeping a high proportion of other types of livestock other than cattle. In open-ended discussion, when asked about the reasons of keeping these other types of livestock, many households indicated that they kept them because it was part of their tradition or culture. However, those who kept dogs indicated that they did so because they needed protection from thieves at night.

Table 4.6: Most important reasons for keeping cattle

Reason	% of Households
Security	41%
Commercial	29%
Tradition	28%
Meat	16%
Milk	5%
Draught power	11%
Manure	2%

Households were also asked to indicate the main reason for keeping cattle. Table 4.6 indicates that about 41% kept cattle for security purposes. On open ended responses, many households indicated that they did this in order to get money to pay the fees of their children who were in schools and buy other households needs. Households also kept cattle for commercial purposes (29%). About 28% households indicated that they kept cattle for traditional or cultural reasons, and those who kept

cattle for meat were about 16%. About 11% households used cattle as their draught power in times of ploughing.

On qualitative responses, households were also asked if they thought there was enough grazing for their livestock and if they bought supplementary feeds for their livestock in times of drought. At least half of the households who owned cattle indicated that they did not buy feeds in times of drought; and more than three quarters of households indicated that the grazing area was not enough for their cattle.

Both groups of households were also asked if they used the grazing area for other purposes other than livestock grazing (see table 4.7). Cattle owning households indicated that they collected firewood (85.4%), cut grass (59.3%), harvested Mopani worms (55.9%); with non-cattle owning households indicating that they collected about 25% firewood, 15.5% grass cutting and 12.7% Mopani worms. About 28.8% cattle owning households indicated that they picked herbs. Cattle owning households seemed to be the ones mainly using the grazing area for other purposes than non-cattle owning households. In open discussion households pointed out that they were not allowed to cut down trees which were not dry since conservation management staff would arrest them. However, they indicated that this remains a challenge since dry trees are not enough for everyone who wants firewood. Regardless of that households indicated that they were arrested and fined for cutting down trees which are not dry.

Table 4.7: Other ways for using grazing area apart from grazing

Type of livestock	**Non-cattle owning households %**	**Cattle owning households %**	**Total averages %**
Picking herbs	2.8%	28.8%	15.8%
Grass cutting	15.5%	59.3%	37.4%
Collect firewood	25.4%	85.4%	55.5%
Collect dung	7%	13.6	10.3%
Collect wild fruits	0%	35.6%	17.8%
Hunting	0%	6.8%	3.4%
Collect Mopani worms	12.7%	55.9%	34.3%

Table 4.8: Household satisfaction from livestock production

Variable	Very dissatisfied	Somewhat dissatisfied	Somewhat satisfied	Very satisfied	Total
Number of people benefiting from livestock farming	0.8%	1.5%	21.5%	76.2%	100
The state of grazing land in community	6.9%	43.1%	36.9%	13.1%	100
The opportunities for livestock farming	0.8%	4.6%	58.5%	36.2%	100
Access to markets to sell livestock	17.7%	46.9%	28.5%	6.9%	100
Income earned from sale of livestock	17.7%	56.9%	19.2%	6.2%	100
The role livestock plays in the community	6.2%	51.5%	10%	24.3%	100
Government support to livestock farmers	36.9%	43.9%	14.6%	4.6%	100

Table 4.8 shows the current land-use practices from communities in Greater-Giyani ranked according to a scale of satisfaction. From the table, statistics indicate that about 76.2% households believed there were many people who were benefiting from livestock farming in rural areas. When asked in open discussion, most of them indicated it is because livestock was crucial for their security and survival. Many people regarded livestock as important because they would sell them and get money to take their children to school and pay for other household expenditures. However, very strangely, when asked about the role of livestock in the community, about 51.5% households were somehow dissatisfied. This might be due to the prevalence of challenges that households indicated such as limited grazing, lack of proper market, theft, and unsatisfied incomes earned from sale of livestock. About 43.1% households indicated that they were somewhat dissatisfied about the state of grazing land in their communities; while 46.9% indicated that they were having difficulties in accessing the market to sell their livestock.

However, those who managed to access the market (about 56.9%) indicated that they were not satisfied with the money they get from sale of livestock. In open-ended discussions, the respondents indicated that lack of market is their major challenge, because they sell their cattle to Makhoma butcheries with a very low price (i.e. between R1500 and R3500). Some indicated that they only sold when there was a funeral or a party in the local community. When asked about the government

support, households indicated that they rarely received support from the government (about 43.9 were somewhat dissatisfied with this).

4.5 Perceptions on the integrated wildlife/livestock based land-use practice

Wildlife farming can be an economically sound alternative to cattle farming in areas where rainfall levels are low (ABSA, 2003). Greater-Giyani area also has a low rainfall level, thus a series of questions were asked concerning integrated wildlife/livestock land-use and the results are discussed next.

4.5.1 Households interest and opinion on integrated wildlife/livestock based land-use practices

In order to test for the relationships and associations between variables on households interest and opinion, Pearson Chi-Square (χ^2 statistic) and Cramer`s V tests were conducted. For large values of χ^2 statistic, then there was a small probability of relationships and associations occurring by chance alone ($p < 0.05$); therefore, it was concluded that the association exists between variables. On the other side, when the Cramer's V was between 0 and 0.30 there was weak relationship, if it was between 0.30 and 0.70 the relationship was moderate and if it was between 0.71 and 1.0 the relationship was strong. In table 4.9, relationships between variables proved to be weak in the first and the last three variables (they were not significant), with their p-values more than 0.05 and Cramer`s V within the range 0-0.30. Variables two and four were significant at 1% level while variables three, five and six were significant at 5% level and their p-values were less than 0.05. Therefore, there was an association between variables meaning that knowing whether a household had cattle or not, one could predict his opinion or interest.

Households were asked to state their levels of interest towards wildlife protection on a scale of interest as follows; extremely interested (EINT), somewhat interested (SINT), not very interested (NVINT) and not at all interested (NAINT). Households were divided into two groups, cattle owning households (CH) and non-cattle owning households (NCH). The results of the statistics are presented in table 4.9. About 91.5% of CH and 90.1% of NCH were extremely interested in wildlife protection. When asked if they would give community land for wildlife protection if there were benefits either to the community or family, about 40.7% CH indicated to be

somewhat interested while about 38% and 39.4% indicated to be extremely interested if there were benefits to the community and family respectively. Although many households were interested in wildlife protection, when asked if they would stop livestock and crop farming about 39% and 35.6% of CH were not very interested with about 28.2% of NCH not at all interested.

However, when asked if they would participate in wildlife protection if they were compensated for livestock and crop loss, about 35.6% of CH and 49.3% indicated that they were somewhat interested and extremely interested respectively. When this scale of interest is averaged from EINT to NAINT both types of households seemed not to be interested when they were asked if livestock farming should stop. Although Shibia (2010) argued that the loss of land by the local communities might have consequences for those who depend on it for resources such as fuel wood, key grazing areas during drought and source of water; many households on, on average were interested on giving land to allow for wildlife protection.

Over 90% in both categories of households indicated to be extremely interested when asked if they would render accommodation and sell crafts to tourists and if they were going to seek employment in the conservation area. Those households without cattle were the most interested with about 97.2% in rendering accommodation and selling crafts and 94.4% of getting employment. This is concurs with the findings of Anthony (2007), who argued that employment in KNP even if for another household member, has greater influence in shaping more positive attitudes. In an area with high unemployment, like in this study, jobs within KNP even temporary ones could make a marked difference in household livelihoods.

4.5.2 Households perceptions regarding the importance of wildlife conservation

Households were asked to indicate their opinion in terms of agreement or disagreement with certain statements regarding wildlife conservation. Table 4.10 shows that both groups of households seemed to agree with the opinion statements they were asked about wildlife. Households agreed that wildlife conservation would generate income and that would create more jobs in the communities.

About 61% CH and 70.4% NCH strongly agreed that wildlife could generate income; with 61% CH and 76.1% NCH strongly agreeing that wildlife can help the community. About 90% in both categories (89.8% in NCH) also agreed that it was important for the benefit of future generation and that government could play a major role (89.8% CH; 95.8% NCH) in supporting conservation projects. Anthony (2007) also found that greater attempts have been made by KNP to educate neighbouring schoolchildren through in-Park educational excursions highlighting the positive role that KNP plays in conserving biodiversity for future generations.

Table 4.9: Households opinion on the attributes of wildlife

Variable	Type	EINT	SINT	NVINT	NAINT	χ^2 df (2)	Cramer`s V
Interest in wildlife protection	%CH_a	91.5	5.1	-	3.4	0.539	0.1
	%NCH_b	90.1	2.8	-	7		
Giving part of community land to allow wildlife conservation if there were income benefits to the community	%CH_a	13.6	40.7	28.8	16.9	0.006***	0.3***
	%NCH_b	38.0	35.2	11.3	15.5		
Giving part of community land to allow wildlife conservation if there were income benefits to my household	%CH_a	16.9	40.7	12.3	6.9	0.021**	0.3**
	%NCH_b	39.4	26.8	15.5	18.3		
Stopping livestock farming to use the land for wildlife tourism projects	%CH_a	10.2	28.8	39	22	0.009***	0.3***
	%NCH_b	28.2	14.6	16.9	28.2		
Stopping crop farming to use the land for wildlife tourism project	%CH_a	10.2	35.6	35.6	18.6	0.022**	0.3**
	%NCH_b	29.6	28.2	19.7	22.5		
Participate in the conservation programme if compensated for loss of livestock/crops	%CH_a	28.8	35.6	27.1	8.5	0.011**	0.3**
	%NCH_b	49.3	21.1	12.7	16.9		
Rendering accommodation to tourists coming for wildlife viewing	%CH_a	91.5	6.8	1.7	-	0.207	0.2
	%NCH_b	97.2	1.4	-	1.4		
Selling crafts to tourist coming to view wildlife	%CH_a	94.9	3.4	1.7	-	0.458	0.1
	%NCH_b	97.2	1.4	-	1.4		
Getting employment in the conservation area	%CH_a	93.2	3.4	0.8	1.7	0.489	0.1
	%NCH_b	94.4	1.4	-	4.2		

CH_a~ cattle owning households (%); NCH_b~ non-cattle owning households (%); EINT~ extremely interested SINT~ somewhat interested; NVINT~ not very interested; NAINT~ not at all interested; Type~ type of household. *, **, *** are significant levels at 10%, 5% and 1%

Table 4.10: Households opinion on the opportunities of wildlife

Variable	Type	SA	A	D	SD	X^2 df (2)	Cramer`s V
Wildlife can be friendly to humans and domestic animals	$\%CH_a$	1.7	-	13.6	84.7	0.109*	0.2*
	$\%NCH_b$	2.8	4.2	4.2	88.7		
Wildlife can be an opportunity to generate income	$\%CH_a$	61	32.2	1.7	5.1	0.449	0.1
	$\%NCH_b$	70.4	22.5	4.2	2.8		
Wildlife can help the community	$\%CH_a$	61	35.6	-	3.4	0.171	0.2
	$\%NCH_b$	76.1	22.5	-	1.4		
Wildlife can be important for the benefit of future generation	$\%CH_a$	89.8	8.5	1.7	-	0.131	0.1
	$\%NCH_b$	90	8.6	-	1.4		
Community should support wildlife conservation	$\%CH_a$	55.9	30.5	11.9	1.7	0.022**	0.3**
	$\%NCH_b$	80.3	15.5	4.2	-		
Wildlife conservation can create jobs for the community	$\%CH_a$	64.4	28.8	5.1	1.7	0.039**	0.3**
	$\%NCH_b$	83.1	16.9	-	-		
Government should support community wildlife tourism and conservation projects	$\%CH_a$	89.8	6.8	3.4	-	0.232	0.15
	$\%NCH_b$	95.8	4.2	-	-		

CH_a~ Cattle owning households (%); NCH_b~ Non-cattle owning households (%) SA~ strongly agrees; A~ agrees; D~ disagrees; SD~ strongly disagrees; Type~ type of household. *, **, *** are significant levels at 10%, 5%, and 1% respectively.

About 64.4% CH and 83.1% NCH strongly believed that wildlife conservation could create jobs in the communities. Boyd *et al*., (1999) also presented similar results on the benefits that came with wildlife conservation. Comparing the two categories CH and NCH, it is clear from table 4.10 that NCH opinions differed from those of CH.

NCH were more convinced with the opportunities that could come with wildlife conservation than CH. This is because CH were concerned about the negative impacts that might arise from wild animals, particularly predation to their livestock. The Chi-Square and Cramer`s V tests indicated that there was a weak relationship between cattle ownership and the responses. This means that knowing that a household owned cattle or not did not necessarily mean that household`s opinions on wildlife conservation could be predicted. It was only valid for two statements where the relationship between variables was found to be moderate (i.e. statements regarding community support for wildlife and that wildlife conservation can create jobs in their communities).

4.5.3 Household concerns towards damages caused by wildlife

Table 4.11 shows households concerns about damages and problems caused by wild animals in rural communities. The results indicate that NCH were mostly concerned about crop damages than CH (45.1% NCH were concerned and 27.1% CH were unconcerned. This result might be because on qualitative responses most households indicated that they had land and had experienced crop damage by wild animals. On attacks to domestic animals by wild animals, about 45.1% NCH and 35.6% CH were concerned (these figures includes attacks on other domestic animals other than cattle such as goats, donkeys, etc.). This finding is similar to that of Anthony (2006), that livestock farmers perceived wildlife as a threat especially when benefits and compensation are not clearly defined. On the other hand, it is contrary to his findings because NCH were more sensitive than CH, because damages were not only referred to cattle but to different livestock that households owned (i.e. including goats, donkeys, chicken, etc.). In open discussion, households indicated that they got bad treatment from conservation management staff when they cut down trees or hunt wild animals in the bush. However, good relations with the park`s staff have been shown to influence community attitudes elsewhere and should be the a continued effort of parks in their outreach to communities (Newmark *et al*., 1993). The Chi-Square test indicated that the relationship between variables exist (p= 0.050) and was significant at 5% level, that is, knowing whether or not a household owned cattle could explain if a household was or was not concerned about damages and attacks to crops and domestic animals by wild animals. The

results were similar to those by Asibey and Child (1999) who indicated that wild animals caused tremendous damage to agricultural crops in Sub-Saharan Africa. Farmers who experienced crop damage by wild animals tend to held negative attitudes toward their conservation (Campbell-Smith *et al.*, 2010).

Table 4.11: Households opinion on damages caused by wild animals

Variable	Type	U	SU	SC	C	X^2 df (2)	Cramer`s V
Damages to crops by wild animals							
	%CH_a	27.1	10.2	39	23.7	0.050**	0.3**
	%NCH_b	18.3	12.7	23.9	45.1		
Damages to infrastructure such as fences and buildings by wild animals	%CH_a	39	22	30.5	8.5	0.027**	0.3**
	%NCH_b	23.9	22.5	25.4	28.2		
Attacks to domestic animals by wild animals							
	%CH_a	28.8	8.5	27.1	35.6	0.452	0.1
	%NCH_b	19.7	12.5	22.5	45.1		
Attacks to human beings by wild animals							
	%CH_a	45.8	35.6	16.9	1.7	0.023**	0.3**
	%NCH_b	28.2	39.4	16.9	15.5		
Diseases transmission from wild animals to domestic animals	%CH_a	30.5	18.6	27.1	23.7	0.660	0.1
	%NCH_b	26.8	26.8	21.1	25.4		
Attitude of wildlife conservation management staff towards community Members	%CH_a	28.8	32.2	32.2	6.8	0.643	0.1
	%NCH_b	21.1	31	36.6	11.3		

CH_a~ Cattle owning households (%); NCH_b~ Non-cattle owning households (%). U~ unconcerned; SU~ somewhat unconcerned; SC~ somewhat concerned; C~ concerned; Type~ type of household. *, **, *** are significant levels at 10%, 5%, and 1% respectively.

4.6 Summary

This chapter discussed in detail the descriptive results of the data through demographic factors and those factors that could influence households` environment in making them to take a decision to participate or not participate in the integrated wildlife-based land-use practices. Most households were found to be headed by females and unemployed, and having monthly incomes of less than R1500 per month. The highest education of most of them was secondary qualification. Generally, most of the households showed interest in participating on wildlife-based land-uses irrespective of whether or not they own cattle. Very few household showed dislike of the integrated wildlife/livestock land-use option, and these were amongst those involved in cattle and crop production since they perceived wild animals as high risk for agriculture. Chi-Square (X^2) and Cramer`s V were used to test if the relationships and associations were strong between variables measuring households' perceptions.

In addition, in quantitative responses households indicated the three wild animals that gave them most problems both in their fields and on their animals. These were lions, leopards, and elephants. Other problematic animals mentioned were hyenas. When asked who they thought should be responsible for wildlife in their area, most of them indicated that conservation management and government should be responsible. Very few thought that the community should be responsible. However, when asked who should benefit from wildlife conservation in their area, almost all indicated that the community should benefit; others however, thought that all parties involved should benefit. In other open-ended responses households indicated that their main challenges in livestock production were lack of market to sell their cattle, and even though they sold (to Makhoma) the money received was small. Another challenge was limited grazing for cattle. These were the most important challenges mentioned by households in all communities of the sampled area.

CHAPTER 5

RESULTS OF EMPIRICAL ANALYSIS

5.1 Introduction

The previous chapter gave foundation for empirical analysis by presenting an overview of basic household characteristics and characteristics of integrated wildlife/livestock land-use options that were expected to be affecting households` perceptions and attitudes to participate in the integrated wildlife/livestock land-use in households adjacent to the KNP. This chapter tests the significance of household characteristics that are hypothesized to impact the perceptions and attitudes of households towards integrated wildlife/livestock land-use; and also tests significance of the hypothesized variables influencing households` decision to participate in the integrated wildlife/livestock land-use option. The results of the empirical analysis are also discussed.

This study used factor analysis and multinomial logit regression model for empirical analysis. Factor analysis was used to reduce the number of variables since the data contained many variables. Factor analysis can identify factors among observed variables, by grouping variables with similar characteristics together. The multinomial regression is used to predict the probabilities of the different possible outcomes of a categorically distributed dependent variable, given a set of independent variables. The empirical results are presented in tabular form and interpreted individually and a summary of the result is made at the end of this chapter based on the multinomial logit regression. Summarized results of empirical models are presented in tabular form showing estimated coefficients, standard errors and p-values.

5.2 Results of empirical models

5.2.1 Factor analysis results

Factor analysis was performed on four different scales of variables namely; the scale of satisfaction, interest, agreement and concern towards integrated wildlife/livestock land-use practices. Each scale was composed of a certain number of variables and four levels or opinion answers to these variable questions. The tables presented below are results obtained from factor analysis on variables under the satisfaction

scale. Thereafter, a summary of the results of factor analysis of the other three scales are given.

Looking at the means in table 5.1, one can conclude that the first variable had the stongest influence on household perception on the current land-use option (livestock production) because it had the highest mean of 3.73, followed by the role of livestock in the community and the opportunities for livestock farming.

Table 5.1: Descriptive statistics of the satisfaction scale on livestock production

Satisfaction on livestock production	**Mean**	**Standard Deviation**	**Analysis N**
1. Number of people benefiting from livestock farming	3.73	0.525	130
2. The state of grazing land in the community	2.56	0.807	130
3. The opportunities for livestock farming	3.30	0.593	130
4. Access to markets to sell livestock	2.25	0.827	130
5. Income earned from sale of livestock	2.14	0.775	130
6. The role livestock plays in the community	3.36	0.597	130
7. Government support to livestock farmers	1.87	0.83	130

Table 5.2: KMO and Bartlett`s Test of the satisfaction scale on livestock production

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.618
Bartlett's Test of Sphericity	Approx. Chi-Square	122.713
	Df	21
	Sig.	.000

The KMO in table 5.2 measured the sampling adequacy, which according to Field (2005) had to be greater than 0.5 for a satisfactory factor analysis to proceed. In this analysis the KMO came out to be 0.618 which was above the required 0.5. Bartlett`s test is another indication of the strength of the relationship among variables. The Bartlett`s test, test the null hypothesis that the correlation matrix is an identity matrix. An identity matrix is a matrix in which all of the diagonal elements are 1 and all off diagonal elements are 0. The intention was to reject this null hypothesis if the Bartlett`s test was significant (i.e. 0.618). Therefore, in this case there was a relationship between the variables included in the analysis, because the Bartlett`s test was significant at 0.000. The significant level was small enough to reject the null hypothesis. This means that correlation matrix was not an identity matrix.

Table 5.3 shows all the factors that were extractable from the analysis along with their eigenvalues and the percentages of total variance attributable to each factor. Notice that the first factor accounts for 30.6% of the variance, the second 17.4% and third 16.4%. All the remaining factors are not significant, so they were dropped. The idea of rotation was to reduce the number of factors on which the variables under investigation had high loadings. Looking at table 5.3 it is clear that variables 1, 2 and 3 were substantially loaded on factor 1 (component 1), while variables 4 and 5 were substantially loaded on factor 2, and the remaining 6 and 7 were substantially loaded on factor 3. These factors were used as variables in the next analysis (i.e. multinomial logit regression).

Table 5.3: Rotated component matrix[a] for Household satisfaction from livestock

Rotated component matrix[a]			
	Component/factor		
	1	2	3
1. Access to markets to sell livestock	.855		
2. Income earned from sale of livestock	.805		
3. The state of grazing land in the community	.716		
4. The role livestock plays in the community		.783	
5. The opportunities for livestock farming		.753	
6. Government support to livestock farmers			.767
7. Number of people benefiting from livestock farming			-.713
% of total variance	30.6%	17.4%	16.4%
Eigenvalues	2.154	1.218	1.146
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.a			
a. Rotation converged in 4 iterations.			

Table 5.4 presents the other set of variables. These variables were investigating the level of interests from households towards wildlife protection. The scale ranged from 1 to 4, with 1 representing “very interested” and 4 representing “not at all interested”. Variable 4 had the strongest influence on household interest on wildlife protection because it had the highest mean of 2.58, followed by variable 5. The KMO and Barttlet`s test were both significant in determining the sampling adequacy and relationship among variables, with 0.748 and 0.000 respectively. Only three factors were extracted from the analysis with eigenvalues greater than 1. All three factors accounted for 42.9%, 24.4% and 12.3% respectively. Looking at the table is clear that only variable 1 substantially loaded on factor 3, with variables 2, 3, 4, 5 and 6 substantially loaded on factor 1; and variables 7, 8 and 9 substantially loaded on factor 2. These factor variables were used in multinomial regression analysis.

Analysis on the agreement scale towards wildlife protection was also conducted using seven variables. Interest in wildlife protection was the variable that influenced households` agreement opinions with a mean of 3.80. The KMO and Barttlet`s test were also performed and proved to be significant at 0.744 and 0,000 respectively for sampling adequacy and relationship within variables. Only two factors were extracted from the analysis with the first factors accounting for 50.1% and the second 15.8% of the total variance.

Table 5.4: Rotated component matrix households opinion on the attributes of wildlife

Component Matrix[a]			
	Component		
	1	2	3
1. Interest in wildlife protection			.891
2. Giving community land to allow wildlife conservation for the benefit of the community	.884		
3. Giving community land to allow wildlife conservation for the benefit of my household	.860		
4. Stopping livestock farming to use the land for wildlife tourism projects	.828		
5. Stopping crop farming to use the land for wildlife tourism projects	.838		
6. Participate in the conservation program if compensated for loss of livestock/crops	.786		
7. Rendering accommodation to tourists coming for wildlife viewing		.892	
8. Selling crafts to tourist coming to view wildlife		.894	
9. Getting employment in the conservation area		.657	
% of total variance	42.9	24.4	12.3
Extraction Method: Principal Component Analysis.			
a. 3 components extracted.			

After factors have been rotated, variables 1 and 7 substantially loaded on factor 2, and all other variables substantially loaded on factor 1. Therefore, nine factors were produced from the analysis of all groups of scales (i.e. FAC1_1, FAC2_1, FAC3_1, FAC1_2, FAC2_2, FAC3_2, FAC1_3, FAC2_3, and FAC1_4). Therefore, these factors were used in the multinomial logit regression as variables. A clear description of these factors is presented in Table 5.5.

Table 5.5: Description of factors produced in factor analysis

Factor	Source	Description
FAC1_1	Table 17, variables 1, 2 and 3	Access to market, income earned from sale of livestock, and state of grazing
FAC2_1	Table 17, variables 4 and 5	The opportunities and role of livestock in the community
FAC3_1	Table 17, variables 6 and 7	Government support and the number of people benefiting from livestock
FAC1_2	Table 18, variables 2, 3, 4, 5 and 6	Giving land and stopping crop and livestock farming to allow for wildlife conservation
FAC2_2	Table 18, variables 7, 8 and 9	Rendering services to tourists and getting employment in the conservation area
FAC3_2	Table 18, variable 1	Interest in wildlife protection
FAC1_3	Q40-Q45 in questionnaire	Roles and opportunities of wildlife in the community
FAC2_3	Q39 in questionnaire	Relationship between wildlife, human and domestic animals
FAC1_4	Q46-Q51 in questionnaire	Damages caused by wild animals especially on crops and livestock

5.2.2 Multinomial logistic regression

The presence of a relationship between the dependent variable and combination of independent variables is based on the statistical significance of the final model chi-square in the table above. In this analysis, the probability of the model chi-square (135.060) was 0.000, less than the level of significance of 0.05 (see table 5.6). The null hypothesis that there was no difference between the model without independent variables and the model with independent variables was rejected. The existence of a relationship between the independent variables and the dependent variable was supported.

Table 5.6: Multinomial logit model fitting information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	Df	Sig.
Intercept Only	242.27			
Final	107.21	135.06	34	.000

Although multinomial logistic regression computes correlation measures to estimate the strength of the relationship (Pseudo R square measures, such as Nagelkerke's R^2), these correlations measures do not really tell us much about the accuracy or errors associated with the model.

A more useful measure to assess the utility of a multinomial logistic regression model was classification accuracy, which compares predicted group membership based on the logistic model to the actual, known group membership, which was the value for the dependent variable. Even if the independent variables had no relationship to the groups defined by the dependent variable, the predictions would still be expected to be correct for group membership some percentage of the time. This is referred to as by chance accuracy. The estimate of by chance accuracy that was used is the proportional by chance accuracy rate, computed by summing the squared percentage of cases in each group. The only difference between by chance accuracy for binary logistic models and by chance accuracy for multinomial logistic models is the number of groups defined by the dependent variable.

Table 5.7: Case-processing summary of the multinomial logit model

Case Processing Summary			
		N	**Marginal Percentage**
PCRW	PARTC	77	59.2%
	NOT PARTC	17	13.1%
	UNCERTAIN	36	27.7%
Valid		130	100.0%
Missing		0	
Total		130	
Subpopulation		127[a]	
a. The dependent variable has only one value observed in 127 (100.0%) subpopulations.			

The proportional by chance accuracy rate was computed by calculating the proportion of cases for each group based on the number of cases in each group in the 'Case Processing Summary' (see table 5.7), and then squaring and summing the proportion of cases in each group ($0.592^2 + 0.131^2 + 0.277^2 = 0.444$). The proportional by chance accuracy criteria is 55.5% (1.25 x 44.4% = 55.5%).

Table 5.8: Classification table from the multinomial logit model

Observed	**Predicted**			
	PARTC	**NOT PARTC**	**UNCERTAIN**	**Percent Correct**
PARTC	69	0	8	89.6%
NOT PARTC	2	14	1	82.4%
UNCERTAIN	9	1	26	72.2%
Overall Percentage	61.5%	11.5%	26.9%	83.8%

The classification accuracy rate was 83.8% (see table 5.8) which was greater than or equal to the proportional by chance accuracy criteria of 55.5%. The criterion for classification accuracy was satisfied in this model.

5.2.3 The relationship of individual independent variables and the dependent variable

The interpretation for an independent variable focuses on its ability to distinguish between pairs of groups and the contribution which it makes to change the odds of being in one dependent variable group rather than the other. The significance of an independent variable's role in distinguishing between pairs of groups is not interpreted unless the independent variable also has an overall relationship to the dependent variable in the likelihood ratio test.

Table 5.9 indicates that all other variables were significant except for FAC1_1, FAC3_1, FAC3_2, FAC2_3, and LAND. The interpretation of an independent variable's role in differentiating dependent variable groups is the same as used in binary logistic regression. The difference in multinomial logistic regression is that we can have multiple interpretations for an independent variable in relation to different pairs of groups.

Table 5.9: Likelihood ratio test

Likelihood Ratio Tests				
Effect	**Model Fitting Criteria**	**Likelihood Ratio Tests**		
	-2 Log Likelihood of Reduced Model	**Chi-Square**	**Df**	**Sig.**
Intercept	101.461[a]	.000	0	.
AGEH	108.119	6.658	2	.036**
FAC1_1	105.631	4.170	2	.124
FAC2_1	117.824	16.363	2	.000***
FAC3_1	101.960	.499	2	.779
FAC1_2	140.632	39.171	2	.000***
FAC2_2	109.869	8.408	2	.015**
FAC3_2	102.863	1.402	2	.496
FAC1_3	117.963	16.502	2	.000***
FAC2_3	103.918	2.457	2	.293
FAC1_4	137.468	36.007	2	.000***
GEND	108.784	7.324	2	.026**
EDUS	110.104	8.643	2	.013**
OCCP	108.711	7.250	2	.027**
MINC	109.185	7.724	2	.021**
CATLE	107.993	6.532	2	.038**
LAND	101.706	.245	2	.885
Note: ***, **, and * are significant at 1%, 5%, and 10% significant levels, respectively				
a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.				

Table 4.10 shows that all other independent variables are significant in distinguishing both categories (NOT PARTC and UNCERTAIN) of the dependent variable at different levels 1%, 5%, and 10%, except for variables FAC1_1, GEND and CATLE which were significant only in distinguishing category 2 of the dependent variable and category 3 of the dependent variable. The results of the model indicate that there was statistically a significant relationship between the independent variables and the dependent variable (looking at the significant levels 1%, 5%, and 10%).

5.2.4 The relationship of individual independent variables and the dependent variable (NOT PARTC with the reference category PARTC)

Holding other variables constant, a one-unit increase in the age of household head multiplies the odds of not participating than participating in wildlife-based land-uses by 1.225 (i.e. 22.5%, see table 5.10). This means that survey respondents who were older were more likely to be in the group of respondents who would not participate than the group that would participate.

Survey respondents who were satisfied about the roles and opportunities of livestock production (FAC1_2) were more likely to be in the group of survey respondents who would not participate in the integrated wildlife-based land-use practices rather than the group who would participate. For each unit increase in satisfaction, the odds of being in the group of survey respondents who would not participate increased by 13608.5% (i.e. 137.085-1= 136.085).

Holding other variables constant, a one-unit increase in satisfaction from government support to livestock production (FAC1_3) multiplies the odds of not participating than participating by 2.919. This means that survey respondents who were satisfied by government support were more likely to be in the group of respondents who would not participate than the group that would participate. Survey respondents who were concerned about the damages caused by wild animals (FAC1_4) were more likely to be in the group who would not participate rather than the one would participate. For each unit increase in the concern, the odds of being in the group of survey respondents who thought would not participate increased by 9875.4% (i.e. 99.754-1= 98.754).

Table 5.10: Multinomial logit model parameter estimates

Explanatory Variables	**Not participating vs Participating**					**Uncertain vs Participating**			
	B	S.E	Exp B	P level		B	S.E	Exp B	P level
Intercept	-18.84	6.530		0.004		-3.090	1.961		0.114
AGEH	0.203	0.103	1.225	.050**		-0.027	0.034	0.974	0.429
FAC1_1	-0.188	1.315	0.829	0.887		0.689	0.368	1.991	.061*
FAC2_1	2.996	1.099	20.007	.006***		1.047	0.395	2.849	.008***
FAC3_1	0.172	0.588	1.188	0.770		0.223	0.320	1.250	0.486
FAC1_2	4.921	1.531	137.085	.001***		1.193	0.503	3.295	.018**
FAC2_2	-3.436	2.279	0.032	0.132		0.021	0.395	1.021	0.957
FAC3_2	-0.263	0.757	0.769	0.728		-0.566	0.545	0.568	0.299
FAC1_3	2.616	0.905	13.684	.004***		1.071	0.560	2.919	.056*
FAC2_3	0.436	0.749	1.546	0.561		-0.642	0.529	0.526	0.225
FAC1_4	4.603	1.321	99.754	.000***		2.013	0.555	7.487	.000***
GEND	-1.256	1.648	0.285	0.446		1.560	0.700	4.761	.026**
EDUS	-7.236	3.037	0.001	.017**		-1.081	0.989	0.339	0.274
OCCP	-4.018	2.411	0.066	.096*		3.033	1.295	20.750	.019**
MINC	-4.662	2.177	0.009	.032**		0.270	0.718	1.310	0.707
CATLE	3.979	1.695	53.460	.019**		0.827	0.753	2.285	0.273
LAND	0.594	1.637	1.810	0.717		0.293	0.724	1.341	0.685
Reference category				Participate					
Number of observations				130					
Note: ***, **, * are significant levels at 1%, 5%, and 10% respectively									

Holding other factors constant the odds for someone with lower or no education of not participating rather than participating were 0.001 times (99.9% lower than) the odds for someone with education higher than grade 12. This means that survey respondents who had less or no education were less likely to be in the group of respondents who would likely not participate than the group that would likely participate. Holding other factors constant the odds for someone without cattle of not participating rather than participating were 53.460 times (5246% higher than) the odds for someone with cattle.

Holding other factors constant the odds for someone with monthly income of lower than R1500 of not participating rather than participating were 0.009 times (99.1% lower than) the odds for someone with a higher monthly income. Holding other factors constant the odds for someone with informal or no employment not participating rather than participating were 0.066 times (93.4% lower than) the odds for someone with formal employment.

5.2.5 The relationship of individual independent variables and the dependent variable (UNCERTAIN with the reference category PARTC)

Holding other variables constant, a one-unit increase in FAC1_1 (state of grazing and market) multiplies the odds of being uncertain rather than participating by 1.991 (increase by 99.1%). Holding other variables constant, a one-unit increase in FAC1_2 (interest in wildlife if compensation is provided) multiplies the odds of being uncertain rather than participating by 2.849 (increase by 184.9%). Holding other variables constant, a one-unit increase in roles and opportunities of wildlife in the community (FAC1_3) multiplies the odds of being uncertain than participating by 2.919 (i.e. 191.9%). Survey respondents who were concerned about the damages caused by wild animals (FAC1_4) were more likely to be in the group who would be uncertain rather than the one that would participate. For each unit increase in the concern, the odds of being in the group of survey respondents who would be uncertain increased by 648.7% (i.e. 7.487-1= 6.487).

Holding other variables constant, the odds for someone who is female of being uncertain rather than participating were 4.761 times (376.1% higher than) the odds for someone who is male. Holding other factors constant the odds for someone with informal or no employment of not being uncertain rather than participating were 20.250 times (1925% higher than) the odds for someone with formal employment.

5.3 Factors influencing rural households` likelihood to participate in integrated wildlife/livestock land-use practices

The previous section discussed the statistical relationships between the explanatory variables and the dependent variable. From the analysis it can be concluded that the statistically significant variables influence households' likelihood to decide on whether or not to participate in the integrated wildlife-based land-use practice. In this section only the variables that distinguished the likelihood of "participating" when contrasted with "not participating" are discussed, as it is difficult to make conclusion with the "uncertainty" category. Gender, age, education, occupation, income, cattle possession and opinion questions all significantly influenced households` decision to participate. However, gender is not discussed as it only explained the likelihood of "uncertainty" when compared with "participating" category.

5.3.1 Age of household head

Age has been found to be significant on one occasion in distinguishing between pairs of groups. Age was only significant when the outcome variable NOT PARTC was being compared to outcome variable PARTC. The results indicate that the more units of age, the higher the odds of people being in the group of not participating rather than that of participating. This result is similar to other findings (Chaminuka, 2012; Chaminuka *et al*., 2014) that older households are less likely to embrace wildlife-based land-uses. Youth group and small business entrepreneurs thought that there was room to accommodate wildlife-based land uses, without eliminating cattle production, since livestock farming could only sustain a few households because incomes were low and only a few jobs were created. This finding on age is also similar to that of Fiallo and Jacobson (1995) who indicated that younger residents were more positive towards the Machalilla National Park. From this finding it was seen that older people were likely to have negative attitude towards wildlife due to them (old people) having retired from their jobs and making livestock rearing their way of survival (i.e. as security) and pleasure. However, it is contrary to the findings of Ebu *et al*., (2011) who found that age did not have any significant impact on the attitudes of people towards wildlife conservation in the Bakossi area of Cameroon.

5.3.2 Education status of household head

Education was significant only in distinguishing the NOT PARTC group from the PARTC group. The results indicate that households who have less or no education were unlikely to be in the group that would likely not participate in the integrated land-uses. This result is contrary to that of Shibia (2010) that illiteracy contributes to negative attitude towards wildlife; but similar to that of Mankin *et al.,* (1999), whereby they found that local communities which lacked conservation education would yield positive attitudes when provided with conservation information. The approach and presentation of conservation benefits can influence even those without education to be interested in wildlife land-uses. In another study conducted by Walpole and Goodwin (2001) positive attitudes tended to increase with respondents' level of education and knowledge about conservation issues.

5.3.3 Monthly income of household

Monthly income was only significant in distinguishing the NOT PARTC group from the PARTC group. The results show that those households who had incomes of less than R1500 were less likely to be in the group of NOT PARTC. This is true when high level of unemployment in Greater-Giyani is considered, and the anticipation of jobs that was present in that area. Therefore, low incomes were associated with positive attitudes looking at the assumption that wildlife land-uses would produce sufficient incomes and capital assets. These result contrasts with findings by Chaminuka (2012). Newmark *et al*., (1993) and Infield (1998) also argued that increased household wealth had been shown to positively influence attitudes towards wildlife conservation in Tanzania and South Africa.

5.3.4 Occupation of household head

Occupation was found to be significant in distinguishing NOT PARTC from PARTC. In distinguishing not participating from participating, occupation was found to be negatively significant on people who don't have formal employment or are unemployed. This finding could be related to that of monthly income which was also negatively significant looking on low level of incomes. People who were unemployed or did not have a formal job would likely show positive interest on wildlife land-use perceiving the opportunities thereof. Given that youth fall amongst the most unemployed in South Africa, this could potentially create employment opportunities for interested unemployed. According to Anthony (2007) local community members equated community improvement and development with access of jobs in KNP. Employment in the park might also result in positive attitudes due to the exposure and appreciation of the park`s functioning and conservation efforts.

5.3.5 Household cattle ownership

Household ownership of cattle was positively significant in distinguishing the NOT PARTC group from PARTC group. This result means that households owning cattle were most likely to be in the group of NOT PARTC, this might be due to the fact that they depended on cattle for security purposes and as to maintain their traditional practice as well. Chaminuka *et al*., (2014) found also that cattle owning households were less receptive of the idea of integrated wildlife land-uses. This could be

because these households suffer problems of livestock depredation by wild animals from KNP; and could also be attributed to lack of tangible household benefits from wildlife and absence of a mechanism to compensate households that suffer wildlife damage (Chaminuka *et al*., 2012; Anthony, 2007).

5.3.6 Perceptions and attitudes towards integrated wildlife/livestock

From the opinions questions only FAC1_4, FAC1_2, FAC1_3, and FAC2_1 were positively significant in distinguishing both groups from the reference group. FAC1_4 represented damages caused by wild animals to the community. Households who had experienced these damages were more likely to be in the NOT PARTC category. Several studies (e.g. Anthony, 2007; Heinen, 1993; Fiallo and Jacobson, 1995; Nepal and Weber, 1995; Udaya Sekhar, 1998; Walpole and Goodwin, 2001) have indicated that costs associated with conservation such as wildlife depredation of crops and livestock had negative effects on local attitudes, whilst benefits from conservation would give positive effects. Anthony (2007) argued that negative attitudes towards KNP were primarily centred on damage-causing animals that caused problems due to the lack of adequate management of the border fence and control of wild animals. Again households who were less interested in giving out part of their land and livestock to allow for wildlife conservation (indicated by FAC1_2) were more likely to be in the groups of not participating even when compensation was provided. In open discussion, many households indicated that they had land and they used it for cultivation (mainly maize) and therefore, they would not risk giving away their land because they were not sure how and how long the wildlife program would be sustainable to their livelihoods.

5.4 Summary

Considering the results of empirical models, several factors influenced whether or not households were likely to participate in the integrated wildlife/livestock land-uses. Government support and the number of people benefiting from livestock; interest in wildlife protection; relationship between wildlife, humans and domestic animals; and land ownership were found not to be significant in distinguishing both categories (not participating and uncertain) of the dependent variable at different levels (i.e. 1%, 5%, and 10%) to participate in the integrated wildlife/livestock land-uses. Therefore,

these variables were not included in the interpretation. All other independent variables were significant in distinguishing both categories, except access to markets, income earned from sale of livestock and state of grazing; gender of household head and cattle ownership that were significant only in distinguishing category two and three of the dependent variable.

CHAPTER 6

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The overall objective of the study was to identify socio-economic opportunities and challenges for integrated wildlife/livestock farming practice in rural areas of Limpopo province for improved livelihoods. Specific objectives were the following; (i) to analyse local community perceptions and attitudes regarding integrated wildlife/livestock as a possible land-use option in rural areas and (ii) to determine factors influencing households` participation in integrated wildlife/livestock farming in rural communities. This study focused on analysing information that was relevant in determining the perceptions of rural households towards integrated wildlife-based land-use practices and identifies their socio-economic characteristics influencing their perceptions and attitudes.

6.2 Summary

This section provides a summary of some of the important sections included in the study. The study was conducted in Greater-Giyani Municipality, one of the five (5) local municipalities falling within Mopani District Municipality of Limpopo Province. The municipality is demarcated into 30 wards and has 60 ward councillors. For the purpose of this survey, only 3 (17, 18 and 19) wards were surveyed since our purpose was to interview those communities that are closer to the KNP (wards 18 and 19). A sample of 130 households was used, which was obtained from 9 villages of the three wards selected. Households were selected by the use of a combination of multistage and stratified sampling and an administered questionnaire was used to elicit the required data.

In organising and analysing data two models were used namely; the factor analysis and the multinomial logistic regression model. Factor analysis was used to reduce the number of independent variables to a significant number of factors which is manageable. The analysis managed to extract 9 factors from 28 variables. These factors were used as variables in the multinomial logistic regression model. Multinomial logistic regression model was used analyse the perception and attitude

of household towards wildlife and also determine the factors influencing this attitude. Variables which were significant in distinguishing between groups of outcome variables from the reference group were, damages caused by wild animals on crops and vegetables; giving land and stopping farming to allow for wildlife conservation; roles and opportunities of wildlife in the community; roles and opportunities of livestock in the community; age of household head; occupation of household head; gender of household head; household monthly income; marital status of household head; education status of household head; and cattle ownership.

6.3 Conclusions

The analyses made in this study were intended to answer the following questions: (i) What are the socio-economic characteristics of households living at the wildlife/livestock interface? (ii) What are the perceptions and attitudes of the local community regarding integrated wildlife/livestock land-use option in rural areas? (iii) Do the perceptions and attitudes differ between non-cattle and cattle farmers? (iv) What are the factors influencing rural households` participation in integrated wildlife/livestock farming practices in rural areas?

In answering the first research question, the study found that most household heads were female. Many households did not have formal education and were unemployed. A significant number of households indicated that they received their monthly income from remittances, government grants and small businesses. Households owning cattle indicated that they own cattle mainly for security purposes. A significant number of households indicated that they used grazing area for firewood and Mopani worms collection other than livestock grazing.

Considering the second question, a significant number of households (both cattle owning and non-cattle owning) were more likely to have positive attitude towards integrated wildlife/livestock land-use option as they showed interest in wildlife protection. However, some cattle owning households were likely to have negative attitude due to cases of damages (attacks) caused by wild animals to cattle. Generally, households had positive attitude and perceptions towards the protection of wildlife given the benefits that come with wildlife protection such as employment in

the protected area, compensation for loss of land and livestock to wildlife, and clearly defined benefits that comes with wildlife protection in their area.

Looking at the third research question, there has been a perception difference between cattle owning and non-cattle owning households. Cattle owning households and households owning land from the field were more likely to have negative attitudes when compared to non-cattle owning households as they regarded cattle and crop cultivation as their security.

Considering the last research question, factors such as age, education, income, occupation, cattle ownership, and perception towards integrated wildlife/livestock land-use were likely to have influence on households' participation in integrated wildlife/livestock land-use option in rural areas. These findings allows for the rejection of the hypotheses made that, (i) perceptions and attitudes of the local community regarding integrated wildlife/livestock land-use option in rural areas are negative. (ii) There are no perception and attitudinal difference between non-cattle and cattle owning households. (ii) There are no significant socio-economic factors influencing rural households` participation in integrated wildlife/livestock farming practices.

6.4 Policy implications and recommendations

Given the results from the attitude of people from Greater-Giyani, several recommendations can be made. These recommendations will be relevant in assisting all stakeholders (i.e. rural households, policy makers, conservation management and the government) to make sustainable decisions.

- ✓ Cooperation of all stakeholders

  The cooperation of community, government, conservationists and funding agencies is crucial for lasting success in environmental protection programs. This initiative will require the adoption of conservation strategies that are proactive, mutually beneficial and environmentally friendly and sustainable. There is need to recognize the value system of the people in decision making process and planning toward the conservation of resources. This can be

successful when the people participate actively in the implementation of the policies affecting the resources in their areas.

- ✓ Maintaining positive attitudes

  Positive attitudes and perceptions could be maintained with carefully implemented conservation programs which serve to alleviation poverty by initiating entrepreneurial activities that could generate income to the local residents to offset the costs incurred. Strategies such as appropriate and adequate support for the agricultural sector as means to increase local food security could be applied. Support measures for agriculture could include subsidizing farming inputs such as fertilizers, providing small and affordable loans, and enhancing access to markets for farm produce.

- ✓ Need for conservation education

  It is recommended that educational and sensitization programs be organized to create awareness among the community people to help them know the essence of sustainable use and effect of resource extinction. In addition alternative sources of livelihood like; employment, trade, skills enhancement should be provided for the people to limit dependence on natural resources exploration and also that the local people be involved in all resource conservation planning, resource-use and sharing of benefits from natural resources in their community. Knowledge could also be enhanced by incorporating wildlife conservation programs into primary and secondary school curricula. The establishment of wildlife information centres in villages or at ward level might also be useful in enhancing knowledge skills and increasing awareness.

6.5 Areas for further research

This study only focused on the perceptions and factors affecting the perceptions of households to participate in integrated wildlife land-use practices. However, it did not indicate as to how much are households willing to accept this proposed land-use option if compensation is provided; and also, to what extent cattle household are willing to give up their stock to allow for this land-use option. Therefore, studies

should be conducted that will focus on how much rural households are willing to accept this proposed land-use option, and also to find out exactly what benefits do they expect to gain from this integrated wildlife land-use practice. It is also important that conservation managements define clearly the conditions of their conservation programs to local communities concerned so that mutual agreements between the communities and conservation managements are made prior to implementation.

REFERENCES

ABSA. 2003. Game ranch profitability in Southern Africa. Amalgamated Banks of South Africa. The South African Financial Sector Forum, Revonia.

ADAMOWICZ, W., LOUVIERE, J and WILLIAMS, M. 1994. Combining revealed and stated preference methods for valuing environmental amenities. Journal for Environmental Economics and Management, 26, 271-292.

ADEDAYO, A. 2003. Conservation and rural poverty alleviation: evidence from Kainji Lake National Park. Environment and Behaviour. Nigeria.

ALLENDORF, T., SWE K.K., OO, T., HTUT, Y., AUNG, M., ALLENDORF, K., HAYEK, L., LEIMGRUBER, P and WEMMER, C. 2006. Community attitudes toward three protected areas in Upper Myanmar (Burma). Environmental Conservation, 4, 344–352.

ALLENDORF, T.D. 2007. Residents' attitudes toward three protected areas in southwestern Nepal.

ALLENDORF, T.D., SMITH, J.L.D and ANDERSON, D.H. 2007. Residents' perception of Royal Bardia National Park, Nepal. Landscape and Urban Planning, 82, 33-40.

ALLPORT, G.W. 1935. Attitudes. In Murchison C. (Ed.), Handbook of social psychology (pp. 798-844). Worcester, MA: Clarck University Press.

ANTHONY, B and MOLDOVAN, D. 2008. Poised for engagement? Local communities and Macin Mountains National Park, Romania. International Journal of Biodiversity Science and Management, 4, 230–241.

ANTHONY, B. 2007. The dual nature of parks: attitudes of neighbouring communities towards Kruger National Park, South Africa. Foundation for Environmental Conservation. Environmental Conservation, 34 (3), 236–245.

ANTHONY, B.P. 2006. A view from the other side of the fence: Tsonga communities and the Kruger National Park. South Africa. PhD Thesis. Central European University, Hungary.

ANTHONY, B.P., ABONYI, S., TERBLANCHE, P and WATT, A. 2011. Towards bridging worldviews in biodiversity conservation: Exploring the Tsonga concept of *ntumbuloko* in South Africa. Environmental Sciences, Research in Biodiversity- Models and Applications.

ASHELY, C and ELLIOT, J. 2003. Just wildlife or a source of local development? Odi. Natural Resources Perspective, 85, 1-6.

ASHLEY, C and LAFRANCHI, C. 1997. Livelihood strategies of rural households in Caprivi: implications for conservancies and natural resource management. Research discussion paper no. 20, Directorate of Environmental Affairs, Ministry of Environment and Tourism, Windhoek. Namibia.

ASIBEY, E.O.A., and CHILD, G.S. 1999. Wildlife management for rural development in Sub-Saharan Africa.Unasylva - No. 161.

BARDWELL, W.A., ANCOLI, I.S and DIMSDALE, J.E. 2001. Response bias influences mental health symptom reporting in patients with obstructive sleep apnea. Annals of Behavioral Medicine, 23 (4), 313-317.

BARNES, J.I. 1998. Wildlife conservation and utilization as complements to agriculture in Southern African development. DEA research discussion paper number 27.

BARRETT, C.B and Arcese, P. 1995. Are Integrated Conservation Development Projects (ICDPs) sustainable? On the conservation of large mammals in Sub-Saharan Africa. World Development, 23 (7), 1073–1084.

BAYAGA, A. 2010. Multinomial logistic regression: usage and application in risk analysis. Quantitative Methods Inquires. Journal of Applied Quantitative Methods, 5 (2), 288-297.

BISONG, F.E. 2001. “Farming systems and forest biodiversity conservation: towards a theory and model for sustainable natural resource management.”

BOYD, C., BLENCH, R., BOURN, D., DRAKE, L and STEVENSON, P. 1999. Reconciling interests among wildlife, livestock and people in Eastern Africa. A sustainable livelihoods approach. Overseas Development Institute.

BRUINE DE BRUIN, W., PARKER, A.M., and FISCHHOFF, B. 2007. Individual differences in adult decision-making competence. Journal of Personality and Social Psychology, 5, 938-956.

CAMPBELL-SMITH, G., SIMANJORANG, H.V.P., LEADER-WILLIAMS, L and LINKIE, M. 2010. Local attitudes and perceptions toward crop-raiding by orangutans (Pongo Abelii) and other nonhuman primates in Northern Sumatra, Indonesia. American Journal of Primatology, 71, 1-11.

CHAMINUKA, P. 2012. Evaluating land-use options at the wildlife/livestock interface: an integrated spatial land-use analysis, environmental and natural resource economics group. Wageningen University. Wageningen, NL.

CHAMINUKA, P., MCCRINDLE, C.M.E and UDO, H.M.J. 2012. Cattle farming at the wildlife/livestock interface: assessment of costs and benefits adjacent to Kruger National Park, South Africa. Society and Natural Resources, 25, 235-250.

CHAMINUKA, P., UDO, H.M.J., EILERS K.C.A.M and VAN DER ZIJPP, A. 2014. Livelihood roles of cattle and prospects for alternative land-uses at the wildlife/livestock interface in South Africa. Land-use Policy, 38, 80-90.

DAFF. 2012. The framework for the Zero Hunger Programme. Actuating the integrated food security strategy for South Africa. Department of Agriculture, Forestry and Fisheries (DAFF), South Africa.

DOVIE, D.B.K., SHACKLETON, C.M and WITKOWSKI, E.T.F. 2006. Valuation of communal area livestock benefits, rural livelihoods and related policy issues. Land Use Policy, 23, 260–271.

DUDLEY, N. (Editor). 2008. Guidelines for applying protected area management categories. Gland, Switzerland: IUCN.

EBUA, V.T., AGWAFO, T.E and FONKWO, S.N. 2011. Attitudes and perceptions as threats to wildlife conservation in the Bakossi area, South West Cameroon. International Journal of Biodiversity and Conservation, 3, 631-636.

EMERTON L and MFUNDA, I. 1999. Making wildlife economically viable for communities living around the Western Serengeti, Tanzania. Evaluating Eden Series. Working Paper No.1.

EYAL, P and EYAL, G. 2011. Too reliable to be true? Response bias as a potential source of inflation in paper-and-pencil questionnaire reliability. Practical Assessment, Research and Evaluation, 16 (9), 1-8.

FIALLO, E.A and JACOBSON, S.K. 1995. Local communities and protected areas: attitudes of rural residents towards conservation and Machalilla National Park, Ecuador. Environmental Conservation, 3, 241-249.

FIELD, A. 2005. Discovering statistics using SPSS. 2nd edition. London: Sage.

GILLIGAN, C. 1982. In a different voice. Harvard University press, Cambridge, Mass.

GREENE, W.H. 2002. Econometric analysis. 5th edition. Prentice Hall: 720-723.

GROOTENHUIS, J.G and OLUBAYO, R.O. 1993. Disease research in the wildlife-livestock interface in Kenya. Veterinary Quarterly, 2, 55-59.

HAIR, J.F., ANDERSON, R.E., TATHAM, R.L and BLACK, W.C. 1995. Multivariate data analysis with readings. 4th edition. Englewood NJ: Prentice Hall.

HEINEN, J. T., and SHRIVASTAVA, R.J. 2009. An analysis of conservation attitudes and awareness.

HEINEN, J.T. 1993. Park-people relations in Kosi Tappu Wildlife Reserve, Nepal: a socio-economic analysis. Environmental Conservation, 20 (1), 25-34.

HEINEN, J.T. 1993. Park–people relations in Kosi Tappu Wildlife Reserve, Nepal: a socio-economic analysis. Environmental Conservation, 1, 25-34.

HOUGH, J.L. 1988. Obstacles to effective management of conflicts between national parks and surrounding human communities in developing countries. Environmental Conservation, 5, 129-136.

INFIELD, M. 1998. Attitudes of a rural community towards conservation and a local conservation area in natal, South Africa. Biological Conservation, 45, 21-46.

INFIELD, M., and NAMARA, A. 2001. Community attitudes and behaviour towards conservation: an assessment of a community conservation programme around Lake Mburo National Park, Uganda. Oryx, 35, 48-60.

IUCN. 1994. Guidelines for protected area management categories. Gland, Switzerland and Cambridge. International Union for Conservation of Nature (IUCN), UK: Commission on National Parks and Protected Areas (CNPPA) with assistance from World Conservation Monitoring Centre.

KELLERT, S.R and BERRY, J.K. 1982. Knowledge and behaviours toward wildlife as affected by gender. Wildlife Society Bulletin, 3, 363-371.

KNAFL, G.J. 2006. Current topics in statistics for applied researchers factor analysis. Oregon Health and Science University.

KREUTER, U.P and WORKMAN, J.P. 1996. Cattle and Wildlife Ranching in Zimbabwe. Rangelands, 18, 44-47.

LE BEL, S., MURWIRA, A., MUKAMURI, B., CZUDEK, R., TAYLOR, R., and LA GRANGE, M. (2011). Human Wildlife Conflicts in Southern Africa: riding the whirlwind in Mozambique and in Zimbabwe. In J. López-Pujol (Ed.), The Importance of Biological Interactions in the Study of Biodiversity (pp. 283-322). Croatia: InTech.

LEPP, A and HOLLAND, S. 2006. A comparison of attitudes towards state led conservation and community based conservation in the village of Bigodi, Uganda. Society and Natural Resources. 19 (7) (in press).

LEPP, A. 2007. Residents' attitudes towards tourism in Bigodi village, Uganda. Tourism Management, 28, 876-885.

LEWIS, C. 1996. Managing conflicts in protected areas. Gland (Switzerland): IUCN-The World Conservation Union.

LEWIS, D. 2005. Synergies between animal husbandry and wildlife conservation perspectives from Zambia. Wildlife Conservation Society. Lusaka. Zambia.

MABUNDA, D. 2004. An integrated management framework for the Kruger National Park, South Africa, 2003. PhD thesis, Department of Tourism Management, University of Pretoria, Pretoria.

MABUNDA, M.M. 2001. Perceptions of disease, illness, and healing among selected black communities in the Northern Province, South Africa. South Africa journal of Ethnology, 24 (1), 11-16.

MAKHURA, M.T., GOODE, M.F and COETZEE, G.K. 1997. Indexing participation in the market economy through factor analysis- an implication for food security: case of Mpumalanga. Paper for AEASA Presentation, University of Pretoria.

MANKIN, P.C., WARNER, R and ANDERSON, W.L. 1999. Wildlife and the Illinois public: a benchmark study of attitudes and perceptions. Wildlife society bulletin, 27, 465-472.

MCFADDEN, D and WINTER, J. 2001. Experimental analysis of survey response bias over the internet: Some results from the Retirement Perspectives Survey.

MCKELVIE, S.J. 2004. Is the neuroticism scale of the Eysenck Personality Inventory contaminated by response bias? Personality and Individual Differences, 36 (4), 743-755.

MUNTHALI, S.M. 2007. Transfrontier conservation areas: integrating biodiversity and poverty alleviation in Southern Africa. Natural Resources Forum, 31, 51-60.

MURPHREE, M.W. 1993. Communities as Resource Management Institutions. Gatekeeper Series, No. 36, Sustainable Agriculture Programme. International Institute for Environment and Development (IIED). London.

NEPAL, S.K and WEBER, K.E. 1995. Managing resources and resolving conflicts: national parks. International Journal of Sustainable Development and World Ecology, 2, 11-25.

NEWMARK, W.D and HOUGH, J.L. 2000. Conserving wildlife in Africa: Integrated conservation and development projects and beyond. BioScience, 7, 585-592.

NEWMARK, W.D., Leonard, N.L., Sariko, H.I., and Gamassa, D.G.M. 1993. Conservation attitudes of local people living adjacent to five protected areas in Tanzania: human density as a predictor. Conservation Biology, 8 (1), 249-255.

OSBORNE, J.W and BLANCHARD, M.R. 2011. Random responding from participants is a threat to the validity of social science research results. Frontiers in Psychology, 1, 1-7.

PARRY, D and CAMPBELLA, B. 1992. Attitudes of rural communities to animal wildlife and its utilization in Chobe enclave and Mababe depression, Botswana. Environmental Conservation, 3, 19.

PAULHUS, D.L. 1991. Measurement and control of response bias. In: J. P. Robinson, P. R. Shaver, and L. S. Wrightsman (Eds.), Measures of Personality and Social Psychological Attitudes (pp. 17-59). San Diego, CA: Academic Press.

ROE, D., THOMAS, D., SMITH, J., WALPOLE, M and ELLIOTT, J. 2011. Biodiversity and poverty: ten frequently asked questions- ten policy implications. Key highlights in sustainable agriculture and natural resource management.

RUBLE, T.L and STOUT, D.E. 1991. Reliability, classification stability, and response-set bias of alternate forms of the Learning-Style Inventory (LSI-1985). Educational and Psychological Measurement, 51 (2), 481-489.

SEBERWAL, V.K., GIBBS, J.P., CHELLAM, R., and JOHNSINGH, A.J.T. (1994). Lion-human conflict in the Gir forest, India. Conservation Biology, 2, 501-507.

SCHIFF, M.R. 1970. Natural hazard research. Some theoretical aspects of attitudes and perception. Woking paper No. 15. University of Toronto.

SHAH, A.K and OPPENHEIMER, D.M. 2008. The Path of Least Resistance: Using Easy-to-Access Information.

SHIBIA, M.G. 2010. Determinants of attitudes and perceptions on resource use and management of Marsabit National Reserve, Kenya. Journal of Human Ecology, 30, 55-62.

SILORI, C. S. 2007. Perceptions of local people towards conservation of forest resources in Nanda Devi Biosphere Reserve, north-western Himalaya, India. Biodiversity and Conservation, 16, 211-222.

SOUTH AFRICA PROTECTED AREAS. 2014. Inside South Africa. From: http://www.insidesa.com/south-africa-protected-areas (Accessed 13 September 2014).

STATSA. 2012. Census 2011 Statistical release. Statistics South Africa.

STRUHSAKER, T., STRUHSAKER, P and SIEX, K. 2005. Conserving Africa's rain forests: problems in protected areas and possible solutions. Biological Conservation, 123, 45-54.

SULLIVAN, B.F and SCANDELL, D.J. 2003. Psychological needs and response bias: An examination of Paulhus and John's reformulation. North American Journal of Psychology, 5(2), 279-287.

TABACHNICK, B.G. and Fidell, L.S. and Osterlind, S.J. 2001. Using multivariate statistics. US, Allyn and Bacon Boston.

TIBBLES, A.C., WAALEN, J.K and HAINS, F. 1998. Response set bias, internal consistency and construct validity of the Oswestry Low Back Pain Disability Questionnaire. Journal of Canadian Chiropractic Association, 42 (3), 141-149.

TREVES, A and KARANTH, K.U. 2003. Human-carnivore conflict and perspectives on carnivore management world-wide. Conservation Biology, 6, 1491-1499.

UDAYA SEKHAR, N. 1998. Crop and livestock depredation caused by wild animals in protected areas: the case of Sariska Tiger Reserve, Rajasthan, India. Environmental Conservation, 2, 160-171.

WALPOLE, M.J and GOODWIN, H.J. 2001. Local attitudes towards conservation and tourism around Komodo National Park, Indonesia. Environmental Conservation, 2, 160-166.

WELADJI, R.B and TCHAMBA, M.N. 2003. Conflict between people and protected areas within the Bénoué Wildlife Conservation Area, North Cameroon. Oryx, 37, 72-79.

APPENDIX

QUESTIONNAIRE NO:

Interview date ……..……

Enumerator's name ……..…….

Name of village ……..…….

Village Head ……..….

Interview Duration ……..……....

SECTION A: Household demographics

This first section is about the people who live at this homestead and eat from the same pot as yourself and the general activities they engage in. this includes people who live away from the house during the month or week, but comes back on a regular basis and contribute to the income of the household.

1. Gender of household head

1	2
Male	Female

2. Age of household head (years)

3. Number of years staying in this village

1	2	3
0-10 years	11-20 years	Over 20 years

4. Size of the household (Number of people in the household)……..

5. Education status of household head

1	2	3	4	5
None	Abet	Primary	Secondary	Tertiary

6. Occupation of household head

1	2	3	4	5	6
Unemployed	Farmer	Pensioner	Civil servant	Private company	Small business enterprises….

7. Marital status of household head

1	2	3	4
Not married	Married	Divorced	Widowed

8. Monthly income level of household

1	2	3	4	5
Below R1500	R1501-R3000	R3001-R5000	R5001-R10000	Above R10000

9. Tick all relevant sources of income household

1	2	3	4	5	6	7
Salary	Livestock farming	Crop farming	Old age grant	Child grant	pension	remittances

: Specify other……..……

10. What is household`s major source of income?……

11. How much land do you have for cropping? (**ha/morgen specify units**)…….

12. What type of livestock do you own? (**More than 1 answers possible**)

1	2	3	4	5	6
Cattle	Donkeys	Goats	Pigs	Chickens	Other (specify)

6: specify other……..

QUESTIONS 13-21 ARE FOR CATTLE OWNERS ONLY

13. If you own cattle how many do you have?.....

14. How many years have you been involved in cattle farming?.....

15. What are your reasons for keeping cattle? (**More than 1 answers possible**)

1	2	3	4	5	6	7	8
Commercial	tradition	Milk	Meat	Security	Manure	Draught power	Other

8: specify other……..

16. Of the reasons above, which do you consider to be the most important?.....

17. Where do you graze the cattle?.....

18. Is there enough grazing for your cattle? Yes ☐ No ☐

☐ ☐

19. Do you sometimes buy supplementary feeds for your cattle? Yes No

20. Do you use the grazing in any other way, apart from grazing? Yes ☐ No ☐

21. If you do, in what way(s) do you use the grazing area? **(More than 1 answers possible**)

1	2	3	4	5	6	7
Picking herbs	Grass cutting	Collecting firewood	Collecting dung	Collecting wild fruits	Hunting	Other

7: specify other…….

22. What are the three challenges you face with cattle farming here?

I. …….
II. ……..
III. ……....

SECTION B: Household perceptions on the current land-use option

Many rural communities practice livestock production (mainly cattle) as their primary land-use option. Please answer the following questions based on livestock production.

Please tick your level of satisfaction and dissatisfaction with the following	**Very dissatisfied**	**Somewhat dissatisfied**	**Somewhat satisfied**	**Very satisfied**
	1	2	3	4
23. The number of people benefiting from livestock farming in the village				
24. The state of grazing land in the community				
25. The opportunities for livestock farming				
26. Access to markets to sell livestock				
27. Income earned from sale of livestock				
28. The role livestock plays in the community				
29. Government support to livestock farmers				

SECTION C: Households perceptions on integrated wildlife/livestock conservation in their land

Wildlife conservation/farming is the raising and protection of non-domesticated animals and plants for viewing by future generation, trophy hunting, and keep as pets, and commodities (food, traditional medicine and fiber). Please respond positively to the following questions regarding integrated wildlife\livestock production.

Please rate your level of interest with regard to the following	**Extremely interested**	**Somewhat interested**	**Not very interested**	**Not at all interested**
	1	2	3	4
30. Interest in wildlife protection				
31. Giving part of land to allow wildlife conservation* if there were income benefits to the community				
32. Giving part of land to allow wildlife conservation* if there were income benefits to my households				
33. Stopping livestock farming to use the land for wildlife tourism projects				
34. Stopping crop farming to use the land for wildlife tourism projects				
35. Participate in the conservation programme if compensated for loss of livestock and/crops by the programme				
36.Rendering accommodation (in return for money) to tourists/people coming for wildlife viewing				
37. Selling crafts to tourists/people coming to view wildlife				
38 Getting employment in the conservation area				

Please tick your level of disagreement and agreement with regard to wildlife conservation	**Strongly agree**	**Agree**	**Uncertain**	**Strongly disagree**
39. Wildlife can be friendly to human and domestic animals				
40. Wildlife can be an opportunity to generate income and improve livelihoods				
41. Wildlife can help my community				
42. Wildlife conservation can be important for future generations				
43. My community should support wildlife conservation projects on our land				
44. Wildlife presents more opportunities for earning income and create jobs in this community than farming				
45. Government should support community wildlife tourism and conservation projects				

Following the experiences of wildlife conservation, it is found that there exist conflicts between wildlife and humans

Please tick your level of disagreement and agreement with regard to wildlife conservation	**Strongly agree**	**Agree**	**Uncertain**	**Strongly disagree**
46. Damages to crops by wild animals				
47. Damages to infrastructure such as fences and buildings by wild animals				
48. Attack to domestic animals by wild animals				
49. Attacks to human beings by wild animals				
50. Diseases transmission from wild animals to domestic animals				
51. Wildlife Conservation management staff (e.g. KNP) attitude towards community members				

.

52. Which three (3) wild animals are most problematic in your area?

I. …….

II. ……..

III. ……..

53. In your opinion, who should be responsible for wildlife in your area? ……

……

54. In your opinion, who should benefit from wildlife in your area?.....

.....

END.

THANK YOU.