

**Exploration and Evaluation of the Alternative Wildlife Management
Options for the Loliondo Game Controlled Area in Tanzania:
Multi-criteria Analysis**

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List of Acronyms and Abbreviations

AHP	Analytic Hierarchy Process
ANP	Analytic Network Process
CBNRM	Community-Based Natural Resources Management
CBO	Community-Based Organisation
CBWMA	Community-Based Wildlife Management Area
DEFINITE	Decision on Finite Sets of Alternatives
DMCA	Deliberative Multi-criteria Analysis
ELECTRE	Elimination and Choice Expressing the Reality
EVAMIX	Evaluation of Mixed Data
FGD	Focus Group Discussion
GCA	Game Controlled Area
GIS	Geographical Information System
GRA	Game Reserve Area
GRP	Gross Regional Product
GSE	Greater Serengeti Ecosystem
IUCN	International Union for Conservation of Nature
VBIWMA	Village-Based Independent Wildlife Management Area
JVWMA	Joint Venture Wildlife Management Area
LGCA	Loliondo Game Controlled Area
MEA	Millennium Ecosystem Assessment
MCA	Multi-Criteria Analysis
MODM	Multiple Objective Decision-Making
NDC	Ngorongoro District Council
NGO	Non-Governmental Organisation
NLUPC	National Land Use Plan
NRM	Natural Resource Management
OBC	Otterlo Business Corporation
PROMETHEE	Preference Ranking Organisation Method for Enrichment Evaluation
SAPs	Structural Adjustment Programmes
SMART	Spatial Monitoring And Reporting Tool
SNP	Serengeti National Park

SPSS	Statistical Package for Social Sciences
SWOT	Strength, Weakness, Opportunities and Threat
TANAPA	Tanzania National Parks
TAWA	Tanzania Wildlife Authority
TNRF	Tanzania Natural Resource Forum
TZS	Tanzanian Shillings
URT	United Republic of Tanzania
WMA	Wildlife Management Area

Declaration

I, Gileard Minja, certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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Sign: ...

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Abstract

This thesis evaluated wildlife management options in the Loliondo Game Controlled Area (LGCA) in the northern region of Tanzania. There has been a lack of consensus among local governments and other stakeholder communities as to whether trophy hunting is a viable form of wildlife management in the LGCA. The major wildlife management issues include an acute lack of community involvement in the wildlife management planning and decision-making process, poorly defined property rights, and the unequitable distribution of the economic benefits generated from the trophy hunting scheme being implemented. Trophy hunting and ecotourism occur on the pastoral village land within the LGCA. The co-existence of trophy hunting, ecotourism and grazing has triggered land-use conflicts across the LGCA stakeholders. This study explored alternative policy options for the LGCA. Multi-criteria analysis (MCA) techniques were employed to identify which options would be the most preferable wildlife management options. A community survey was conducted to supplement the MCA. This study found that the local communities were not adequately involved in the wildlife management planning and decision-making process. Under the current LGCA scheme, the Maasai communities have no exclusive rights to their pastoral land and resources, and this limited the livelihoods of the pastoral communities. This study found that while investors and the government benefitted substantially, the individual pastoral households did not benefit as much from the revenues accrued from the current LGCA wildlife management scheme. The study identified and analysed alternative wildlife management options, which include the Game Reserve Area, Village-Based Independent Wildlife Management Area, and Joint Venture Wildlife Management Area. The study found that the latter community-based wildlife management option was the most preferred, and that by replacing the current LGCA scheme with this scheme this would lead to an efficient wildlife conservation, with well-defined property rights, and equitable benefits shared across the various stakeholders. Therefore, it is argued here that the institutional framework for wildlife management needs to be set in such a way as to ensure equitable benefit sharing and to support the legitimate decentralisation of wildlife management in the LGCA.

Chapter 1. Introduction

This chapter provides background information on wildlife management in the Loliondo Game Controlled Area (LGCA) in the northern part of Tanzania. A brief background of trophy hunting in Africa and Tanzania is presented in Section 1, describing issues of mismanagement, conflicting policies, and property rights. Following this, a critical research gap in wildlife management options is identified. The research question and objectives are presented in Section 1.2, followed by the justification of the study in Section 1.3. A summary of the research methodology is presented in Section 1.4. Finally, the structure of the thesis is presented in Section 1.5.

1.1 Research Background and Problem Statement

There have been growing concerns and numerous debates about trophy hunting, nature conservation dynamics and indigenous people's welfare, particularly in Africa. Trophy hunting is defined as a 'form of tourism where a person travels outside their place of residence for the purpose of hunting' (Matilarnen and Keskinarkaus 2010, p. 5). Similarly, Lindsey *et al.* (2007, p. 456) describe trophy hunting as hunting by tourists 'typically with the objective of selecting animals with exceptional physical attributes such as large horns, tusks, body size and skull length'. Trophy hunting tourism generates huge amounts of revenue for African governments, which in return support wildlife conservation and the livelihoods of people in the adjacent core protected areas (Lindsey *et al.* 2006; Lindsey *et al.* 2007; Muposhi *et al.* 2016). Trophy hunting is actively practised in 13 African countries, namely: Benin, Burkina Faso, Cameroon, Central Africa Republic, Chad, Ethiopia, Mozambique, Namibia, South Africa, Tanzania, Uganda, Zambia and Zimbabwe (Campbell 2013; Mbaiwa 2017); and as a recreational activity it is considered a legitimate business (Saayman *et al.* 2018). In these sub-Saharan African countries, trophy hunting generates at least US\$ 201 million per annum from the approximate 18,500 international hunting clients (Lindsey *et al.* 2007).

Tanzania welcomes hunters from all over the world (Leader-Williams *et al.* 1996). Revenue from this business in Tanzania, ranges between US\$ 11.2 million and US\$ 36.1 million per year (Lindsey *et al.* 2006; International Union for Conservation of Nature [IUCN] 2016; Booth

2017). Much of this comes from hunting either buffaloes, leopards or lions, which are more popular to be hunted in Tanzania than in other East African countries.

In Tanzania, about 43 percent of the surface land is protected and classified as either National Parks, Game Reserves, Conservation Areas, Forest Reserves, Wildlife Management Areas (WMAs), or Game Controlled Areas (GCAs) (United Republic of Tanzania [URT] 1998; URT 2009). In 1965, trophy hunting tourism was introduced in GCAs including the LGCA. However, in 1973 it was banned all over the country because of malpractice in the industry, but was reinstated by 1978 (Baldus and Cauldwell 2004; Booth 2010). Since then, hunting tourism in Tanzania has suffered from further malpractice, including problems associated with administration and management.

The LGCA is adjacent to the famous Greater Serengeti Ecosystem (GSE) in the east, which is the largest African ecosystem with diverse wildlife species and it is comprised of the world-renowned protected areas such as Serengeti National Park and Ngorongoro Conservation Area in Tanzania and Maasai Mara reserve in Kenya. It is part of the migratory corridor of over 2.5 million wildebeests and other big mammals between the Serengeti National Park (SNP) and the bordering the Maasai Mara reserve in Kenya. Trophy hunting, was introduced here by the government in the 1990s, but is affected by the lack of well-defined property rights, undisclosed hunting leases, poor stakeholder consultation, and allegations of corruption (Tanzania Natural Resource Forum [TNRF] 2011; Mwakaje *et al.* 2013). Recently, the LGCA has attracted many investors in both trophy hunting and ecotourism ventures (Ojalammi 2006; Kitabu 2013; Burgoyne and Mearns 2017).¹ For example, AndBeyond Safaris and Thomson Safaris which both offer ‘photographic safaris’ have invested the most in the village land areas of the LGCA, while the Otterlo Business Corporation (OBC) (based in the United Arab Emirates has invested in ‘trophy hunting’ (Gardner 2007; TNRF 2011; Rurai 2012). The co-existence of investors from these two starkly different tourism businesses - photographic safaris and trophy hunting – but located on the same village lands within the LGCA has triggered a major land-use conflict in Loliondo regarding land ownership, access and control. This conflict is now long-standing and has negatively affected all stakeholder activities, including trophy

¹ ‘Ecotourism’ is defined as ‘a nature tourism that contributes to conservation, through generating funds for protected areas, creating employment opportunities for local communities, and offering environmental education’ (Boo, 1991b, p. 4).

hunting investment, ecotourism, wildlife management, biodiversity conservation and pastoral livelihoods in the area (Rurai 2012; Yesaya 2014; Bartels *et al.* 2017).

One of the underlying causes of the above situation is the lack of clearly defined ownership rights to both land and natural resources in the LGCA. There are conflicting claims being made by villagers, investors and the state, which have resulted from conflicting policies evident in the *Village Land Act of 1999* and the *Wildlife Conservation Act of 2009* (Ojalammi 2006; TNRF 2011). Of concern has been the outcome of the lack of government recognition for some Maasai traditional villages which existed in the Loliondo area (after they were evicted from the Serengeti) when the LGCA was gazetted as a GCA in the 1970s. However, according to *Village Land Act of 1999*, following re-mapping of the LGCA in the 1990s, official village land registration certificates were offered as the legal document for ownership of this village lands. Despite this, the government subsequently allocated the whole LGCA land areas as a trophy hunting block to OBC (Nelson 2003).

As revealed by Gaston (2003), many weaknesses exist in the legislative framework governing village land allocation and tourism investment in Tanzania. Firstly, LGCA villagers were not adequately consulted during land allocation for tourism investments. Secondly, there was a lack of user rights of wildlife resources and direct benefits from tourism by communities. Thirdly, there was a lack of a clear institutional arrangements and poor participation from the local communities in wildlife management. These have all led to disagreements between investors and local communities adjacent to protected areas, in the LGCA. As a result, there have been increased levels of encroachment for settlement and pastoralism on the conservation areas. In July 2009, the government forcefully evicted Loliondo residents from the area set to be used for trophy hunting, which resulted in public protests and resistance from local and international human rights activists (Kitabu 2013; Dekker *et al.* 2020). These protests have resulted in ongoing violent evictions, leaving the Maasai displaced and dispossessed of their land and livelihoods (Mittal and Fraser 2018; Fraser 2019; Weldemichel 2020). Therefore, in order to understand these conflicting issues, it is important for research to be conducted to enable suitable policies and actions to be developed that will reflect and incorporate the competing interests of the various stakeholders, and to understand the wildlife management options available to the LGCA. There is also a need to involve the community in decision-making and the evaluation of realistic operational policies and practices, particularly for wildlife management and land use in the area.

There are many decision-making tools that can be employed by researchers to assist in such evaluations. For example the multi-criteria analysis (MCA) identified by Redpath *et al.* (2004) and Kiker *et al.* (2005) is an effective tool for stakeholders as it enables the evaluation of different wildlife management options in complex management scenarios, such as in the LGCA. MCA can be adopted to explore and evaluate the complexity of issues that involve stakeholders with different interests such as pastoralism, ecotourism and trophy hunting.

To date there is a shortage of studies that have undertaken such evaluations, and thus there is scant literature on the problems inherent in Loliondo's wildlife management problems. Many empirical studies have been undertaken in the LGCA in relation to land-use conflicts, land tenure and livelihoods of the Maasai pastoralists (Homewood *et al.* 2001; Nelson 2003; Nelson and Ole-Makko 2005; Malpas 2005; Ojalammi 2006; Brockington *et al.* 2008; TNRF 2011; Benjaminsen *et al.* 2011; Rurai 2012; Gardner 2012; Yesaya 2014; Bartels 2016; Silisyene 2018; Fraser 2019; Dekker *et al.* 2020). For instance, Brockington *et al.* (2008) and Benjaminsen *et al.* (2011) focused on neo-liberal environmental policies and wildlife conservation governance, while Malpas (2005), Bartels (2016), Mayunga (2018), and Kija *et al.* (2020) all highlighted the key issues related to livestock and wildlife co-existence, conservation-led displacement, land-use change and land-use compatibility. Yet, little has been done in relation to evaluating alternative policy options for the management of wildlife. This thesis argues that the evaluation of alternative policy options for sustainable wildlife management and livelihoods is the key to addressing the problem at the LGCA. This study therefore primarily seeks to evaluate appropriate policy options for the management of trophy hunting in the LGCA, taking into account economic, social-ecological and cultural impacts of these options.

1.2 Research Question and Objectives

This thesis explores alternative wildlife management options and identifies the most preferable option for the LGCA. To this end, the thesis seeks:

- 1) to examine the impacts of the current trophy hunting scheme on all stakeholders in the LGCA.
- 2) to explore alternative policy options for sustainable trophy hunting in the LGCA.

- 3) to assess the impacts of each of the alternative policy options available in the LGCA.
- 4) to analyse the most appropriate policy option that will benefit stakeholders in the LGCA.

1.3 Justification for the Research

This study addresses some gaps in the current literature relating to the evaluation of wildlife management options in areas adjacent to protected areas, through the application of the MCA technique. This section thus presents a summary of gaps in the research and demonstrates how this study addresses these shortfalls.

The literature on Community-Based Natural Resources Management (CBNRM) adjacent to protected areas, particularly in Africa, is growing, and there is a significant literature on trophy hunting and ecotourism schemes (Baker 1997; Long 2002; Lindsey *et al.* 2007; Lovelock 2007; Manyara and Jones 2007; Leader-Williams 2009; Mitchel and Ashley 2010; Mbaiwa and Stronza, 2010; Kaswamila 2012; Lindsey *et al.* 2013; Mwakaje *et al.* 2013; Loveless 2014; Lamers *et al.* 2014; Stone and Nyaupane 2014; Nthiga *et al.* 2015; Bluwstein *et al.* 2016; Moyo *et al.* 2016; Burgoyne and Mearns 2017; Mbaiwa 2017; Muposhi *et al.* 2017; Kicheleri *et al.* 2018; Melubo and Lovelock 2019; Wilfred 2019; Mawi and Mashenene 2020). However, there is an ongoing debate about the socio-economic and ecological viability of trophy hunting vis-à-vis ecotourism in areas adjacent to protected areas. There are those in favour of trophy hunting as an ecologically and economically feasible wildlife management option, and there are others who argue that ecotourism is the more ethical and profitable activity rather than trophy hunting. In the LGCA, it has been argued that trophy hunting is economically viable, but it is less valuable to the local communities mainly due to the management complexities and the lack of direct benefits to the local communities (TNR 2011; Mwakaje *et al.* 2013; Dekker *et al.* 2020). This study contributes to this debate by evaluating alternative options using various criteria for managing wildlife in the LGCA, including trophy hunting and ecotourism.

There is also a growing concern about trophy hunting tourism schemes, conservation and the welfare of indigenous people adjacent to protected areas in village lands. In Tanzania, a number of scholars have long bemoaned the poor participation of local communities, complexities of ownership, poor governance, unequal benefit-sharing, and lack of clear policies and institutional framework in WMAs adjacent to protected areas (Lindsay *et al.* 2006; Wilfred

2010; Benjaminsen *et al.* 2013; Loveless 2014; Bluwstein *et al.* 2016; Moyo *et al.* 2016; Bluwstein *et al.* 2017; Booth 2017; Kicheleri *et al.* 2018; Wilfred 2019). This study thus contributes to these concerns by examining trophy hunting tourism as a viable form of land-use and wildlife management which can financially support conservation adjacent to the protected areas under a joint venture partnership. Furthermore, some scholars have been critical of the ‘one-size-fit-all approach’ which for example has seen the combination of several villages and communities into one CBNRM programme (Stone and Nyaupane 2014; Kicheleri *et al.* 2018). This calls for additional insights into examining community-based programmes established on village land which is under control and authority of the village. This study thus contributes to this by examining the nature of the villages and communities under a joint venture tourism scheme in the LGCA.

There is a scarcity of MCA theoretical and empirical literature in wildlife management, although the literature on the application of MCA in Natural Resources Management (NRM) has been growing (Janssen 1992; Hajkowicz *et al.* 2000; Mendoza and Prabhu 2003; Kangas *et al.* 2005; Mendoza and Prabhu 2005; Wolfslehner *et al.* 2005; Kangas *et al.* 2006; Messner *et al.* 2006; Balana *et al.* 2010; Juutinen *et al.* 2011; Khadka and Vacik 2012; Nijkamp *et al.* 2013; Baral *et al.* 2019; Nyongesa and Vacik 2019). Nonetheless, there is a limited application of MCA studies in wildlife management, particularly in Africa where wildlife occurs mostly in areas where local communities live (Redpath *et al.* 2004; Zia *et al.* 2011; Mustajoki *et al.* 2011; Zia *et al.* 2015). Although Zia *et al.* (2011) and Sanare *et al.* (2015) have applied MCA to evaluate core protected areas management options at both Ruaha and Serengeti National Parks in Tanzania, there have been no previous applications of MCA to the management of wildlife adjacent to core protected areas. This is a significant gap in the research and thus potential policy responses because many communities live outside core protected areas in Tanzania. This study therefore addresses this gap by applying MCA to the evaluation of preferable wildlife management options in the LGCA.

There is also limited involvement of stakeholders in the MCA decision-making process in the current NRM literature. Stakeholder analysis and involvement is an important component of the MCA process as stakeholders have the power to influence decision-making (Harrison and Qureshi 2000; Proctor and Drechsler 2003; Messner *et al.* 2006; Ananda *et al.* 2007). Also, effective stakeholder participation in the decision-making process contributes to agreed objectives and expectations, transparency, equity, and representation (Buchy *et al.* 2000).

Participatory MCA was developed to address the limitations of the traditional MCA techniques, which relied on experts to evaluate problems and decision-making (Zia *et al.* 2011; Khadka and Vacik 2012; Zia *et al.* 2015; Favretto *et al.* 2016; Baral *et al.* 2019; Nyongesa and Vacik 2019). Despite growing interest in participatory MCA, the involvement of a wide range of stakeholders in the whole process of MCA remains limited, thereby limiting the effectiveness of stakeholder participation in the whole process of decision-making. This study thus seeks to address this limitation by undertaking a thorough analysis of stakeholder groups in the LGCA, and interactively involving stakeholders from different backgrounds, experiences, and expertise in all processes of decision-making.

Additionally, there is limited application of community surveys in the MCA framework. Previous studies have applied mainly focus group discussion (FGD) workshops in the process of MCA to elicit stakeholder information (Zia *et al.* 2011; Khadka and Vacik 2012; Favretto *et al.* 2016; Baral *et al.* 2019; Nyongesa and Vacik 2019). Yet, the FGD workshops often require the community to participate only after the experts have made the technical decisions. Other scholars have applied Delphi surveys, Decision analysis interviews, Nominal group technique, and deliberative approaches such as a Citizen Jury (see for example, Mustajoki *et al.* 2011; Scolozzi *et al.* 2012; Srdjevic *et al.* 2013; Proctor and Drechsler 2003; Sell *et al.* 2007; Ananda 2007; Jozi and Ebadzadeh 2014). However, there is limited application of community surveys in the MCA framework. The use of FGD and other methods are fettered with many limitations since they exclude the majority of the individual local community members from participating in the decision-making process. Moreover, the current literature has revealed some weakness in these supporting techniques, such as the lack of willingness to participate, under-representation of stakeholders, and limited public participation in decision-making. Thus, there is a need to go beyond these techniques to adopt more inclusive and representative techniques, such as community surveys in the MCA framework. This study thus contributes to the MCA theoretical and empirical literature in wildlife management by complementing and corroborating MCA results with cross-sectional data from local communities using a community survey. Such an application of a community survey will significantly contribute to the effective incorporation of public interests, perceptions, and preferences in the MCA process.

Moreover, the existing literature is deficient in MCA empirical studies that adopt a property rights approach to analyse wildlife management in areas adjacent to protected areas. There are

numerous theoretical and empirical studies on property rights in natural resources existing in the extant literature (Pearse 1988; Pearse 1990; Bromely 1991; Ostrom 1992; Schlager and Ostrom 1992; Kundhlande and Luckert 1998; Ribot and Pleuso 2003; Galik and Jagger 2015). However, MCA studies that adopt a property rights approach to analyse wildlife management is limited. This is worrying since Mustajoki *et al.* (2011) and others have rightly suggested that when dealing with natural resources conflicts which involve property rights, it is important to address the issue of property rights before proceeding to MCA decision-making (Saarkoski *et al.* 2013). If such an important element is missed, MCA results will be groundless and conflicts will persist after making the decision. However, with the exception of a few scholars (Rodriguez-Dowdell *et al.* 2007; Saarkoski *et al.* 2013; Favretto *et al.* 2016), the issue of property rights has not been explored in MCA studies. In the case of the LGCA, none of the existing empirical studies have adopted the MCA and a property rights approach. For instance, most of the studies undertaken in the LGCA area have focused on land-use disputes, framing conflicts, political ecology, rangeland management, conservation conflicts, and wildlife management (O'Malley 2000; Homewood *et al.* 2001; Nelson and Ole-Makko 2005; Ojalammi 2006; Kivelia 2007; Rurai 2012; Benjaminsen *et al.* 2013; Kileli 2017; Bartels *et al.* 2017; Silisyene 2018; Fraser 2019; Dekker *et al.* 2020). This study thus employs the property right framework proposed by Pearse (1990) to analyse the issues of natural resource conflicts in relation to wildlife management in the LGCA.

1.4 Research Methodology

This study was conducted in selected villages in the Ngongorong District, Loliondo Division, in the northern part of Tanzania. The villages are those affected by wildlife and land-use conflicts including Ololosokwan, Soitsambu, Arash, Oloipiri, Maaloni and Olorien.

The study applied MCA as the main method for analysing policy options for the management of the LGCA. A FGD was the main method used to elicit information from the participants, comprising both stakeholders and experts. Semi-structured questions were presented to all participants during the FGD meetings from August to November 2018 in the LGCA. The MCA process involved defining the problem, identifying options and criteria, weighting criteria, scoring options against the criteria, aggregation, sensitivity analysis and deliberation of the results by decision makers. The study applied the rating method in weighting criteria and weighted summation to aggregate the results. The maximum standardization method was

applied to standardise criteria scores. The Decision on Finite Set of Alternatives (DEFINITE) software was used to analyse the results obtained from the FGD to determine the preferred wildlife management option for the LGCA.

This study also used a community survey for collecting information to complement and corroborate MCA results. A cross-sectional survey design was adopted which enabled the researcher to examine the perception and preferences of local communities concerning wildlife management options and associated property rights. The population sampled involved pastoralists, farmers, agro-pastoralists, and individuals involved in ecotourism from the six villages in the LGCA. Purposive sampling was used to select the six villages based on their involvement in wildlife conservation, pastoralism, trophy hunting, and ecotourism. The study applied simple random sampling to select 330 households from the village register.

A pilot survey was conducted for 15 household respondents from Ololosokwan, Soitsambu, and Oloipiri. The pilot survey helped to ascertain and improve the content validity and reliability of the instruments. A questionnaire was administered through face-to-face interviews to collect data on trophy hunting and ecotourism concessions, wildlife management options, and property rights to land and natural resources for the stakeholders in the LGCA. The household survey data were used to triangulate the MCA results and to address the objectives of this study. The Statistical Package for Social Sciences (SPSS) software was adopted to analyse the survey data. The study used descriptive statistics, Mann–Whitney *U*-test, chi-square, and *t*-test to analyse the data and report the results from the community survey.

1.5 Structure of the Thesis

This thesis is organised into eleven chapters. Chapter 1 as above has introduced the main issues and background to the study. Chapter 2 presents a description of the study area, which includes its location, demography, climate, topography, and economic activities. It then presents the ecology of the study area showing its unique potential for trophy hunting, ecotourism and pastoralism. In addition, a brief history of Maasai pastoralists in the study area and wildlife conservation is presented here. The chapter then proceeds with an analysis of the important current land-use types, including trophy hunting, ecotourism, farming, conservation, and livestock grazing. It also shows the compatibility and incompatibility of these land-use types in the study area.

Chapter 3 analyses the property rights regime, wildlife, and land-use conflicts in the LGCA. An in-depth analysis and discussion of the land tenure system and associated property rights are presented. The chapter then discusses the characteristics of property rights in relation to wildlife management and Maasai land-use in the LGCA, followed by a discussion on how property rights have influenced livestock grazing, trophy hunting and ecotourism in the study area. Finally, the chapter provides an overview of natural resource disputes relating to ill-defined property rights and appropriate natural resources conflict resolution strategies.

Chapter 4 presents and discusses trophy hunting tourism and wildlife management in areas adjacent to core protected areas in Tanzania. The chapter builds the conceptual foundation for this research by reviewing empirical studies and theories relating to the research objectives. It examines the economic contribution of trophy hunting to conservation and local communities' livelihoods. Furthermore, the chapter presents in brief challenges to the management and administration of trophy hunting adjacent to the core protected areas. The chapter finishes by describing the community-based conservation approach and wildlife management in Tanzania.

Chapter 5 presents the MCA methodology adopted for undertaking this research. The chapter presents the MCA methods, which have been developed and adopted in discrete MCA studies. It then presents a detailed conceptual description of the MCA procedure, methods and associated software package. The chapter proceeds with a discussion about the appropriateness of MCA for this study and justification of applying a community survey, which was used to allow local community members who are not leaders or experts, to participate in decision-making at the LGCA. This chapter forms the conceptual basis of the empirical procedures applied later in Chapter 7.

Chapter 6 presents a systematic literature review of studies using MCA in natural resource management (NRM). The chapter analyses current MCA empirical studies in NRM and identifies gaps by examining stakeholder engagement, methods for eliciting information from stakeholders, nature of options and criteria, and the MCA methods applied. In addition, the review analyses the application of the property rights approach, ecosystem services, spatial MCA and a community survey. The chapter then discusses the strengths and limitations of the reviewed empirical studies, which are addressed by this study using the LGCA problem as a case study.

Chapter 7 is, an account of how the methodological concepts presented in Chapter 5 are applied in the study. It presents the application of FGD and a community survey in the MCA framework, which is followed by a detailed description of the application of the MCA method and how stakeholders and experts were engaged in all process of making decision. The chapter proceeds with a description of the application of the cross-sectional survey using a household questionnaire to collect data to support MCA modelling results. The target population of the stakeholders involved in this study (particularly the Maasai communities in the LGCA) are described. The sampling procedure which was applied to determine the sample size is discussed in a wider context. The chapter then discusses the procedures adopted for collecting and analysing the data.

In Chapter 8, empirical results of the MCA in wildlife management at the LGCA are presented. The results of the four wildlife management options and twelve criteria selected by stakeholders and experts for evaluation are presented. A detailed description of the criteria weighting, scoring, aggregation, and results of a sensitivity analysis are also presented. The chapter then presents the graphical results of the MCA evaluation undertaken by decision makers.

Chapter 9 presents the empirical results of the community survey on wildlife management options. It presents the results on the demographic characteristics of the respondents, followed by the status of land-use, trophy hunting and ecotourism schemes. It then presents the results of land-use tenure, property rights and wildlife management at the LGCA. This chapter then provides the views of respondents on their preferred options and the ecological, economic and socio-cultural implications for wildlife management options and land-use at the LGCA.

Chapter 10 discusses both the MCA and survey findings presented in Chapters 8 and 9 respectively. The discussion of wildlife management under the current option and its implications are presented. It then presents a discussion about the alternative policy options and the most preferred option for managing wildlife at the LGCA.

Finally, Chapter 11 provides a summary of the study findings, outlines the contribution of this study, discusses the policy implications, mentions the limitations of the study and provides recommendations for further research.

Chapter 2. History of Land-Use and Wildlife Conservation in LGCA

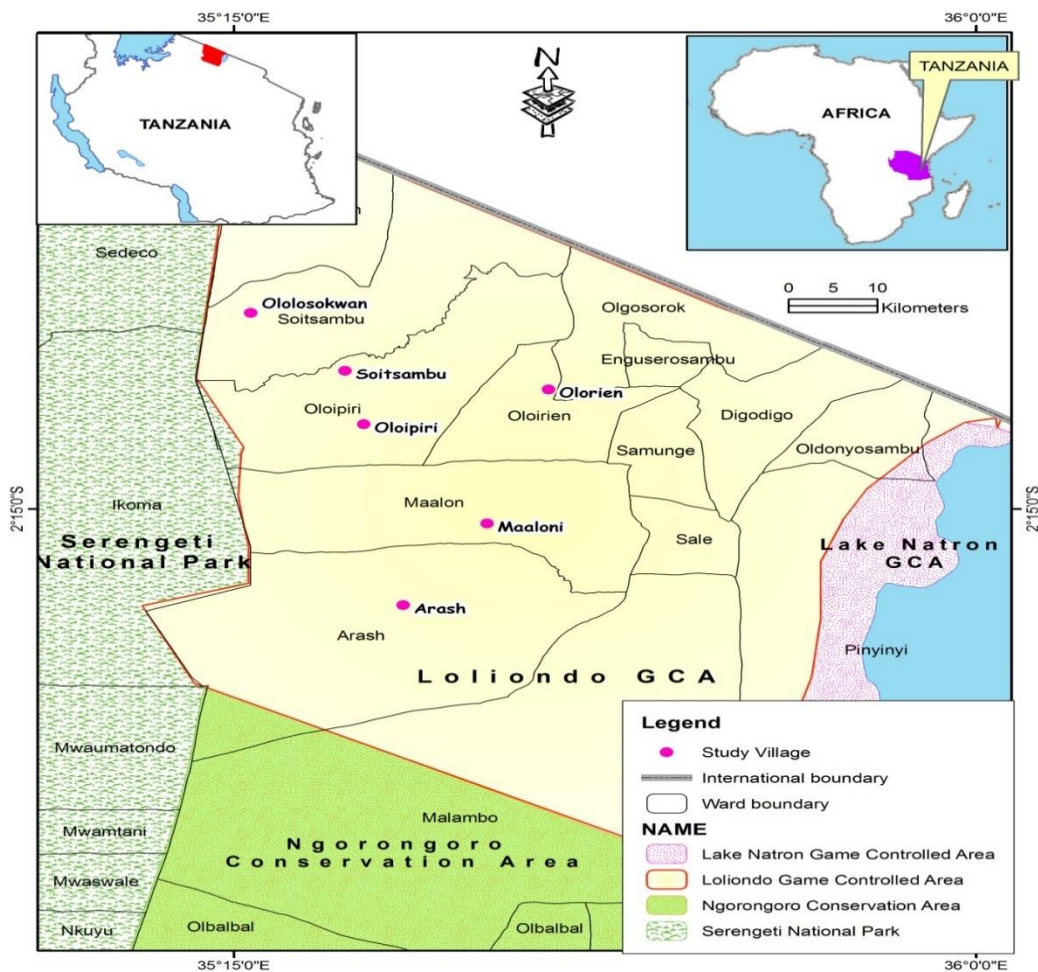
This chapter introduces and gives an overview of wildlife management and land-use in the LGCA. Section 2.1 presents information on the location, demography, institutional framework, climate, soil topography, hydrology, and biodiversity in Loliondo. Section 2.2 gives a brief history of the Maasai community in LGCA to generate an understanding of the society's formal and customary land tenure in relation to wildlife conservation in Loliondo. In Sections 2.3 and 2.4 the various land-uses including for livestock grazing, agriculture, trophy hunting, ecotourism, and wildlife conservation are analysed in relation to their economic viability and compatibility. Lastly, Section 2.5 summarises the key issues discussed in the chapter.

2.1 Location and Geographical Characteristics of the Study Area

The LGCA is a Maasai community concession and hunting block located within the Loliondo Division of the Ngorongoro District, in the Arusha Region, of northern Tanzania. The Loliondo Division is divided into two hunting blocks, the South and North blocks. The northern block is where there is competition between wildlife management and land-use, and is thus the focus of this study. The Loliondo Division is also comprised of three wards, namely Olgossorok, Arash, and Soitsambu. These wards are further divided into nine villages, which are Loliondo, Sakala, Wasso and Engaserosambu in Olgossorok ward; Loosoi, Olorien and Arash in Arash ward; and Soitsambu, Ololosokwan, and Oloipiri in Soitsambu ward (See Figure 2.1 below).

The Ngorongoro District covers an area of 15,026 km² with many protected areas, including Conservation Areas, GCAs, Forests Reserves, Biosphere Reserve and Archaeological Reserves. The District is divided into three divisions, namely Sale, Ngorongoro, and Loliondo. The headquarters of the Loliondo Division is Loliondo Town. The study area covers an area of 4,000 km² within the Loliondo Division and is rich in biodiversity, with enormous potential for both ecotourism and trophy hunting. The Loliondo Division is bordered by two districts of Northern Kenya (Kajiado and Narok), while on the West it borders SNP. To the East, Loliondo borders Sale division and Lake Natron. To the South, it faces the highlands of the Ngorongoro Conservation Area.

Figure 2.1 Location of the study area in the LGCA



Source: Geographical Information System Laboratory at the IRA (2019).

The Loliondo area is characterised by a semi-arid climate. The minimum annual rainfall ranges from 400 mm to 1500 mm (National Land-Use Planning Commission [NLUPC] 1987), while the mean annual temperature ranges from 16°C to 20°C (O'Malley 2000). The area experiences a mixture of warm and dry weather with cooler months from June to October due to rainfall and temperature variations. However, the temperature decreases to about 10°C between June and October, and gets warmer from December to February, averaging 30°C. Moreover, Loliondo's altitude ranges between 1,500 m and 3,000 m (O'Malley 2000; Ojalammi 2006). The climatic seasons in Loliondo determine the availability of resources, annual cycles of livestock, and wildlife grazing, and thus have an impact on ecotourism and trophy hunting activities. During the wet season, livestock grazing occurs in the southern part in range reserves near Maasai settlements, whereas, in the north-western part, grazing takes place adjacent to SNP during the dry season. In contrast, the same movements are naturally perpetuated by

wildlife between SNP and the Maasai Mara Reserve. From December to March, they migrate to the southern plains of the Serengeti, which are adjacent to the park in Loliondo (Homewood and Rodgers 1991).

Currently, an unreliable precipitation cycle largely determines water availability, livestock grazing, and small-scale farming in Loliondo. Recurring precipitation failures in Loliondo have resulted in continual drought, which has affected the availability of pasture that has resulted in land-use competition between wildlife and livestock. Thus, the sustainability of both wildlife and livestock in the entire ecosystem is largely dependent on seasonal rivers, such as the Pololeti and Grumeti Rivers. Due to its relative proximity to SNP, and with these two rivers, Loliondo, serves as a catchment area for many animals and hosts much of the biodiversity of the Serengeti Greater Ecosystem (SGE) (O'Malley 2000). There is diverse flora (vegetation) and fauna (animal) species, similar to those found in Serengeti and Ngorongoro, and this includes diverse wildlife such as carnivores, herbivores, omnivores, birds, reptiles and small mammals (Homewood and Rodgers 1981; Sinclair and Arcese 1995). The wildlife in the area includes the so-called 'big five' which refers to wildlife species in Africa that trophy hunters consider the most challenging and dangerous to hunt on foot, such as Cape buffalo (*Syncerus caffer*), African Elephant (*Loxodonta africana*), Lion (*Panthera leo*), and the Leopard (*Panthera pardus*). The last of the 'big five', Black rhinoceros (*Diceros bicornis*), is however an endangered species, and is no longer found in the LGCA (Leader-Williams *et al.* 1996). There are over forty wildlife species in the LGCA, some are non-migratory inhabitants including hartebeest, zebra, Grant's gazelle, Thomson's gazelle, eland and topi (O'Malley 2000). In addition, there is seasonal migration of over 2.5 million wildebeest and other ungulates to the Loliondo area for grazing in the dry season (between December and March). Both the seasonal migratory and permanent wildlife species co-exist effectively with livestock grazing on village land, since they have different feeding preferences (Homewood *et al.* 2001; Bartels *et al.* 2017).

The LGCA is thus unique in biodiversity and the abundance of wildlife has triggered investment in both ecotourism and trophy hunting, giving both activities potential. Vegetation cover is distinct, determined by edaphic and non-edaphic factors in Loliondo. Soils are one of the edaphic factors which determine vegetation growth in the area, particularly forests and grazing pastures. The geology of Loliondo also determines the types of soil available in the area. The Pre-Cambrian metamorphic basalt rock underlying the area consists of gneisses,

migmatites, granodiorites and, most important, quartzites. Most of the area in Loliondo has black vertisols and red clay soils (oxisols or latosols), the latter being rich in iron and aluminium, which makes it unfavourable for extensive agriculture (Tanganyika Atlas 1948; Birkeland and Larson 1989; O'Malley 2000).

The vegetation in Loliondo is confined to two main zones, which are open grassland and Savannah woodland. The grassland in the highlands includes small brush plants, such as salvia (*Salvia merjamie*), lupine (*Lupinus princei*), and trefoil (*Trifolium assaiense*) (O'Malley 2000). Additionally, several species of acacia (Commiphora woodland) such as *Acacia tortilis*, *Acacia drepanolobium*, and *Acacia mellifera* are dominant in Loliondo and the southern part of SNP (Ojalammi 2006). Tall grass and broad-leaved trees dominate the north-western part of Loliondo while the upper part of the Loita hills is dominated by montane forest reserves (Watson *et al.* 1969; NLUPC 1993). The Loliondo forest reserve lies in the mountains south of the village forest with limited access to and use of the resources by villagers. The forests are evergreen, dominated by species such as olmoljol (*Fagaropsia anglolenis*), loliondo (*Olea welwitschii*), bamboo (*Arundinaria alpina*) and cedar (*Juniperus procera*). Furthermore, in the southern part of Loliondo, there are short grass plains that are highly productive during the rainy season. The grass plains are important as wildebeest feeding and breeding grounds (Sinclair and Arcese 1995; Bartels 2016). Vegetation in Loliondo is an important component of the complex ecosystem fostering both hunting and livestock grazing, while creating habitats for many wildlife species in the area.

2.2 History of Maasai Pastoralists, Land-Use and Wildlife Conservation in Loliondo

The Maasai make up the majority of the population in Loliondo. Only a few people are non-Maasai, including some migrants, such as the Chagga and Wambulu, who migrated in the area to farm and run small businesses. The Maasai settled in Loliondo Division after they were evicted from the Serengeti. Since then, the population of the Maasai in Loliondo has increased dramatically. For instance, the recorded population of Loliondo Division in 1967 was 9,884 people. However, this increased to 12,768 in 1978 and further to 21,657 in 1988, a rate of 5.4% per annum (URT 1991; NLUPC 1994). The National Population Census of 2002 revealed that Loliondo Division had a population of 37,714 people with an annual growth rate of 3.9% (URT 2003). The population per village is between 2500 and 4000, and at the ward level there were 12,268 people in Olgosorok; 10,956 people in Soitsambu, and 7,841 people in Arash (URT

2013a). The National Population Census of 2012 indicates that the population at Ngorongoro District Council (NDC) is 174,278 (URT 2013a). Interestingly, the population growth rate in Loliondo is argued by Potkanski (1987) to be above the average growth rate of Tanzania due to the migration (seasonal and annual) of pastoralists. This population increase coupled with its attendant pressure on the ecosystem has created resource-use competition in Loliondo, which has adversely affected the competing socio-economic activities, such as livestock production, photographic tourism and trophy hunting in the area.

The ethnographic and historical background of Maa-speaking people - the Maasai, is well documented in East Africa, including Tanzania (Jacobs 1965; Kituyi 1990; Rutten 1998; Talle 1998), as specialised pastoralists (Marshall 1990). The origin of the Maasai is believed to be from the Kerio Escapement in Kenya, part of the East African Rift Valley. At the end of the 19th century, the Maasa immigrated to the Serengeti plains (which derived its name from the Maasai word *Siringit* meaning ‘endless plains’), located adjacent to Lake Victoria in Tanzania and is currently a National Park. Here the Maasai mixed with other agro-pastoralists and hunter-gatherers (Spear and Waller 1993), and have for over the past half century settled into this region using a traditionally controlled grazing system, coexisting with wild animals (Fosbrooke 1948; Ole-Nangoro 1998).

European colonisation in the 1880s, resulted in many challenges for the Maasai in the Serengeti Region. The first German colonial explorers who arrived in East Africa established their Germany East Africa territory, and their mission was to control the land. During the 20th century, conservation gained popularity, leading to the emergence of the idea of preserving wildlife in parks. The Germans introduced the *Game Preservation Ordinance 1908* and *Game Preservation Ordinance 1911*, to control wildlife in their territory.

After the First World War in 1919, the British colonisers arrived and took over a large area of the former German colonies. They created a new territory known as Tanganyika, now Tanzania. The English were interested in the same resources as the Germans, and targeted the Serengeti Region and other areas in order to control and exploit the land. The British introduced conservation and resource management research, but also allowed trophy hunting (Neumann 1995a). In 1919, the Tanganyika Game Department was established focusing on wildlife preservation in Game Reserves. The *Game Preservation Ordinance 1921* and *Land Ordinance 1923* were respectively formed by the British in their colony. The British Colonial Government

earmarked the Serengeti Plains as their first National Park in Africa (URT 1994; Neumann 1995a). In 1929, some parts of the Serengeti Region were established as Game Reserves (today known as the SNP) following the earlier ordinance of 1921. In 1931, the Society for the Preservation of the Fauna of the Empire triggered the development of preservation programmes in Tanganyika. The London Convention was held in 1933 aimed at protecting flora and fauna by establishing National Parks in all British colonies in Africa, particularly Tanganyika (Neumann 1995a).

In the 1940s, the Tanganyika Government drafted a new *Game Ordinance 1940*, which included a new article for establishing a National Park in the Serengeti Region. The ordinance was approved in 1948, named the *National Park Ordinance 1948*, with strict legal protection for the earmarked SNP (Ole-Nangoro 1998). However, the *Game Ordinance 1940* interfered with the customary rights of the Maasai. Thus, to curtail short-term problems associated with this, the Maasai were deliberately allowed to remain in the Serengeti Region. Consequently, the Serengeti Sovereign Governing Body (the board of trustees) was established and a special administration was set up in 1950 (Tanganyika Territory 1957). However, the board faced the major challenge of Maasai customary rights and so sought possible ways to evict them from Serengeti. After this, the Maasai disputed the proposed boundaries of the SNP because they were denied access to grazing land and other natural resources. In reaction to that, in 1951, stricter conservation ordinances were enforced concerning the SNP. Similarly, there were other Maasai disputes in 1954, concerning user rights to graze livestock in the Serengeti.

Despite these disputes calling for access and user rights, the Serengeti was gazetted as a National Park in 1958, covering an area of 14,763 km² with rigid boundaries (Tanganyika Territory 1957; Tanganyika Territory 1958b). After being gazetted in 1958, the Maasai were still residing in the SNP with their livestock until 1959 when it was re-gazetted by the colonial government due to major changes incorporated in the *National Park Ordinance 1940* (Tanganyika Territory 1958a). This new ordinance regarded all other activities and settlements in the Serengeti as illegal (Tanganyika Territory 1958a). In 1959, the Maasai and non-pastoral groups were evicted from the Serengeti and they subsequently settled in Loliondo.

After gaining political independence from the British on the 9th December 1961, the Tanzanian government introduced the *Wildlife Conservation Act No. 12 of 1974* (URT 1974). The *Act* mandated the establishment of GCAs adjacent to protected areas in Tanzania, including

Loliondo. Consequently, the LGCA was established in an area of 4,000 km² on land traditionally owned by the Maasai pastoralists. Crop cultivation and livestock grazing were allowed in the GCA by the *Wildlife Conservation Act 1974*, signifying a paradigm shift from the past colonial approach of ‘fines and fences’ to manage the protected areas with a more participatory approach.

However, through the *Wildlife Conservation Act of 1974*, the Tanzanian government also introduced commercial trophy hunting with a special permit as a form of wildlife management in the LGCA from 1975 (URT 1974). The Tanzania Wildlife Cooperation, a state-commissioned organisation, through the Wildlife Division, was tasked to oversee hunting in the LGCA and to grant permits. However, due to increased poaching, hunting activities were subsequently banned all over the country until 1978 (Balduş and Cauldwell 2004). During this period in which hunting activities were banned, informal villages were established under the ‘*Ujamaa Policy*’ based on the *Rural Land Act 1973*.² Loliondo was registered as an *Ujamaa* (communal village settlement) under the *Village and Ujamaa Village Act 1975* (Shivji 1998a; Parkipuny 1975; Ojalammi 2006). The policy aimed to create unity, eradicate poverty, ignorance, and diseases by managing and utilising natural resources for sustainable socio-economic development (Nyerere 1974). However, the programme was criticised for weakening indigenous communities control over land and natural resources which resulted into endless land disputes and poverty in Tanzania (Ojalammi 2006).

In the 1980s, Tanzania faced major economic changes under the Structural Adjustment Programmes (SAPs) leading to the concurrent introduction of the *Local Government Act 1982*. This *Act* formed district councils such as the Ngororongo District to administer land management and other socio-economic development activities in villages (Neumann 1995b; Tenga 1992). The Loliondo area was targeted for large-scale farming, such as wheat and barley cultivation. In addition, the government launched the *National Agriculture Policy 1983* and attracted large-scale agricultural investments in the Loliondo Division with more than 100 requests for investment in 1985 and 264 requests in 1989 (Ojalammi 2006). Large tracts of land were thus leased to large-scale agricultural investors leading to widespread Maasai protests and resistance. For instance, in 1984, Tanzania Brewers Limited acquired 10,000 ha

²*Ujamaa*, the Swahili word for extended family, was a social and economic policy developed and implemented in Tanzania by first President Julius Kambarage Nyerere between 1964 and 1985.

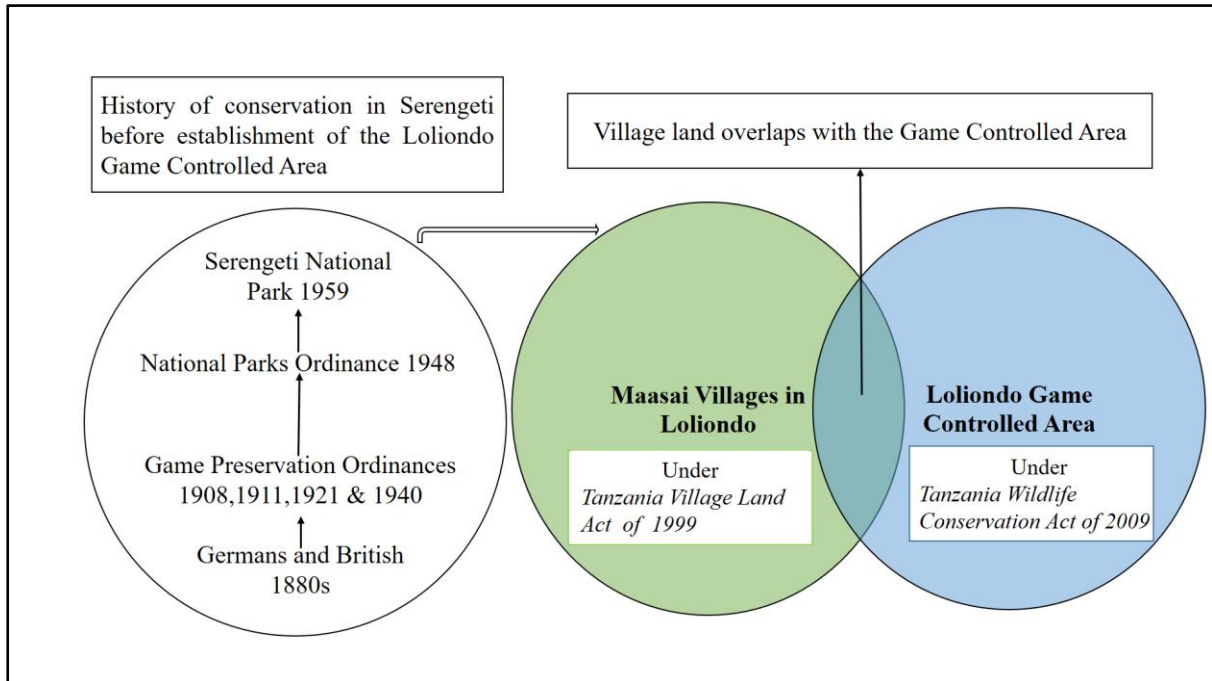
in Sukenya for barley farming, and in 1988 John Aitkenhead a non-Tanzanian investor acquired 20,000 ha for hunting in Soitsambu which was later converted to a farmland. However, the Maasai pastoral communities refused to allow this proposed large-scale agricultural development in their grazing area. Subsequently, Tanzania National Parks (TANAPA) decided to support the Maasai villages at the expense of the existing Loliondo wildlife ecosystem (TNRF 2011). TANAPA, the Ministry of Lands, development activists and communities joined forces to fight for the rights of occupancy in the LGCA. In October 1990, an area of 2,300 km² was surveyed and an official village land registration certificate was offered to nine villages in LGCA for 99 years. As a result, the government passed the *Village Land Act 1999* to formalise village lands in the country, including Loliondo. (URT 1999b; Ojalammi 2006).

In 1993, however, the central government leased the same land to the OBC, giving it an exclusive trophy hunting licence in the LGCA. However, this OBC contract signed by the Tanzania Wildlife Cooperation was revoked after concerns were successfully raised by the Maasai pastoralists that hunting on village land which is under control and authority of the village was contrary to the *Village Land Act 1999* and their customary rights (see Figure 2.2). This became known internationally as the ‘Loliondo Gate Scandal’, meaning the gates were opened for the grabbing of land from the Maasai under the guise of so-called investments in tourism. After this, OBC obtained another five year contract, which prompted litigation by villagers against OBC in April 2000 in Dar es Salaam, albeit unsuccessfully. The impasse between the villagers and the OBC concerning the LGCA was further deepened when the government renewed OBC’s contract in 2007. Meanwhile, the villages had signed contracts with ecotourism companies regarding the same land that was leased to OBC, which then led to confrontation and misunderstanding among the various LGCA stakeholders (Ojalammi 2006; TNRF 2011). As a result in 2009 and 2018 respectively forceful evictions of the Maasai, by the police force and conservation officers left the local pastoral communities dispossessed of their land and the natural resources in Loliondo (Mittal and Fraser 2018).

Despite the unique biodiversity and potential for the LGCA in relation to wildlife tourism (ecotourism and trophy hunting) and conservation, challenges such as encroachment of pastoralists on areas marked for conservation, and the subsequent potential for land degradation also enabled by local population increases, have emerged resulting in a number of conflicts. This has compelled the conservation authorities to suggest the establishment of a community conservation area along the Serengeti border (Institute of Resource Assessment 2001; URT

2003; TNRF 2011). However, this suggestion has not been implemented and as a result detrimental impacts on both wildlife conservation and livelihoods in Loliondo continue.

Figure 2.2 History of wildlife conservation and land-use at Loliondo



Source: Author's Construct (2017).

2.3 Land-Use Types and Systems in Loliondo

Land-use is normally driven by socio-economic, political and environmental factors which govern the livelihoods of individuals entrusted with the resources. It is a product of nature and history determined by the availability of resources and demand in a particular place (Kivelia 2007). The LGCA concession provides unique mixed land-use activities for the stakeholders and the Maasai pastoralist communities in the area.

It is worth noting that the Loliondo village land comes under the *Village Land Act 1999, Rural Lands (Planning and Utilization Act) No.14 1973, Village and Ujamaa Village Act 1975*. Village land is defined in the *Village Land Act No. 5 of 1999* as having three major domains.

- 1) Land which is registered under the *Local Government Act No. 7, Section No. 22 of 1982*,

- 2) Villagers have been living in the area for twelve years or more after being declared a village,
- 3) The land in the named area is designated under administrative procedures or customary laws (Igoe and Brockington 1999, URT 1999b).

However, the LGCA comes under the *Wildlife Conservation Act 2009* (URT 1995; URT 1999b; URT 1999a; URT 2009), which according to its *Section 15*, GCAs are located on village land on which human activities, wildlife management and conservation are undertaken. The LGCA is one of the 42 GCAs in Tanzania where trophy hunting occurs concurrently with other human activities (Moyo *et al.* 2016). Thus, Loliondo has a mixed land-use system. The land-use system involves crop farming, livestock production, wildlife conservation, trophy hunting, photographic tourism, and settlement (see O'Malley 2000; Malpas 2005; Ojalammi 2006; Kivelia 2007; TNRF 2011; Rurai 2012; Yesaya 2014). The dominant land-use in Loliondo is for livestock, and this is the main occupation of Maasai pastoralists with approximately 80 percent of them engaged in transhumance (O'Malley 2000; Malpas 2005; Rurai 2012). Small-scale agriculture is practiced by the remaining 20 percent of the population. Studies by Marshall (1990), Swift (1998), and O'Malley (2000) have categorised the Maasai in the LGCA as nomadic pastoralists who migrate seasonally between wet and dry areas with their cattle. The same cycle is practiced by wildlife between the SNP and the Maasai Mara Reserve from July to March (Homewood and Rogers 1991; Sinclair and Arcese 1995; Galvin *et al.* 2002). These annual grazing cycles of both livestock and wildlife coexist in the Maasai rangelands have done so for over a half century in East African rangelands. Ecologically, the co-existence is significant because the wildlife and livestock have different feeding preferences and therefore can co-exist in the same habitat without directly competing for grazing (Homewood and Rogers 1991; Bartels *et al.* 2017). However, pastoralists are now blamed for causing environmental degradation due to an increased livestock populations and overstocking (Ojalammi 2006). Nevertheless, the economic value of livestock in Loliondo is estimated to be higher than other land-use types (Malpas 2005; TNRF 2011). Despite its importance for Maasai livelihoods and its contribution to the country's GDP, keeping livestock in Loliondo is constrained by other secondary land uses.

Next to livestock rearing is crop farming which has been vital for the livelihoods of rural communities since the introduction of villagization in the 1960s. It was introduced by migrants from different ethnic groups, such as the Chagga, the Wambulu, the Pare, the Nyiramba and

the Sonjo who migrated to Loliondo in search of grazing farming and white-collared jobs (O'Malley 2000; Ojalammi 2006; Kivelia 2007). Crop farming takes place in almost all villages in Loliondo. Maize, millet, beans, potatoes and other vegetables are the seasonal food crops commonly cultivated. The cultivated land is less than 5 percent of all the land in Loliondo and the Maasai semi-arid rangeland. Based on current land-use, more land is being acquired and crop farming is practised as a viable livelihood strategy and a way to overcome food insecurity in Loliondo (McCabe *et al.* 2010; TNRF 2011). It should be noted, however, that the expansion of crop farming in Loliondo is of concern to wildlife conservation since the area is a migratory corridor for wildlife of the GSE (Rurai 2012). Expanded crop production is in competition with livestock grazing during the dry season. Also, the acquisition of land for tourism contributes to the reduction of arable land in the area, thereby mitigating the effects of crop production and livestock rearing in Loliondo (Yesaya 2014), which left to expand would have negative impacts on the scenic and pristine tourism environment offered in Loliondo.

Trophy hunting has been practised in Loliondo since it was declared a GCA in 1974 (Baldus and Cauldwell 2004). The government leased the GCA hunting blocks to OBC in 1992 when it embarked on its economic liberalization policy in the 1990s. The *Wildlife Conservation Act 2009* declared LGCA a trophy hunting area thereby excluding human activities in the area. Since all hunting activities undertaken adjacent to the core protected areas are managed by the state, in the LGCA the OBC pays 75 percent of the block fees to the state while 25 percent is sent to the Ngorongoro District for socio-economic and conservation purposes (Malpas 2005; TNRF 2011).

Ecotourism is another noticeable form of wildlife tourism in Loliondo. As discussed above, as per the *Village Land Act 1999*, Loliondo is regarded as a village land in which utilization, management and control of resources are under the authority of the Village Council. Currently, six companies are involved in ecotourism in the villages, in which lease contracts are signed between individual villages and the investors (see Table 2.1). Despite competition with other land uses, advocates strongly argue that ecotourism is the most viable form of land-use in the LGCA since it generates US\$ 314,500 per year for the villages (TNRF 2011; Burgoyne and Mearns 2017). Land for ecotourism in Loliondo is acquired through the Village Council and investors, after which the Village Assembly discusses all requests and approves them in writing. Later, these are submitted to the NDC and then to the Central Government for final approval (NLUPC 1998; NDC 2010). However, some ecotourism investors have acquired land

through Village Councils without consulting the government investment centre. Yet, acquiring land without involving central government contradicts the *Tanzania Investment Act 1997* (Yesaya 2014).

Table 2.1 Land acquired for ecotourism investment in LGCA

Company	Year acquired	Size (ha)	Location	Current type of land-use
AndBeyond Safari	1993	25,000	Ololosokwan	Camp and photographic tourism
Buffalo Luxury Camp	1993	60	Ololosokwan	Luxury Tourist camp
Leisure Holding	1990	497	Ololosokwan	Photographic tourism
John Aitekenhed Farm	1988	52	Ololosokwan	Photographic tourism
Thomson Safari	1988	12,765	Soitsambu	Camp and photographic tourism
John Aitekenhed Farm	1988	20,638	Soitsambu	Photographic tourism

Source: Ngorongoro District Council (2011).

Aside from the above, wildlife and forest conservation has been ongoing in Loliondo since 1959 when it was declared a conservation area during the colonial era. Some community conservation projects and wildlife conservation research have been undertaken in Loliondo as part of conservation efforts (Maddox 2003; Sinclair *et al.* 2002; Masenga *et al.* 2013; Lyamuya *et al.* 2014; Bartels 2014). Forest conservation is conducted through village forest reserves comprising 87,489 ha in the northern part of Loliondo at Enguserosambu. The forest acts as a catchment area for the SNP, Lake Natron and the Ngorongoro conservation area, and as a habitat for wildlife in the area (Sirima 2015; Silisyene 2018). Similarly, it provides ecosystem services, both wood and non-wood products, for the Maasai living adjacent to the forest. Efforts to conserve forest and wildlife in Loliondo are needed due to the changing forest landscape brought about by increased human population, increased livestock and other socio-economic activities (Sirima 2015; Silisyene 2018). These efforts therefore resonate with the main aim of the *Wildlife Policy 1998* which is to ensure the conservation of biological diversity and sustainable utilization of wildlife resources (URT 1998).

2.4 Land-Use Change and Compatibility in Loliondo

Land-use types and land cover in Loliondo are changing rapidly. This change is currently influenced by different factors, including rapid population growth and increased investment in

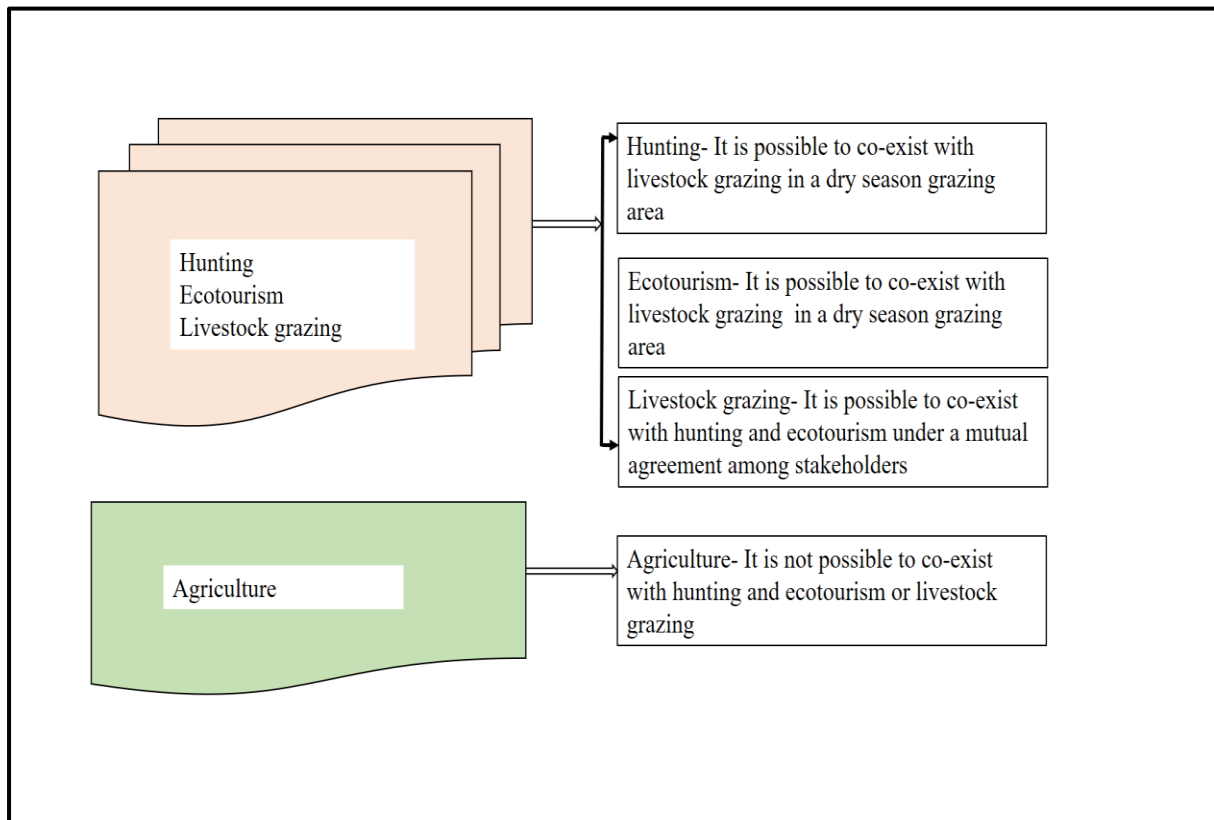
tourism in the area. This situation has affected livestock keeping as a traditional land-use type compatible with other land-uses. It was revealed from LANDSAT TM satellite images that between 2003 and 2009, about 565 hectares of grazing land were converted to open land, while 73 hectares of grassland changed to open land between 2010 to 2014 (Yesaya 2014). Mayunga (2018) found that between 1996 and 2016 land cover has changed markedly in various land types including forest (19.63%), agriculture (8.74%), bare land (15.32%), grassland (50.08%), water bodies (4.51%) and sand (1.72%). Significantly, the forest cover has been shrinking at 1467.81 ha per year compared to agriculture which has been expanding at the rate of 1,467 ha per year (Silisyene 2018). The overall land use and land cover changes revealed significant shrinking of the woodland to other types of land use in the entire GSE (Masao *et al.* 2015; Kija *et al.* 2020). Scholars confirmed that the rapid shrinking of the land use and land cover is due to increase human population, land acquired for agriculture and tourism investment and expansion of settlements affecting the pastoral livelihoods of Maasai and also for wildlife conservation (TNRF 2011; Rurai 2012; Yesaya 2014; Bartels *et al.* 2017; Mayunga 2018; Kija *et al.* 2020).

Ongoing competition over land-use in Loliondo raises the question as to whether the current use of land in the LGCA is compatible with the other socio-economic activities undertaken in the area. Malpas (2005) asserted that trophy hunting, ecotourism, conservation and pastoralism are compatible land-use activities in Loliondo, while farming is incompatible with the rest, particularly on a small scale (see Figure 2.3). Farming is incompatible because it involves destroying the habitats of wildlife and thus the scenic nature for photographic tourism. It is thus also a source of conflict between humans and wildlife.

Hunting tourism may co-exist with livestock grazing in the dry season if the livestock population is kept under control. There is no evidence to suggest that such a co-existence between Maasai pastoralists and wildlife in the LGCA adversely affects wildlife species or decreases biomass (Bartels 2014). Therefore, hunting tourism may coexist with ecotourism, but the activities may influence each other as hunting is undertaken during the peak season of ecotourism in the area (Malpas 2005; Rurai 2012). Cooney *et al.* (2017, p. 14) asserted that ‘photographic tourism and trophy hunting are frequently highly complementary land uses when separated by time or space’.

It should be noted that when undertaking above mentioned land-use activities, compatible uses should be agreed upon by all stakeholders. Hence, to address land-use compatibility in Loliondo, it is necessary to analyse existing policies, stakeholders' interests, types of land use, user rights, benefits to stakeholders, and implications of the land-use types for livelihoods and wildlife management in the study area.

Figure 2.3 Land-use compatibility in LGCA



Source: Adapted from Malpas (2005).

2.5 Summary

The LGCA is a unique Maasai concession that has the potential for both trophy hunting and ecotourism. The Maasai settled in Loliondo after they were evicted from the Serengeti to make way for the establishment of SNP. The introduction of other land-use types has affected livestock grazing, which is the main livelihood activity of the Maasai living in the area. The overlap between the GCA and village land which is under control and authority of the village has been the source of intense land-use conflicts in LGCA for the past 25 years. This has affected both wildlife management and the livelihoods of the Maasai.

Chapter 3. An Analysis of Property Rights and Land-Use Conflicts

This chapter examines property rights, land-use conflicts, and wildlife conservation in Tanzania, with particular reference to the LGCA where conflicts are intense and multidimensional. The chapter highlights how the co-existence of different land-uses without well-defined property rights can become the main source of conflict. In this chapter, it is argued that to achieve the twin goal of conservation and enhancing livelihoods through economic benefits, there is a need to clearly define and enforce the property rights to use land and wildlife resources. Thus, property rights and institutions associated with NRM are examined in this chapter. Section 3.1 presents a theoretical and empirical review of property rights regimes adopted in this thesis. Section 3.2 presents a detailed review of the evolution of property rights to land and natural resources in Tanzania. The rights of the indigenous Maasai to land and resources and those of wildlife are described in Section 3.3. Section 3.4 analyses and presents the characteristics of property users' rights in relation to efficient wildlife management and land-use in Loliondo, such as exclusiveness, transferability, duration, benefits conferred, and comprehensiveness. In Section 3.6 the chapter finally briefly examines the disputes on resource-use and the conflicts resolution mechanism in the LGCA.

3.1 Property Rights Regimes and Natural Resources

Property rights and natural resources have been widely discussed in empirical and theoretical studies in relation to land and NRM (e.g. Ostrom 1990; Pearse 1990; Bromley 1991; Schlager and Ostrom 1992; Agrawal and Ostrom 2001; Ribot and Peluso 2003; Galik and Jagger 2015; Sikor *et al.* 2017). In the economics of NRM a property right is defined as 'a claim to a benefit stream that the state will agree to protect through the assignment of duty to others who may covet, or somehow interfere with the benefit stream' (Bromley 1991, p. 2). According to Roman law, the benefit stream is contextualised as '*usus* (the right to use), *abusus* (the right to encumber or transfer) and *fructus* (the right to the fruits)' (Whinston and Segal 2010, p. 2). In his study on economic analysis of forest property rights Pearse (1990) analyses property rights over land and natural resources into five categories, namely, comprehensiveness, duration, benefits conferred, transferability, and exclusiveness, as explained in Table 3.1.

Table 3.1 Characteristics of property rights over land and natural resources

Characteristic	Description
Exclusiveness	The extent to which the holder of the property can claim the sole right to use and benefit from the resources to the exclusion of others.
Transferability	The capacity of the property to be sold or assigned to someone else.
Comprehensiveness	The degree to which the holder of the property has the right to the full range of benefits from the asset.
Benefits conferred	Holders enjoy potential economic benefits from the asset.
Duration	The length of time the property rights extend to, or the length of time the resources will endure.

Source: Adapted from Pearse (1990).

However, a new and comprehensive property rights framework on users' 'bundles of rights' in NRM systems was developed by Schlager and Ostrom (1992, pp. 250–252). This framework consists of five types of rights held by individuals to a particular resource including 'access, withdrawal, management, exclusion, and alienation rights'. The bundles of rights are attached to four classes of users, namely, authorised user, claimant, proprietor and owner. Based on contemporary NRM strategies and the evolution of property rights, Galik and Jagger (2015) suggested a modification of Schlager and Ostrom's (1992) framework to include an additional characteristic, 'alteration' right. Alteration right is defined as 'the ability to change the goods and services provided by the resource.' For example, a change of land-use from grazing to trophy hunting may alter activities, decisions and use of the land.

Furthermore, Kundhlande and Luckert (1998, pp. 7–12) categorised the elements of property rights into 'comprehensiveness, exclusiveness, designated use, duration, allotment type, transferability, fees, operational requirements, operational control, security and size'. The frameworks offered by Pearse (1990) and Kundhlande and Luckert (1998) agree on the characteristics of property rights in that they may lead to efficient allocation and use of natural resources. Therefore, Pearse's (1990) characteristics of property rights over land and natural resources includes transferability, exclusiveness, duration, and transferability. This thesis adopts Pearse's (1990) classification to analyse property rights and current resource-use conflicts in Loliondo to arrive at a resolution and viable option for maintaining equity and managing efficient allocation of the available resources under different regimes.

Bromley and Cernea (1989) described a resource regime as a structure of rights and duties characterising the relationship of individuals to each other concerning the resources they use. These scholars identified four possible resource regimes under which natural resources may be used and controlled. These are state property, private property, common property and open access, as discussed below.

First, state property is a type of property regime where ownership and control over resource use rests in the hands of the state. The state may either directly manage the resources through government agencies or lease them to groups, while rules on access and conservation are enforced by the state (Bromley and Cernea 1989; Bromley 1991). For example, in Tanzania, protected areas such as Government Forests, Game Reserves and National Parks are managed and administered entirely by the state. Similarly, the LGCA concession (which is a state-owned hunting block) comes under the Wildlife Division responsible for wildlife administration and management in Tanzania. A unique characteristic of state property is that it does not occur in its pure form because ownership rights, types of resources, and duration determine the rights of individuals to resources.

Second, private property refers to a type of property, which may be owned by an individual or corporate body (Bromley and Cernea 1989). This type of property embraces many characteristics, such as exclusivity, comprehensiveness, transferability and benefits conferred (Pearse 1990). The owner of the property is legally and socially endorsed by the state to exclude others from using and making decisions over resources within its borders. Private property rights can be perfect or imperfect. The perfect private property regime grants the owner the right to use, transfer, change, possess or destroy the asset leading to efficient allocation of natural resources, while imperfect private property increases level of inefficiency in which the resources may be allocated efficiently but not fairly (Plateau 1996; Heltberg 2002).

Third, the common property right regime refers to the power granted to a particular group (ethnic or clan) to own and have control over the resources. This type of property right regime has finite membership and defined boundaries for members to access the resources (Bromley and Cernea 1989). These members may also have common cultural norms and authority systems, such as the Maasai pastoralists in East Africa, who share pasture-land as a 'common pool' resource with defined rules (DeLuca 2002). Common pool resource management can be categorised as regulated and unregulated resources. The latter is a combination of open access

and common property that lacks conservation rules, which may therefore lead to over-utilization and degradation of the resources (Ostrom 1990; Baland and Plateu 1996).

Finally, open-access property denotes the absence of property rights (*res nullius*). Open access lacks ownership and control, which means that access to and use of the resources is free and unregulated. Therefore, it is susceptible to degradation as hypothesised by Hardin's 'Tragedy of the Commons' (Hardin 1968; Heltberg 2002). Hardin argued that as common-pool resources become open access they are over-exploited and degraded as they lack ownership (Hardin 1968; Ostrom 1990). Similarly, the advocates of the 'commons problem' argue that there is no incentive to conserve common pool resources, which results in inefficient and unsustainable resource uses, because 'everybody's resource is nobody's resource' (Olson 1965; see also Hardin 1968). However, such arguments conflate open access (no property rights) with common (collective property) rights. However, while open access resources have no assigned property rights, rights and rules exist with the common-pool resources. Therefore, property rights and rules help to distinguish between these two. However, if property rights are not properly enforced, common-pool resources may easily assume open access characteristics. For example, most natural resources such as forests, wildlife, fisheries and grazing land have property rights, but they may become 'partial' open access due to weak and unenforced property rights (Ostrom 2003).

3.2 History of Land and Property Rights in Tanzania

Land tenure in Tanzania has a long evolving history. Land and other natural resources were managed under customary tenure before the arrival of the German and then British colonials. Communities lived in indigenous settlements, where resources were managed and shared under territorial rights (Jacobs 1965). The German *Decree 1895 Section 74* sparked the evolution of land tenure in East Africa, including Tanzania where the creation, acquisition and conveyance of 'Crown Land' was adopted. After World War I, the British Colonial Government published the *Land Ordinance Chapter 113, of 1923*, under which the British Governor took control, thereby changing the landscape of customary rights to land and resources (Shivji 1998a). The *Land Ordinance 1923* states that, first, all land is publicly owned and under the control of the state; second, land rights and titles are determined by land uses; third, commoditisation of and speculation regarding land are prohibited; fourth, the right of occupancy entitles the use and occupation of the land (Ojalammi 2006). The British Colonial Government offered *Granted*

Right of Occupancy under the *Deemed (customary) Right of Occupancy* to land (Shivji 1998b; Ojalammi 2006). Individuals, chiefs and native communities were allowed to claim customary rights to their land. Rights to occupancy and ownership of land by local people were recognised under both *Granted Right of Occupancy* and the *Deemed (customary) Right of Occupancy*, but there was no certificate of ownership (Ojalammi 2006). Following the first ordinance, the *Native Authority Ordinance 1926* introduced major changes to traditional land allocation which had been managed by the chiefs and instead vested it in the *Colonial Native Authorities* (Tenga 1992).

Both customary and statutory tenure existed leading to disputes by indigenous people who resisted tenure changes in Tanzania (Ojalammi 2006). This dual tenure system of territorial rights created more disparity in access to land marginalised communities. Here, *Deemed (customary) Right of Occupancy* property rights threatened customary tenure (Fimbo 1992). Similarly, the *Granted Right of Occupancy* brought about changes in customary tenure by creating a path to the expropriation of communal land by the colonial state (Ole-Nangoro 1998). The expropriated land was granted to planters and settlers for cash crop production without compensating the indigenous people. Thus, the subsistence indigenous production system was suppressed and the legal right to land was lost (Tenga 1991).

Tanzania gained independence from the British Colonial Government in 1961 but the colonial land laws continued to operate (Shivji 1998a). The new Government introduced a social policy (*Ujamaa*) to nationalise all land in Tanzania. The colonial model of controlling and disposing of public land was still vested in the President. Based on the first President's socialist policy, the land was converted to 'communal ownership' for socialist cash crop production for export (Fimbo 1992). In 1963, during the neo-liberal socialist era, colonial freehold land tenure was converted to government leasehold (Sundet 1997). Two major *Acts* were passed as the legal basis for converting land tenure (Shivji 1994). These *Acts* included the *Freehold Titles Conversion Act of 1963* and *Government Leasehold Act of 1969*. The government also embarked on villagization under the *Rural Land Act 1973* and the *Village and Ujamaa Village Act 1975*. All these empowered the state to override customary tenure by forming common villages (Ojalammi 2006). The creation of new territories (villages) with defined boundaries ignored existing customary tenure. The territories were changed to collective land ownership under control of village councils as a new form of *Native Authority Ordinance 1923*, thereby conflicting with the existing territorial customary tenure (Sitari 1983; Lerise 1996).

Consequently, customary land tenure rights were revoked in the new villages under the *Land Tenure (Village Settlement) Act 1965* and *Land Acquisition Act 1967* (Sundet 1997). Land allocation under the customary tenure system ended in 1974 and different typologies regarding access, ownership and administration to land and natural resources were introduced. Since then, land conflicts have prevailed, affecting both the customary and statutory land tenure system in Tanzania.

The SAPs promoted by the international financial institutions such as the International Monetary Fund, overrode land tenure during the economic liberalization in the 1980s, when the *Local Government Act 1982* was promulgated. The *Act* vested power for administering land in District Authorities and Village Councils. However, large tracts of land were privatised by the state without involving Village Councils (Hodgson 2001). The SAPs ended the *Villagization Policy of 1974* and the *Agricultural Policy 1983* was formed. In this policy, official land tenure came under the jurisdiction of ‘villages’ with right of occupancy, but existing customary rights were not recognised by law (Ojalammi 2006). Under the SAPs, land was privatised, and the co-existence of customary and state land tenure created loopholes, leading to village land being allocated for large-scale agricultural estates and private investment without compensation.

In the 1990s, the growth of private investment brought about more intense land conflicts in Tanzania. The Presidential Commission of Inquiry into Land Matters was established to analyse the conflicts based on the opinions of village communities countrywide (URT 1994). Several weaknesses, such as policy overlap and lack of land and natural resources access, were exposed based on the previous land regulations. Many endless, unresolved and complex court cases on land conflicts were also revealed, leaving indigenous people landless (Shivji 1994). To address conflicts over village tenure the ‘*Land Tenure Act No. 22, 1992* was ratified by parliament which revoked all the customary rights to land use and occupancy without compensation’ (Shivji 1994, p. 10). The Commission’s results enabled the Ministry of Land, Housing and Urban Development to draft a new *Land Policy 1995*. However, this policy did not address the claims for the revoked customary tenure.

Customary rights to land were again recognised when the *Land Act 1999* and the *Village Land Act 1999* were ratified (URT 199a; URT 199b). This was a remarkable transformation in the customary property rights regime in legal institutions in Tanzania (Plateu 2000; Cousins 2002).

The *Acts* categorically allowed the state to grant statutory rights to a group of people to access and own common property with certificates of customary rights of ownership. Therefore, the *Customary Right of Occupancy and Granted Right of Occupancy* were again enshrined in these new laws. The difference between colonial *Deemed (customary) Right of Occupancy* and the one in question is that the latter grants certificates of ownership. Unfortunately, few villages obtained certificates, because of an ineffective titling bureaucracy (Shivji 2004). The foregoing developments resulted in the co-existence of both *de-facto* and *de-jure* rights to the allocation and use of land, especially the Maasai rangelands.

Currently, according to the *Land Policy 1995*, land in Tanzania is divided into three categories, namely, General Land, Reserved Land and Village Land. These categories are summarised in Table 3.2. Out of the three categories, 70 percent of the land is classified as village land, 28 percent as reserved land and the remaining 2 percent falls under general land. Thus, a large part of the land in Tanzania is considered village land held under customary tenure (Shivji 2004).

Table 3.2 Categories of land in Tanzania

Land category	Definition	Administration
Reserved land	Set aside for conservation	Government sector
Village land	Declared to be village land under the law	Village council
General land	All land that is not reserved or village land	Commissioner for lands

Source: Adapted from Land policy URT (1995).

According to the law, village land can be communal public land, land for an individual family or group under customary law, and land reserved for future communal or individual use (Lerise 1996). Access to village land, particularly for investment, is gained through the ‘Commissioner of Lands under the Village Council’ and the Tanzania Investment Centre (Gastorn 2003, p. 5; Yesaya 2014). In contrast to village lands, all land outside village boundaries is termed general land. General land is controlled by the state for investment and the establishment of protected areas in close proximity to existing core reserve land such as National Parks. However, pastoralists have been using the general land for grazing under customary tenure (Shivji 2004; URT 2008; URT 2009). This situation has therefore created tension between state officials and pastoralists.

3.3 Evolution of Property Rights to Wildlife Resources in Tanzania

Before colonialism, access to wildlife resources by local communities was for hunting for food under customs and rules in the territories. The German Colonial Administration introduced the *Imperial Crown Land Ordinance 1895*, which granted the Colonial Government exclusive rights of occupancy and established the first hunting reserve in 1896 under the Germans (Wanitzek and Sippel 1998). The Crown Land property was owned by the Colonial Governor while local communities occupied land in areas that had customary land rights. Similarly, the management of wildlife resources on Crown Land was under the *Game Preservation Ordinance 1891 and 1911*, which formed protected areas for licensed trophy hunting and the ivory trade. However, customary user rights to wildlife hunting were limited to snares, nets and pits (Nelson *et al.* 2007).

In 1920, when the British took over from the Germans, they declared that all Tanganyikan land was ‘public’ land and customary rights were under the power of the Governor (Shivji 1998a). Game Reserves established during the German era to protect wildlife were enforced by the *Game Ordinance 1921* (Neumann 1998; Neumann 2000). Access to subsistence food by indigenous hunters was also restricted and a special Game Hunting Licence was introduced (Neumann 1998). Furthermore, the *Game Ordinance 1940* and the *National Parks Ordinance 1948* brought about a paradigm shift in property rights and the management of wildlife resources in Tanzania. Under this ordinance, Game Reserves and National Parks were introduced. Traditional subsistence hunting was allowed in Game Reserves, in which hunter-gatherers, such as the Hadzabe, were granted user rights to wildlife. Areas that were termed ‘open access land’ and the Maasai’s ‘common pool’ rangelands were designated for conservation and the preservation of wildlife (Neumann 2000).

The *National Parks Ordinance 1958* prohibited communities from settling, hunting, grazing and cultivating in National Parks (Neumann 1998). Land such as Serengeti and Tarangire rangelands were earmarked for National Parks and protected areas. The Colonial Government had the mandate to access and control land and wildlife resources, while communities were evicted from areas earmarked for conservation. Though customary rights to land remained, this eviction weakened their rights to land and subsistence wildlife resources. In 1959, the ‘*Ngorongoro Conservation Area Ordinance 1959* provided the Maasai with the right to control and manage wildlife in their area’ (Shivji and Kapinga 1998, pp. 8–11). However, in 1968, the

Government Notice No. 269 declared 4,000 km² of the Loliondo land in Ngorongoro District a GCA, in which later the Maasai pastoral communities in Loliondo were granted grazing rights under the *Wildlife Conservation Act 1974*.

The colonial framework of wildlife management and administration was adopted in Tanzania as statutory ownership after independence. Traditional rights, management and access to wildlife resources were extinguished. Hunting was regulated by a special licence granted by a government agency. Special territorial groups such as hunter-gatherers were also restricted from accessing and using natural resources in the area (DeLuca 2002). During villagization and after the *Village Land Act 1999*, many wildlife areas were on communal village land (URT 1999b). However, the state owned and controlled both private and communal land (Shivji 1998). In the mid-1980s, wildlife hunting tourism in GCA concession areas was privatised, although hunting in GCAs continued to co-exist with other human activities on authorised village land with both statutory and customary tenure. However, the ban on all human activities in GCAs by the *Wildlife Conservation Act 2009* created the obligation to establish Community-Based Wildlife Management Areas (CBWMAs) in areas occupied with GCAs in Tanzania.

The *Wildlife Management Areas (WMAs) Policy 1994* (draft) defined WMA as ‘village land set aside for wildlife conservation’ (URT 1998). WMAs are ‘common property’ regimes, in which the management of natural resources is anticipated to encourage conservation and the development of local communities. The *Wildlife Policy 1998* aimed to ‘allow rural communities and private landholders to manage and utilise wildlife on their land for their benefit’ (URT 1998, p. 14). The establishment of WMAs was made legal under documented procedures and regulations, particularly on how communities were to be involved. Both the Village Assembly and Village Council were to be involved based on existing by-laws (URT 2009b). Despite the opportunity to establish WMAs, the procedures for developing them are described as complex and bureaucratic, with few decisions being made by local communities that had insecure user rights (Baldus and Cauldwell 2004; Benjaminsen *et al.* 2013). For example, hunting in WMAs on community land requires a separate application to be approved by the state, and concession areas for investors or hunting companies are also allocated by the state through the Wildlife Division. To complicate issues, section 45 of the *Land Act No. 4, 1999*, vests power in the President to acquire and revoke any land in protected areas for the public interest (URT 1999a; URT 2009). These complications are among the reasons for the unwillingness of local communities in Tanzania, such as the pastoral Maasai, to establish a

WMA on their village land under control and authority of the village. The Maasai are also concerned about the plan to establish a WMA through reallocation of their land, rather than as a result of a community project, and thus it lacks participation and transparency (Ngoitiko *et al.* 2010).

Decentralisation of wildlife management from the state to the community brought about a transformation in property rights, previously unavailable to the communities adjacent to the protected areas (Benjaminsen *et al.* 2013). Yet, this process of decentralisation has gradually reduced the community's right to wildlife (Nelson *et al.* 2007). The *Wildlife Conservation Act 2002* has however mitigated the effects of decentralisation and through the community-based wildlife management approach; communities are now empowered with the right to wildlife resources in their area (Adams and Hulme 1998; URT 1998). Therefore, CBWMAs were designated in order for communities to be able to 'manage and benefit from wildlife on their own land' (URT 1998, p. 30). However, there is some doubt if these new institutions and arrangements will be able to achieve their stated aims, because of the assumption that institutions will provide more power to the state, when it comes to the control and administration of the economic value of wildlife (Agrawal and Ostrom 2001). This shows that a major policy issue to be addressed is the need to promote the legal customary rights of people to access and use wildlife resources. Therefore, to Benjaminsen *et al.* (2013, p. 20) if a 'CBWMA is [seen by the government as] the final compromise, it is likely to be a CBWMA designed along the lines that enable greater local decision-making and pastoral land-use'. However, CBWMAs have not been developed along participatory lines, and conflicts have persisted over land-use rights, wildlife resource use and the establishment of protected areas in Tanzania (Brockington and Igoe 2006; Nelson 2010).

3.4 Property Rights to Maasai Pastoralists Rangelands

The Maasai is the largest nomadic pastoralist ethnic group in Tanzania. Grazing is their major livelihood activity in arid and semi-arid areas. They practise spatio-temporal grazing between dry and wet seasons (Cassanelli 1982; DeLuca 2002; Ojalammi 2006). The nomadic system allowed colonialists to perceive the Maasai's land as barren, uninhabited and underutilised (Goldman 2003). The right to land by Maasai pastoralists in Tanzania has changed over time. Before colonialism, the Maasai lived in customary pastoral territories, known as 'landscapes',

which were shared for productive activities. Their customary rights gave them access to pastoral resources (Ingolds 1986).

According to Kaare (1996), pastoral land tenure falls under the two categories of territorial and domain. Territorial land tenure is defined by jurisdiction of the state or community, while domain land tenure is under customary control. The territorial system was used to determine the availability of resources for members, and it was also the mechanism through which permission was granted to visitors who followed the procedures for accessing resources (Ingold 1986). The customary appropriation was at the level of 'sections' (sub-clans) and community, securing land rights. Only sub-clan members had access to resources and could make land allocation decisions.

In Loliondo, the rights of the Maasai to land in the past were based on pastoral communal life in territories, sections, clans and sub-clans, such as the Loita and Purko. These rights to land and the utilization of pasture were managed by section elders under communal customary rules (Talle 1988). Grazing land was demarcated by physical objects, such as rivers, mountains, hills and big trees. These boundaries were distorted during the 'villagization' process when formal villages were established in Tanzania (Ojalammi 2006). Despite the changes in boundaries during villagization, grazing rights and the use of other natural resources such as water were still managed by section elders under the communal customary system. This form of management involved the alienation and dispossession of land and the exclusion of some members of the community. The power to exclude non-section members from accessing and using resources was vested in the traditional council of elders for the three sections in Loliondo. Potkanski (1994) reveals that some of those who were excluded from accessing resources managed to acquire access through friendships or forceful intrusion into grazing areas. Currently, the allocation of resources in Loliondo is based on administrative boundaries, which overlap the former traditional sections.

Recently, there has been a shift among the Maasai in Loliondo from being 'pure' pastoralists to agro-pastoralists (sedentary) and then to 'pure agriculturalists' so as to control and secure their right to land as private property through occupation and utilization (Turner 1999; Turner 2004). Private property, such as a piece of agriculture land or '*shamba*', reflects 'ownership' with the right to exclude, dispose of, allocate and manage (O'Malley 2000; Yesaya 2014). This has caused the Maasai depending more on land as property rather than livestock. Farmers from

other communities, who in the past invaded pastoral areas, have also influenced these changes (Kivelia 2017; McCabe *et al.* 2010). The Maasai ‘communal property’ system has thus been transformed into ‘private or individual property’, because ‘communal property’ rights were vulnerable to alienation by the state (Ojalammi 2006).

3.5 Characteristics of the Property Rights to Wildlife and Maasai Pastoral Land

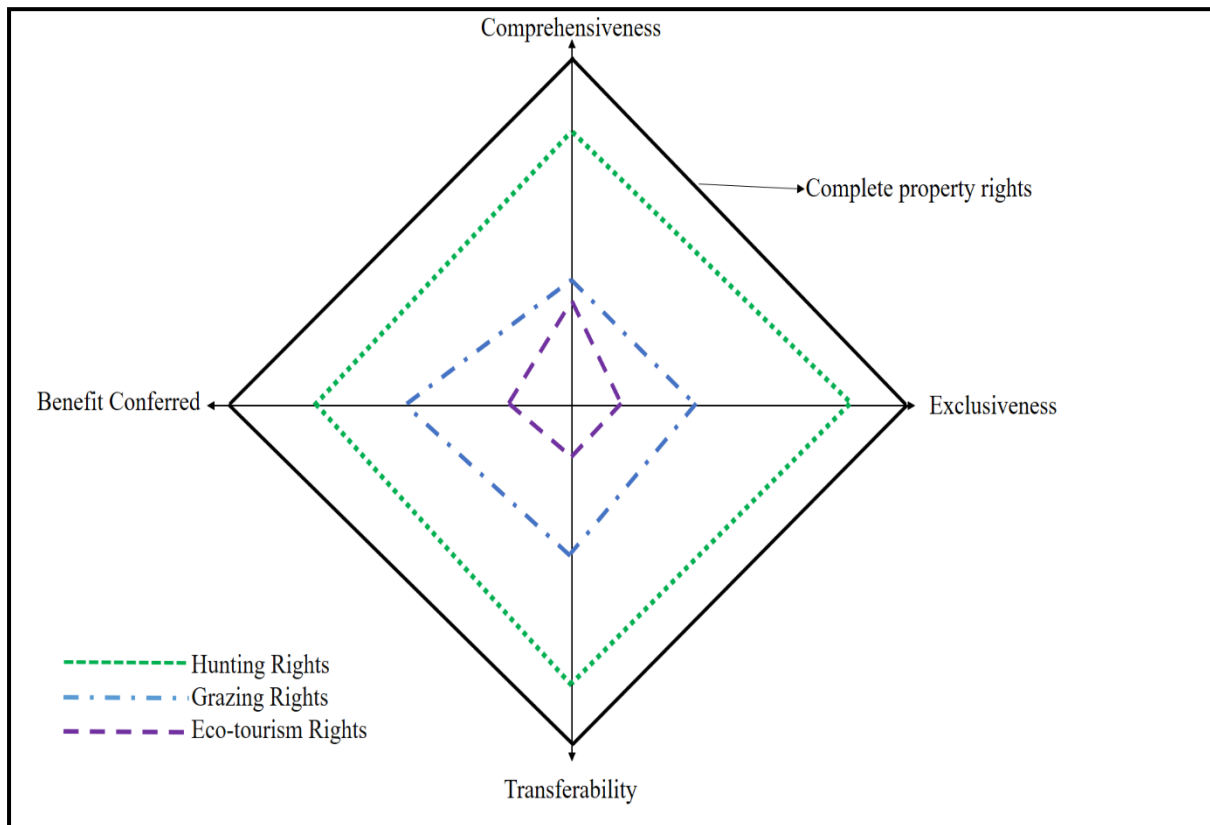
The dimensions of property rights to natural resources developed by Pearse (1990) have been adapted to analyse wildlife management options in the LGCA, such as comprehensiveness, transferability, exclusiveness, divisibility and duration of the current status of *Granted and Customary Rights of Occupancy* (see Figure 3.1). This analytical framework provides valuable information to reconcile public ownership with private and communal natural resource utilisation in the search for efficient options to resolve resource-use conflicts at Loliondo.

First, according to Pearse (1990, p. 177) comprehensiveness is ‘the extent to which the holder of rights extends to all attributes of the resources’. Currently, Maasai pastoralists lack the full range of benefits from the pastures in Loliondo. They can only benefit from wet grazing areas on village land located in their settlements. The dry grazing areas which pastoralists normally benefit from during the dry season are now restricted due to tourism ventures replacing this land-use. Furthermore, the 10 km buffer zone established along the SNP has created even more restrictions, preventing pastoralists from enjoying the full benefits of their pasture resources (Bartels 2016). In other community conservation areas, such as the Enduimet wildlife management concession, pastoralists access to restricted ‘short time’ grazing rights with permits granted by companies undertaking tourism activities in the area (Dekker *et al.* 2020). In Loliondo, comprehensive rights are lacking, as both trophy hunting and grazing occur concurrently in the same area. Therefore, the Maasai pastoralists lack comprehensive rights to their pastures for grazing, access to thatching grass and medicinal plants due to hunting and ecotourism taking place on the same land (Benjaminsen *et al.* 2013; Nelson and Ole-Makko 2005).

In the above context, the rights to resource benefits are fragmented among different individuals in the current legal framework. For example, the local communities and the state have different rights to wildlife and pasture resources. The government has allocated *de jure* rights to the OBC hunting block in the LGCA while Maasai pastoralists use their *de facto* rights to access

grazing in the same hunting block on village land. This lack of ‘comprehensive’ rights undermines both parties causing conflicts, because the rights to access land and natural resources are divided (Pearse and Jessee 1994).

Figure 3.1 Dimension of property rights to wildlife resources and grazing in Loliondo



Sources: Adapted from Scott (1998) and Pearse (1990).

Comprehensive rights to resources are closely linked to the security of property rights. Arnason (2000, p. 246) described property security as the ‘ability of the owner to withstand government challenges and maintain the property’. The challenges imposed by the OBC and the government on the Maasai and their right to ownership revealed the insecurity of their village land and the resources. For example, Arnason (2000) analysed the security of property on a scale ranging from zero (0) to one (1), where one represents complete ownership with certainty and zero is certain that the owner will lose the property. The loss of dry-season grazing rights by the Maasai reflects the zero scale. According to Pearse and Jessee (1994), comprehensive licensed user rights can help users retain their rights. In this context, the licence holder can only claim rights to the resources held under the licence. As a result, the holder of a trophy hunting licence in the LGCA, for example the OBC, can claim ‘only’ the number of animals allocated

in the 'quota' (the total number of individuals of a particular species that are legally allocated or prescribed for harvesting per year in a particular area). Thus, Maasai pastoralists have the right to the remaining resources such as for grazing areas, access to medicinal plants and to use the water resources.

The second characteristic of property rights considered here is the duration in which the owner has the right to the resources. According to Pearse (1990), private freehold property covers rights in 'perpetuity', while leases and licences are 'finite'. In Loliondo, OBC can hunt because the government leases the block to them, with the option to renew the lease. In the lease, OBC are allocated a specific number of species for their annual quota (between the July to December hunting season) per block (URT 2008). In Loliondo, this lease contract for trophy hunting has existed for over 25 years now. However, the legitimacy of the lease is questionable because pastoralists were not sufficiently involved in the first negotiations, then after the initial lease expired, it was renewed for a further ten years (Bartels 2014; Nelson 2010; Ngoitiko 2008). The duration of this OBC lease has thus had negative implications for the Maasai's rights to the land and natural resources in LGCA.

Third, the benefit conferred refers to the right to economic benefits from the resources, sometimes known as profit rights or cash flow rights (Pearse 1990; Pearse and Jessee 1994). Economic benefits from ecotourism were directly accrued at the village level by the village government (TNR 2011; Rurai 2012; Nelson and Ole-Makko 2005). The new *Wildlife Conservation Act No. 5 of 2009* prohibits any tourism activities on village land negotiated by the village government (URT 2009). In this context, villages were disempowered as the *Village Land Act 1999* grants them the right to enjoy potential benefits from village land through direct agreement with investors (Gardner 2007). However, the majority of the economic benefits from trophy hunting in the LGCA accrue to the District Council and Wildlife Division. That is, trophy hunting benefits the state more than local communities. In fact, the benefits conferred directly from trophy hunting to the Maasai in Loliondo are less than the economic benefits from pastoralism (TNR 2011; Gardner 2007). Hence, the Maasai prefer the rights to grazing areas instead of trophy hunting and ecotourism due to lack of economic benefits. This situation has created the incentive for the Maasai to participate in illegal activities such as poaching thereby adversely affecting the efficiency of trophy hunting and conservation efforts in the area.

The fourth dimension is the transferability and divisibility of rights. Transferability refers to the ‘capability of being sold, bought or assigned to someone else’ (Pearse 1990, p. 180). On the other hand, divisibility is ‘the ability to divide property rights into smaller parts to transfer.’ The core attribute of transferability is ‘divisibility’, in which the former allows the progressive allocation and re-allocation of resources to potential users. Divisibility normally uses a lease or licence. In Loliondo, the government granted a licence to OBC for hunting in the LGCA. The Village Council leased the same land to ecotourism investors, who obtained a tourism licence granted by the state (URT 2010; TNF 2011). Both parties have the right to allocate and re-allocate land through lease contracts and may also have a licence to use consumptive and non-consumptive wildlife resources as per the stipulated derivative rights. According to wildlife conservation non-consumptive use regulations *Government Notice No. 196, 2007*, non-consumptive tourism activities are restricted in game-controlled areas and on village lands. A divisibility right can operate better when there is a single use of wildlife resources, such as hunting tourism. The hunting block licence and quota system are a good example of divisibility, in which the hunting company has leased a block and the quota is allocated to tourist hunters (Pearse 1990; Pearse and Jessee 1994). Even though well-defined rights in relation to transferability and divisibility determines the security of property rights, transferability and divisibility of rights are not well-defined in the existing institutional framework in Loliondo. The situation in Loliondo has had negative repercussions on the security of ecotourism rights to the Maasai in the LGCA.

The last dimension is exclusiveness. This characteristic offers an opportunity to property holders to claim sole rights and exclude third parties (Pearse 1990). Property rights can be either exclusive or non-exclusive. In Loliondo, the *Wildlife Conservation Act No. 5 of 2009* excludes pastoralists from the GCA where hunting blocks are situated. Therefore, the investor (i.e. OBC) has exclusive *de jure* rights while the Maasai community in Loliondo lacks exclusive rights to trophy hunting. This has led to the encroachment for grazing and poaching in an area where OBC is undertaking hunting. Thus, trophy hunting rights to OBC lacks exclusivity as the Maasai lacks incentive to conserve wildlife in the area. This lack of exclusive rights to resources held under private property, such as trophy hunting, can lead to depletion as a negative incentive (Eggertsson 2005; Pearse 1988).

3.6 Property Rights and Natural Resource Conflicts in Loliondo

The property rights for the Maasai in Loliondo come under the notion of legal pluralism, in which statutory and customary laws coexist. Meinzen-Dick and Pradhan (2001, p. 4) define 'legal pluralism as co-existence and competition of multiple legal orders in the same geographical or political environment'. Legal pluralism has been among the sources of land-use disputes and natural resource conflicts in the LGCA, where contradictory laws on land resources co-exist (e.g. the *Village Land Act 1999* and the *Wildlife Conservation Act 2009*). A resource conflict refers to the poor relationship between two parties who have, or think they have, incompatible interests for the use of natural resources (Hendrickson 1997; Fisher *et al.* 2000; see also Imbusch 1999). It is a broken relationship of inevitable interactions among stakeholders sharing natural resources (Cleaver 2001). This study thus uses land conflicts to discuss the disputes over the right to land and associated resources such as wildlife and pasture.

Conflicts over land and natural resources occur in many forms for different reasons in diverse geographical spaces (Ojalammi 2006). In Africa, conflicts over land acquired for conservation is a well-known phenomenon, in which governments use the acquired land to set aside protected areas with little recourse to existing customary rights (Igoe and Brockington 1999; Newmann 2000). Many indigenous people have been dispossessed of their land and rights to resources through appropriation and privatization (Benjaminsen and Bryceson 2012; Mbaiwa 2016). Even where the *de jure* rights of local people to land and resources exist, bureaucracy, nepotism, fraud, and bribery compounded administrative challenges thereby leading to unceasing conflicts over land resources (Wehrmann 2008).

The situation in Loliondo is not different. Numerous studies on conflicts and land-use disputes have confirmed multiple causes, such as competition for resources, land insecurity, lack of ownership, contradicting government policies, and unequal benefit sharing from consumptive and non-consumptive tourism (Nelson 2010; Rurai 2012; Ojalammi 2006). Policy analysts claim that the ambiguity of tenure systems is the root cause of multi-decades of land-use conflicts and associated impacts in Loliondo (Shivji 1998a; Shivji 2004). The effects are far-reaching and unresolved with diverse economic, socio-cultural, environmental and ecological impacts, particularly for the Maasai communities. Wehrman (2008) argue that despite the negative impacts of unresolved conflicts, they lead to policy changes and implementation. For instance, conflicts over access, ownership, control and use of land and natural resources in

Tanzania led to the development of the *Land Policy 1995*, *Wildlife Policy 1998*, and associated legislations. This notwithstanding, legal overlaps require a mechanism for redefining property rights and resolving conflicts in Tanzania.

3.7 Mechanism for Resolving Property Rights and Natural Resources Conflicts

There are several methods for resolving conflicts based on the causes, characteristics, types and stage of conflicts (Humphreys 2005). In order to address natural resource conflicts successfully, there is a need to analyse the conflicts based on the existing property rights. The most common methods for resolving conflicts over land-use and natural resources are facilitation, moderation, consultation, conciliation, mediation, arbitration and adjudication (Moore 2003; Wehrmann 2008). Arbitration normally follows strict rules and is directed by an arbitrator for settling the conflict with decision-making authority. It is different from adjudication, in which decisions are made by a powerful authority or someone trusted by both parties. In Loliondo, both have been applied for decades to resolve resource-use conflict but have been unsuccessful. Based on the complexity and multidimensionality of the LGCA conflicts, arbitration and mediation are not feasible for addressing the right to resources, and so there is a need to develop a specific and enforceable property rights framework to land and natural resources in LGCA.

3.8 Summary

In Tanzania, property rights to natural resources are dynamic and evolving. In the LGCA the rights of the Maasai to land and natural resources have also changed over time. Both statutory and customary tenure and their associated legislation, conflict with stakeholders' rights to land and natural resources in Loliondo. For instance, currently, customary tenure does not guarantee pastoralists the right to grazing resources. There is also the lack of comprehensive and exclusive rights for the Maasai communities to access land and natural resources. It is evident that the multi-decades conflict in Loliondo is due to the lack of well-defined and enforced property rights. Formalisation of the rights to wildlife and pastoral resources for stakeholders is key to resolving the conflicts in Loliondo. Enforceable and specific property rights could minimise conflicts under different management options.

Chapter 4. Trophy Hunting and Wildlife Management in Protected Areas

Trophy hunting is a form of consumptive wildlife tourism that occurs across the globe. Through its activities, it has become a conservation tool which contributes to wildlife management and community development. In Tanzania, trophy hunting forms a tourism activity which occurs in reserves under special permit and on village lands adjacent to protected areas such as GCA and Wildlife Management Ares (WMA). Despite decentralisation under the *Wildlife Policy of 1998* that empowers local communities to manage wildlife resources on their own village land, there are fewer socio-economic and ecological benefits from hunting for them since the industry faces several management and administrative challenges in Tanzanian. The challenges outweigh the benefits, and they include among other issues corruption, over-utilization of quotas, poaching, lack of transparency, poor community involvement, incompetent ‘professional’ hunters and poor wildlife monitoring. As a result, trophy hunting tourism has failed to achieve its objectives. This failure calls for new management options to achieve the twin goal of wildlife conservation and community development. This chapter introduces trophy hunting and wildlife management in Section 4.1. Section 4.2 describes trophy hunting and wildlife management in Tanzania and in Section 4.3 examines the economic contribution of hunting tourism to conservation and livelihoods. It presents the process of administering and managing trophy hunting in protected areas in Section 4.4, followed by an analysis of the challenges in managing and administering hunting tourism in Section 4.5. Finally, the community-based conservation approach to wildlife management in Tanzania is presented in Section 4.6, and the final section 4.7 presents a summary of the chapter.

4.1 Introduction to Trophy Hunting Tourism and Wildlife Management

Trophy hunting is hunting by tourists with the objective of selecting and shoot animals that have exceptional physical features (Lindsey *et al.* 2007). To do this, they travel from their place of residence (which is not local) for the purpose of hunting. However, other purposes such as wildlife viewing can be involved in the trip (Lovelock 2007; Matilarnen and Keskinarkaus 2010). Han and Radder (2011) asserted that trophy hunting is a legitimate and organised activity undertaken by individuals whose primary objective is to secure wildlife trophies. The commonly obtained trophies are hides, skins, ivory and scales (Van der Merwe *et al.* 2014). Others include meat and blood after obtaining the trophies (Van der Merwe *et al.* 2014; Booth

2017; Damm 2008). Both locals and foreigners normally pay fees for a guided trophy hunting experience either for leisure or for food (IUCN 2016).

Trophy hunting has increasingly become part of the global conservation policy debate (Taylor 1994; Gunn 2001; Hulme and Murphree 2001; Hofer 2002; Campbell 2013; Gressier 2014; Mbaiwa 2017; Batavia *et al.* 2019). On the one hand, it is argued that trophy hunting is the source of declining wildlife species and loss of biodiversity (Gunn 2001; Campbell 2013). The media and animal rights and welfare advocates view trophy hunting as an unethical and unsustainable activity and thus advocate against it (Gunn 2001; Macdonald *et al.* 2016). Some critics of trophy hunting also argue that it is not an economically viable form of land-use. It is contended that if trophy hunting is not properly regulated and managed under scientific principles it may lead to loss of key species (Damm 2015). Other scholars also maintain that trophy hunting is only sustainable in concessions where wildlife populations are healthy and hunting is effective and well-managed (Nelson *et al.* 2013; Muposhi *et al.* 2017).

On the other hand, it is acknowledged that trophy hunting can create incentives for wildlife management by local communities through financing conservation, habitat protection, recovery of species and promoting rural development (IUCN 2012; Van der Merwe *et al.* 2014; Muposhi *et al.* 2016; Princee 2016; DiMinin *et al.* 2016; Cooney *et al.* 2017; Mbaiwa 2017; Lindsey *et al.* 2007; Muposhi *et al.* 2017; Saayman *et al.* 2018; CITES 2017). Generally, ‘trophy hunting’ (recreational hunting tourism) as a consumptive tourism provides the potential for wildlife management and the generation of revenue needed for conservation and rural development (Hutton and Leader-Williams 2003; Lovelock 2007; Newsome *et al.* 2005; Van der Merwe *et al.* 2014; Muposhi *et al.* 2017). According to Hall (2012 pp. 2–3), scientifically, sustainability of wildlife under trophy hunting is maintained through adaptive management and precautionary principle by ‘accurately monitoring and modelling populations, setting harvest quotas for sustainable yields, and reducing the potential for genetic loss while harvesting trophy males’. The ‘precautionary principle’ dictates that when faced with scientific uncertainty, the wildlife administrators should act in anticipation of harm to ensure that harm does not happen. ‘Adaptive management’, involves making decisions about hunting based on previous harvests and adjusting future management (Hall 2012, p. 3). Booth (2010) also argued that trophy hunting can be sustainable because the process is ethical and the age, sex, and population of a species in an area is identified and considered before hunting through the quota system proceeds. In South Africa for instance, the legalization of rhinoceros hunting, and its

subsequent re-introduction on private land, has led to an increased population, from 100 to 11,000 (Cousins *et al.* 2008; Amin *et al.* 2006).

Trophy hunting is regarded as a legitimate form of conservation that can generate markets for wildlife resources of high value, and revenue obtained from hunting can be used to support conservation and development projects for communities adjacent to the protected areas (Lewis and Jackson 2005; Price 2017). Revenue from hunting and the sale of trophies accounts for over US\$ 500 billion annually in the world (Va der Walt 2002). It generates about US\$ 22 billion in Europe (Kenward and Sharp 2008), and US\$ 63.5 billion in the USA in 2016 (CSF 2016). In sub-Saharan Africa, hunting for the ‘big game’ generates approximately US\$ 201 million revenue (Lindsay *et al.* 2007; Booth and Chardonnet 2015; IUCN 2016). South Africa hosts the leading hunting industry, with trophy hunting contributing more than US\$ 341 million annually to the South African economy (Saayman *et al.* 2018). Tanzania also obtains a gross annual revenue of about US\$ 11.2 million from hunting areas (IUCN 2016). In the LGCA, the hunting concession generates US\$ 819,000 annually (TNRF 2011; URT 2013b). Therefore, trophy hunting can bring enormous revenue to countries and in turn this can also support conservation and development.

However, the polarised debates across the media and also academic publications have led to the ban on trophy hunting in some African countries, including Kenya and Botswana (Booth and Chardonnet 2015; Mbaiwa 2017). Nonetheless, some scholars have argued that the ongoing restrictive policies and the ban on hunting may exacerbate loss of biodiversity due to reduced financial support for conservation (DiMinin *et al.* 2016; Lindsey *et al.* 2016; Mbaiwa 2017). There are few scholars who have examined trophy hunting in relation to the implications of its institutional framework for the welfare of communities adjacent to protected areas (Lovelock 2007; Mbaiwa 2017). Examining the challenges and benefits of trophy hunting to the stakeholders and its implications for wildlife management and conservation will go a long way to influence conservation and livelihood policies.

4.2 Trophy Hunting and Wildlife Management in Tanzania

Tanzania is the ultimate big-game trophy-hunting destination in Africa and one of the world’s biologically richest countries. It has an extensive network of protected areas for wildlife management with some unrivalled wildlife resources (Leader-Williams 2000). Protected Areas

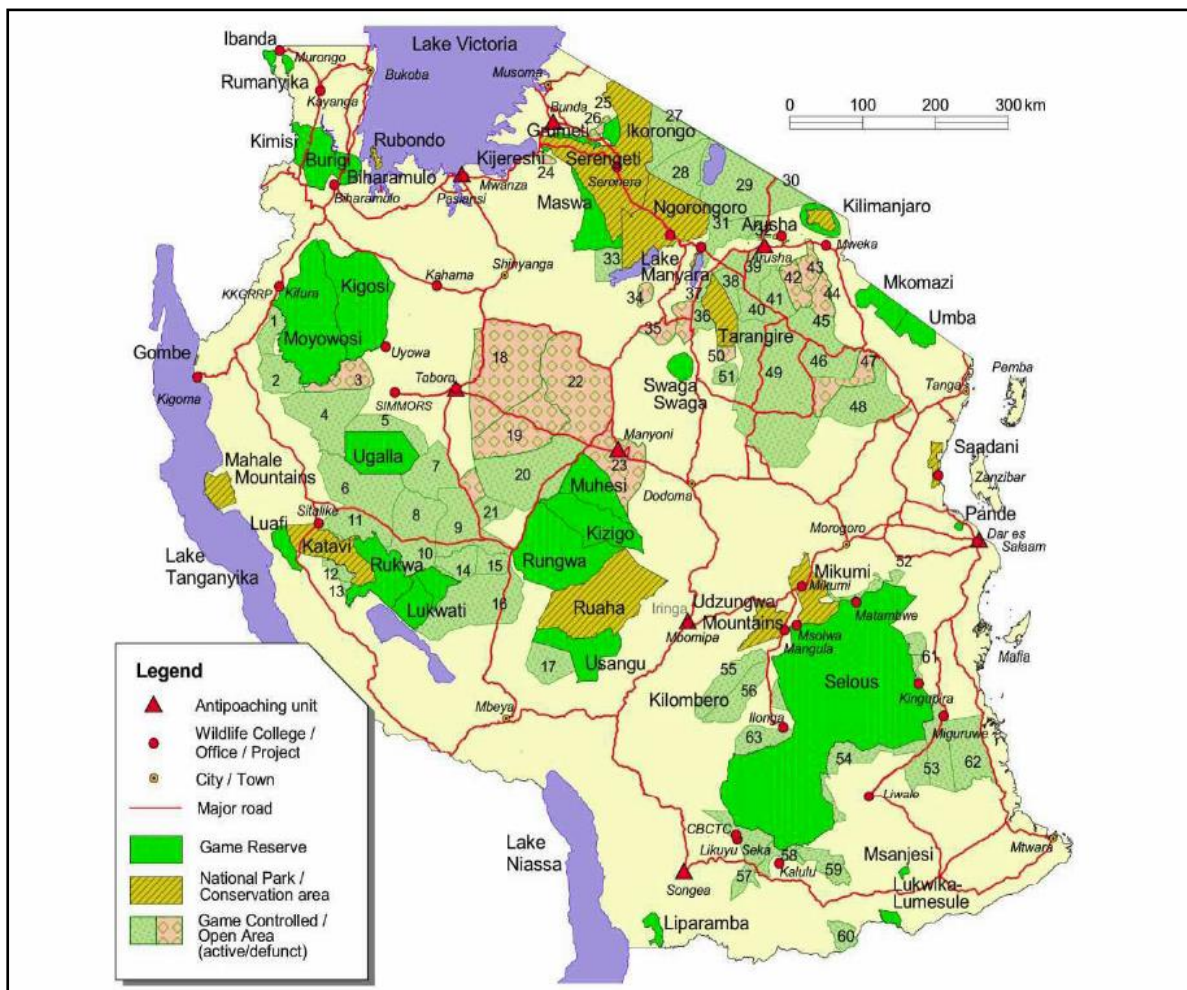
make up approximately 43 percent of the total land surface of Tanzania (URT 2008; URT 2009). Protected areas include National Parks, Game Reserves, Forest Reserves, Game Controlled Areas (GCAs), WMAs, Marine Reserves, Biosphere Reserves, Conservation Areas, Wetlands and Wildlife Corridors. The majority of the protected areas occur on village lands where local communities co-exist with wildlife. For instance, the GCAs and WMAs are established on village lands adjacent to core protected areas under multi-stakeholder partnerships. In all, there are 22 National Parks, 42 GCAs, 40 Game Reserves and 38 WMAs in Tanzania in which various ecotourism and hunting activities are undertaken except in National Parks where there is no hunting (Baldus and Caudwell 2004; Moyo *et al.* 2016) (see Figure 4.1).

Wildlife in Tanzania is owned by the state under the Wildlife Division in the Ministry of Natural Resources and Tourism. Thus, the utilisation of wildlife must be approved by the state. The main forms of wildlife utilization in Tanzanian protected areas are photographic tourism (game viewing), tourist hunting, resident hunting, wildlife ranching and farming (URT 2013b; Wilfred 2019). Photographic tourism and high-end luxury tented lodges are the popular forms of ecotourism in the GCAs and WMAs. Similarly, big-game trophy hunting is a significant activity undertaken in places adjacent to protected areas, such as GCAs and WMAs. These are primarily for wildlife management and conservation, but they also support the development and livelihoods of local communities.

Trophy hunting in Tanzania started in 1974 under the *Wildlife Conservation Act of 1974* (URT 1974). There are over 167 hunting blocks all over Tanzania, shared by over 40 licensed trophy-hunting companies covering an area of about 266,914 km² (Baldus and Caudwell 2004; Booth 2017). The most commonly hunted species in Tanzania are Lion, Buffalo, Impala, Hartebeest, Wildebeest, Warthog, Zebra, Waterbuck, Eland, Hippo and Crocodile. While lion trophies are the most highly valued among hunters, Buffalo is the species most hunted (Baldus and Caudwell 2004; Lindsay *et al.* 2006; Booth 2009; Lindsey *et al.* 2012). Trophy hunting takes place in hunting blocks, on open land and in unfenced areas in GCAs and WMAs. Open land refers to land without any form of conservation status and with no restriction on human habitation or any other form of land-use (Baldus and Caudwell 2004). In Tanzania, open areas come under the category of public land. Thus, the government has the mandate to permit hunting to take place in these areas. The *Village Land Act of 1999* put some areas under ‘village lands’, resulting in an overlap and complex land-use management, particularly in relation to

wildlife hunting. This is similar to other hunting blocks located in WMAs and GCAs within ‘village lands’. For example, two hunting blocks in the LGCA are situated within the land of nine villages. This has led to wildlife and land-use conflicts occurring for over two decades between local communities and hunting companies in the respective villages.

Figure 4.1 A map of tanzania showing hunting areas



Source: Baldus and Caudwell (2004).

4.3 Economic Contribution of Hunting Tourism in Tanzania

Hunting tourism is part of the global travel tourism sector contributing to the economy of the destinations visited. According to the World Travel and Tourism Council (WTTC), travel tourism is one of the largest economic sectors, supporting 292 million jobs and generating US\$ 7.6 trillion (10.2%) of global GDP (WTTC 2017). This was predicted to grow by 3.9 percent annually. In Tanzania, the total contribution of travel and tourism to GDP was US\$ 5.9 billion,

which was 13.3 percent of the total GDP in 2016, rising to 4 percent in 2017. Thus, the potential contribution of hunting tourism to the economy in Tanzania cannot be understated (URT 2013b). The current gross income from trophy hunting in all 167 blocks covering 266,914 km² is approximately between US\$ 11.2 and US\$ 36.1 million per annum accounting for 0.11% of the economy (Lindsey *et al.* 2006; IUCN 2016; Booth 2017; Saayman *et al.* 2018).

At the LGCA, a hunting concession area of 4,000 km² adjacent to the SNP was leased to OBC in the 1990s (Nelson and Olle-Makko 2005; TNRF 2011; Bartels 2014). The OBC's annual revenue from hunting in 2009 was US\$ 819,000, of which US\$ 560,000 is paid to the central government, US\$ 109,000 to the NDC, and US\$ 150,000 to the villages for community development activities (refer to Table 4.1). In 2010, no payment was made for hunting to villages in the LGCA, but they received US\$ 314,500 ecotourism revenue from direct contracts with ecotourism investors.

Table 4.1 Hunting tourism revenue from LGCA paid in 2009 and 2010 in us dollars

Authority Paid	2009	2010
Central Government	560,000	632,000
Ngorongoro District Council	109,000	158,000
Ololosokwan Village	25,000	0
Oloipiri Village	25,000	0
Soitsambu Village	25,000	0
Olorienmagaiduru Village	25,000	0
Loositomaalon Village	25,000	0
Arash Village	25,000	0
Grand Total US\$	\$819,000	\$790,000

Source: Ngorongoro District Council (2010).

4.4 Management and Administration of Hunting in Tanzania

The state is responsible for managing wildlife in Tanzania. The Tanzania Wildlife Authority (TAWA) and Tanzania Wildlife Division under the Ministry of Natural Resources and Tourism are responsible for developing policies, undertaking administration and sustainable management of wildlife resources and biodiversity conservation outside core protected areas in Tanzania (URT 2008; URT 2013b). They are responsible for overseeing its administration,

monitoring the wildlife sector, and implementing the *Wildlife Policy of 1998*. The Wildlife Division works with the local government authority at regional, district, village and community levels. It also collaborates with hunting associations and non-governmental organisations involved in the sector.

The Director of the Wildlife Division leases hunting concessions to hunting businesses or tourism operators according to the *Wildlife Regulations of 2000*. The regulation states that operators are liable for the management and maintenance of the hunting concession leased to them. The hunting operators pay US\$ 7,000 per year as a block fee, although permit, conservation, observer, trophy handling and annual professional hunter fees are also payable by tourist hunters and hunting operations (URT 2013b). They also pay concession fees ranging from US\$ 5000 to US\$ 60,000 for the better blocks (URT 2010). Hunting is regulated by criteria such as age, sex, trophy size, weight and the number of animals allocated per package. Each concession is allocated a quota of animals that can be hunted during the hunting season. Hunters also have to secure hunting licences before they can commence hunting (Booth 2017).

The revenue from hunting concessions comes from ‘game fees, capture permit fees, certificates of ownership, trophy dealer licences, trophy export certificates, conservation fees, observer fees, hunting block application fees, professional hunters’ licence fees, and penalties’ (URT 2013b, pp. 13). Under the reallocation scheme, 75 percent of the revenue collected is issued to the Wildlife Division, and 25 percent is given to the districts where hunting takes place (Booth *et al.* 2000; Baldus and Caudwell 2004; Baker 1997). The revenue accruing to districts is used for various development projects. Although management and administration is well organised, poor governance and weak policies have combined to saddle the trophy hunting industry with many challenges.

4.5 Challenges to the Management and Administration of Hunting Tourism

Hunting tourism in Tanzania faces a number of challenges including corruption, bushmeat trade, lack of professional hunters, overutilization of quotas, subleasing of concessions and poor wildlife monitoring. These challenges are discussed below.

4.5.1 Corruption and poor community involvement in hunting tourism

Corruption has affected hunting and conservation efforts in Tanzania. It acts as a barrier to community participating in and benefiting from tourism (Nelson *et al.* 2007; Sachedina 2008; Nelson 2009). In Tanzania, there is inconsistency and an inequitable distribution of hunting revenue in the villages where hunting takes place (Kiss 2004; Sachedina 2008; Leader-Williams 2009). For instance, at Loliondo, there is poor involvement of local communities and they do not benefit from hunting tourism, due to corruption among district and village officials (Rurai 2012; Mwakaje *et al.* 2013). At the same time, hunting companies fail to contribute substantially to community development, wildlife conservation, and environmental protection in Tanzania (URT 2013b). Although, in Tanzania, joint ventures between foreign operators and local communities are a requirement, this is not adhered to. The law requires 15 percent of the hunting block shares to be owned by foreign operators and 25 percent by joint ventures (Booth *et al.* 2000; Kicheleri *et al.* 2018). At Loliondo, hunting investors have implemented community development projects in some villages in the LGCA (Rurai 2012; Kileli 2017). Yet, due to the lack of community participation in the planning and implementation of these projects, they are not appreciated, and many scholars view the contribution of trophy hunting to the livelihoods and wildlife management as marginal (see for example Benjaminsen and Bryceson 2012; Green and Adams 2015).

4.5.2 Over-utilization of quotas and sub-leasing of concessions

There is over-utilization of quotas and sub-leasing of concessions in Tanzania. This is due to poor marketing skills and inadequate scientific skills thereby causing depletion of the wildlife gene pool (Hutton and Leader-Williams 2003; Baldus and Caudwell 2004; Booth 2010). For instance, in Tanzania's Selous hunting concessions, quotas have been utilised beyond the permits given to hunting operators due to the limited marketing skills of local owners of the concessions (Baldus and Caudwell 2004). Most of the foreign owned hunting businesses market their concessions abroad, particularly in America (Hutton and Leader-Williams 2003). Limited marketing skills has enabled about 70 percent of local owners sub-leasing their concessions and quotas to foreign companies, a consequence of which is that this adversely affects local and state tax collection (Hutton and Leader-Williams 2003). In addition, there are not enough scientific procedures or expertise for setting quotas, or for monitoring trophy quality, which can encourage excessive and unselective harvests (Leader-Williams *et al.* 1996;

Hutton and Leader-Williams 2003; URT 2013b). The Wildlife Division undertakes a wildlife population census every three years, the data of which are used to set up the quotas (Tanzania Wildlife Research Institute 2010; URT 2013b). However, the setting of quotas has been carried out for many years without adequate wildlife population data. Also, the setting of quotas based on aerial survey data on the hunted species is unrealistic, as it makes it difficult to develop a truly scientific basis for setting a quota. Further, the weakness in the collection and analysis of the data on the abundance of wildlife, trophy quality and quotas has resulted in the over-shooting and under-valuing of hunting trophies (URT 2013b). This has had a detrimental impact on the population of leopards, lions and buffaloes (Nelson *et al.* 2013). It has also affected the management of prospective hunting blocks which have become unreliable because existing population data are inaccurate.

4.5.3 Undefined duration of concession ownership

There is inconsistency in the duration of concession ownership, as tour operators claim that they lose their hunting blocks during the reallocation season. For various reasons, one outfitter can be allocated more than one concession. This inconsistency in quota allocation has led to the depletion of wildlife and over-hunting, and mistrust between operators and the Government (Njau 2013). Most of the concessions in Tanzania have been offered in a closed tender system at a fixed rate and not according to the competition between companies. The *Wildlife Conservation Act 2009* states that the Minister of Natural Resources shall advance a hunting block to the successful applicant (URT 2010), but this procedure has been described as bureaucratic, and ‘command allocation decisions’ have created loopholes for malpractice (URT 2013b). It is argued that this way of allocating quotas has been carried out through political influence and decisions rather than by following the public auctioning policy (Nelson and Agrawal 2008; URT 2013b). This problem has become so rampant that in 2017, the Minister of Natural Resources and Tourism revoked all hunting licences offered in the 2016 and 2017 hunting season as they lacked the allocation criteria (Gibbs 2017).

In the LGCA, the OBC has held the same concession for 25 years despite the intense conflicts and mismanagement of wildlife. Brink *et al.* (2016) emphasise that long leases encourage wildlife management and provide economic benefits. However, concessions with a long lease, such as OBC’s, have not been allocated through a transparent market-driven system, leading

to poor revenue sharing, conflicts and mismanagement of wildlife (Baldus and Caudwell 2004; TNRF 2011; Nelson 2012a; Lindsey *et al.* 2012).

4.5.4 Incompetent ‘professional’ hunters

Booth (2010) observed that there has been a low level of professional development in Tanzania’s hunting industry, particularly concerning big game. In fact, most Tanzanian hunting guides are not professional game hunters (Leader-Williams *et al.* 1996; Booth 2010). One of the weaknesses of these hunters is their inability to distinguish between male and female animals. Consequently, they mistakenly hunt many female animals (URT 2013b). On the other hand, some ‘professional’ hunters have bad hunting practices, such as disregarding hunting laws and being disrespectful to officials. Furthermore, because ethical hunting standards are lacking, malpractices abound, including locating animals using drones, hunting during the night, attracting lions using taped sounds, and the wounding of animals (Baldus and Caudwell 2004).

4.5.5 Poor disbursement of revenue for wildlife management

There is poor disbursement of revenue for wildlife management at the local government level. For example, from 2009 to 2012, the government disbursed 3.8 billion Tanzanian shillings (TZS) to 40 local government authorities to fund conservation. However, the funds were not used to protect wildlife as intended resulting in ineffective anti-poaching activities and insufficient patrols in areas with high levels of poaching (URT 2013b). Poor disbursement of revenues has also led to poor implementation of wildlife monitoring techniques such as spatial monitoring and reporting tool (SMART) in the trophy hunting concessions (Wilfred *et al.* 2019). As a result, game scouts are facing challenges, including the lack of motivation to use SMART, limited knowledge of SMART, insufficient ranger capacity, and limited resources for patrolling.

4.5.6 Illegal bush-meat trade

The illegal bush meat trade has become rampant in Tanzania due to the increased human population adjacent to protected areas. People are increasingly encroaching upon hunting blocks and poaching wildlife because of a) the lack of adequate infrastructure to ward off

encroachment and poaching (Booth 2010; Campbell 2013); and b) the exclusion of traditional hunters from the current and commercial ‘trophy hunting’ system. For instance, subsistence resident hunting was suspended in 2015 because of poor enforcement which led to overshooting of quotas, killing unauthorised game, hunting outside resident specified areas, and lack of transparency in the scheme (Wilfred 2019). Such exclusions have long acted as a source of conflict between resident hunters and commercial trophy hunting investors in areas which used to be the sole hunting grounds for resident hunting. In addition, poor community involvement, lack of revenue and poor livelihoods have contributed to the increased illegal trade in bush meat in Tanzania (Rentsch and Damon 2013). The illegal bush-meat trade in Tanzania has led to a decline in wildlife populations, especially in Game Reserves and GCAs where the problem is prevalent (Bitanyi *et al.* 2012; Rentsch and Damon 2013; Lindsey *et al.* 2013; Wilfred 2020). For this reason, the government has been forced to introduce a community conservation approach in some areas adjacent to protected areas.

4.6 Community-Based Conservation Approach to Wildlife Management in Tanzania

The community-based conservation approach to wildlife management is a way of devolving responsibility for managing natural resources to local communities in protected areas. In Africa, there are several community-based conservation programmes aimed at promoting conservation and improving the livelihoods of local communities (Nelson and Agrawal 2008; Nelson 2012b). These are: Communal Areas Management Programmes for Indigenous Resources (*CAMPFIRE*) in Zimbabwe; Administrative Management Design (*AMADE*) in Zambia; Living in a Finite Environment (*LIFE*) in Namibia; and Community Hunting Areas (*CHAs*) and *CBNRM* both in Botswana (Mbaiwa 2004; Baker 1997). In Tanzania, *WMAs* were implemented for the first time as a community-based conservation approach in 1997. *CBWMAs* are protected areas set aside for wildlife conservation on community land (URT 1998), and were established based on the *Wildlife Conservation Act No. 12, 1974*, *Wildlife Conservation Act No. 5, 2009* and *Wildlife Management Areas Regulations 2002*, which were revised in 2012 (URT 2009; URT 2012). Currently, as highlighted above there are 38 *WMAs* countrywide at different stages of development, 18 of which have attained Authorised Association status (WWF 2014). The *Wildlife Policy 1998* was aimed at enabling communities to benefit from hunting taking place on their village land (URT 1998; Nelson 2009), which is why half of all tourist-hunting concessions in Tanzania are on village land. Suh and Emtage

(2005) asserted that CBNRM empowers communities to manage resources on their land, but it requires stable government policies that do not conflict with each other.

The fundamental reason for establishing WMAs is to promote joint wildlife management and improve the livelihoods of local communities (Akuunay *et al.* 2003; Kaswamila *et al.* 2010). This could ultimately provide economic incentives for local communities to manage wildlife (Moyo *et al.* 2016). However, despite the 1998 wildlife management devolution in Tanzania, wildlife is still under the control of the state, with fewer benefits being passed on to local communities (Nelson 2009; Benjaminsen *et al.* 2013; Bluwstein 2017; Mawi and Mashenene 2020).

Table 4.2 Sharing of gross hunting revenue in the WMAs

Fees	Central Government (%)	Local Government (%)	Wildlife Management Area (%)
Block fees	25	0	75
Game fees	40	15	45
Conservation fees	55	0	45
Observer fees	55	0	45
Permit fees	85	0	15

Source: WMA Regulations (2012).

The situation in Tanzania differs markedly from other African countries. In Botswana, for example, revenue from tourism is divided among individual families (Mbaiwa 2004; Mbaiwa and Stronza 2010). Yet in Tanzania, local communities with hunting concessions on their village land such as in Loliondo are not part of a CBWMA programme, and have to engage in constant battles to fight for the revenue to be directed to their households. As a result, local communities prefer non-consumptive tourism in most of the existing CBWMAs compared to trophy hunting because they receive direct benefits from the former but not the latter (Bluwstein 2017; Kileli 2017). However, without a CBWMA, such a preference may result in conflicts among stakeholders in the area. Therefore, the establishment of a CBWMA is likely to address these conflicts, support conservation and ensure sustainable livelihoods in the LGCA. This is because other economic activities such as ecotourism can co-exist with trophy hunting in CBWMAs (Christopherson and Jambiya 2002).

Apart from the exclusion of local communities from CBWMAs, there is poor ownership and benefit arrangements in CBWMAs that are jointly managed in Tanzania. It has been found that the mechanism for sharing hunting revenue among stakeholders in CBWMAs is inadequate (Kicheleri *et al.* 2018). There is a lack of political will in Tanzania to devolve power to local communities to make decisions on wildlife management (Nelson *et al.* 2006). These complexities of ownership and revenue-sharing of jointly managed CBWMAs hinder hunting tourism from achieving its goal of conservation and an improvement in the livelihoods of communities (Honey 1999; Kicheleri *et al.* 2018). Similarly, Akuunay *et al.* (2003) asserted that local conflicts over land-use, conflicting policies, weak rights to local resources, and limited management capacity at the local level act as a barrier to the success of CBWMAs in Tanzania. For CBWMAs to be successful therefore, the involvement of local communities is indispensable. This is because ‘local communities are the most important stakeholders in conservation as it is their local environment and livelihoods that are in question’ (Campbell 2013, p. 6). Hence, a clear institutional framework that actively involves local communities is urgently needed to achieve sustainable CBNRM in Tanzania.

4.7 Summary

Trophy hunting is a form of consumptive tourism and a niche tourism market, which has social-economic and ecological benefits. The industry suffers from management problems, particularly in Africa, where there are inadequate policies and governance. In Tanzania, mismanagement has resulted in conflicts between stakeholders adjacent to protected areas where trophy hunting is undertaken. Both ecological and socio-economic problems are intense, affecting wildlife management, conservation efforts, income, and the livelihoods of local communities. More importantly, local communities do not benefit much from trophy hunting in Tanzania. For this reason, they prefer non-consumptive tourism as an alternative to trophy hunting since communities receive some direct benefits from non-consumptive tourism. Yet, consumptive tourism is not a panacea for the problems of hunting tourism and wildlife management since it has its own problems. The following chapters of this thesis will therefore explore alternative policy options to resolve the Loliondo wildlife management problem.

Chapter 5. Research Methodology

Multi-criteria analysis (MCA) is utilised in many disciplines to address economic, ecological and socio-cultural trade-offs among stakeholders. Both participatory and non-participatory MCA methods have also been proposed and applied to support the decision-making process. This chapter presents the MCA approach to decision-making. Section 5.1 of this chapter presents the introduction and background to MCA, followed by the classification of MCA methods, approaches and techniques. Section 5.2 presents an overview of the basic procedures for applying MCA. Section 5.3 presents a description of the stakeholders engaged in the MCA procedure. Section 5.4 presents the FGD as the main method for obtaining information from stakeholders in the MCA procedure. Section 5.5 gives a detailed theoretical description of the MCA options and criteria. Section 5.6 describes the method for weighting criteria, while Section 5.7 presents the method for aggregating and ranking the options. Section 5.8 discusses the need for a community survey to complement the MCA results. Finally, Section 5.9 gives a summary of the chapter. The methodological concepts discussed in this chapter form the bases for the practical processes, detailed later in Chapter 7, which discusses the research objectives of this thesis.

5.1 Introduction to MCA Methods and Techniques

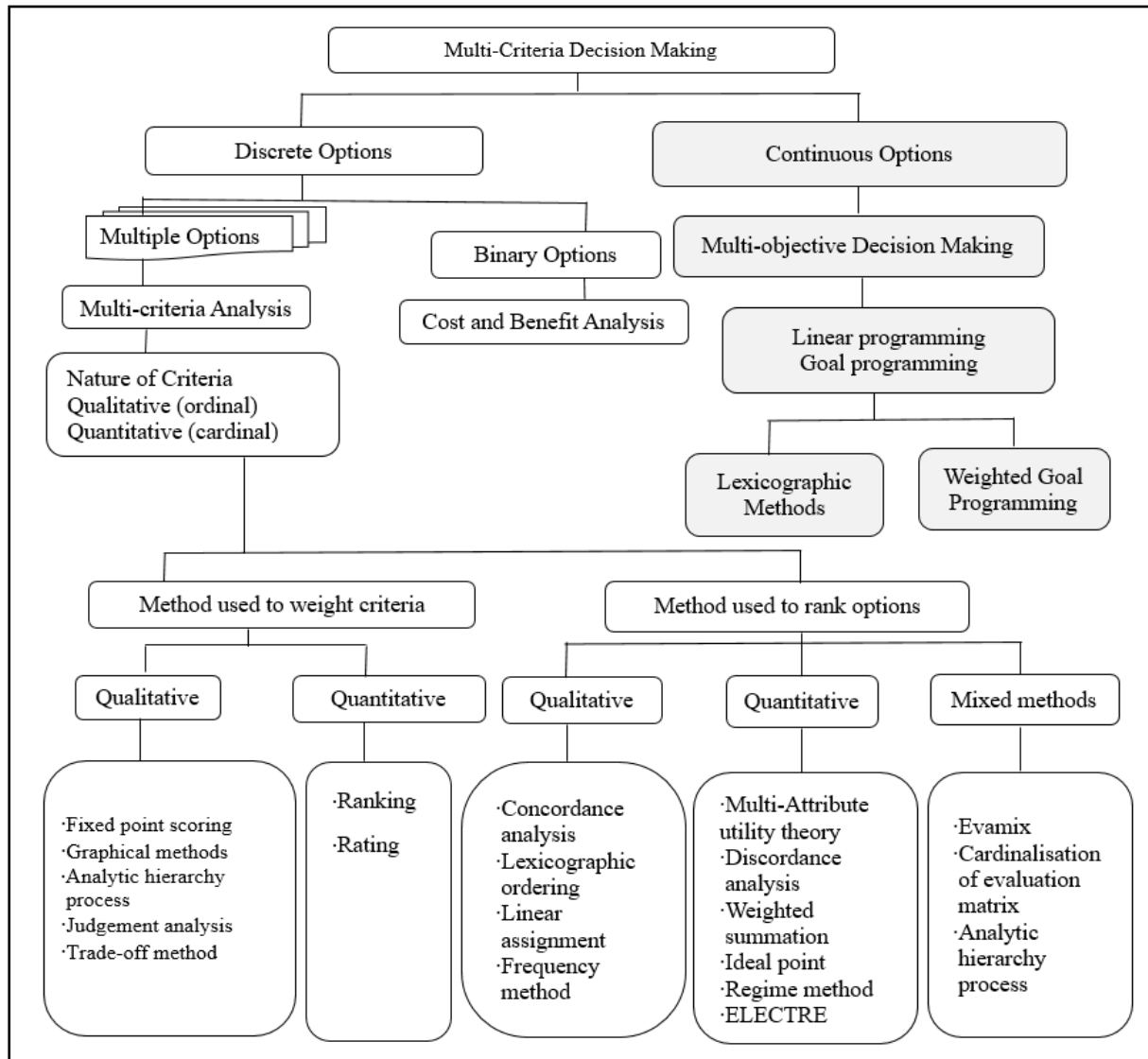
MCA is a structured framework for investigating, analysing and resolving decision-making problems constrained by multiple objectives and criteria (Nijkamp *et al.* 1990; Hajkowicz *et al.* 2000). MCA originated from the traditional neo-classical environmental economics in the early 1970s concerning decision-making problems. The terms Multi-Objective Decision Support (MODS), Multi-criteria Decision Aid (MCDA), Multi-Criteria Decision Modelling (MCDM) and Multiple Attribute Decision Making (MADM) are commonly used in MCA and have similar theoretical foundations for decision-making (Hwang and Yoon 1981; Bana-e-Costa 1990; Howard 1991; Janssen 1992; Hajkowicz *et al.* 2000). MCA is composed of the disciplines of Mathematics, Psychology, Management, Informatics and Social Sciences (Carver 1991; Bohanec *et al.* 2003) and is a collection of approaches used to explore viable decisions (Belton and Stewart 2002), and provides a framework for analysing choices with multiple objectives and criteria (Malczewski 1999; Nijkamp *et al.* 2013). MCA is composed of the elements of the Multi-Criteria Decision Support System (MCDSS), which involves

methods, approaches and models that help decision makers to analyse decision-making problems using multiple criteria (Siskos and Spyridakos 1999). It creates models to provide guidelines for decision makers concerning decision-making problems (Belton and Stewart 2002), and because of its features, MCA is an appropriate tool for analysing complex problems by considering appropriate methods, approaches and techniques (Mendoza 2006).

Several classifications for MCA methods, approaches and techniques have been developed and applied over time particularly in managing natural resources (Belton and Stewart 2002; Mendoza 2006). Classifications have been developed from a wide spectrum of operational research to facilitate MCA in decision-making problems to arrive at a meaningful decision (Kangas and Kangas 2002; 2005; Liou and Tzeng 2012; Mardani *et al.* 2015). Belton and Stewart (2002) suggested the classification of MCA approaches based on their mode of application (i.e. value measurement, goal aspiration, and outranking models). Similarly, Gal *et al.* (2013) classify MCA methods, approaches and techniques based on the models used, decision characteristics, and solution processes. Jeffreys (2004) classified MCA based on the aggregation technique as compensatory and non-compensatory.

A summary of the various classifications suggests that MCA can be put into the two broad categories of approaches, namely Multiple Attribute Decision-Making (MADM) and Multiple Objective Decision Making (MODM) (see Figure 5.1). MADM focuses on the choice of problem, while MODM addresses the design of the problem (Keeney and Raiffa 1976; Kangas and Kangas 2002). MODM is a continuous theory in which the model includes optimization of an alternative on the basis of prioritised objectives (Nijkamp *et al.* 1990; Janssen 1992; Hayashi 2000; Belton and Stewart 2002), while MADM is a discrete process in which the models are used to identify the most desirable scenario from a finite set of alternatives (Zavadskas *et al.* 2014). Similarly, MADM fits well in selecting a discrete ‘finite’ set of alternatives, while MODM deals with continuous ‘infinite’ alternatives of a decision-making problem (Janssen 1992; Hayashi 2000; Belton and Stewart 2002). An example of the continuous multi-objective decision technique is linear and goal programming.

Figure 5.1 Classification of multi-criteria decision-making methods



Sources: Adapted from Hajkowicz *et al.* (2000), Proctor and Qureshi (2005).

Discrete MCA methods can be categorised into weighting and ranking techniques (Nijkamp *et al.* 1990) (see details in Section 5.3). Under these are sub-categories including qualitative, quantitative and mixed methods (Janssen 1992). The quantitative method uses cardinal measures in which all the data are expressed in cardinal numbers or ratio measurements (Janssen 1992; Hajkowicz *et al.* 2000; Nijkamp *et al.* 2013). However, mixed methods provide the opportunity to integrate qualitative and quantitative information in planning, managing, and evaluating conflicting NRM policies (Harrison and Qureshi 2000). For instance, Evamix integrates both quantitative and qualitative data in software such as Decision on Finite Sets of Alternatives (DEFINITE) (Janssen 1991; Nijkamp *et al.* 1990). Discrete techniques are widely applied in problems with a finite set of alternatives than continuous techniques (Janssen 1991).

Admittedly, even a casual review of the MCA literature shows that the number of MCA approaches and techniques is growing and are modified based on the complexity of decision-making problems, the availability of software, the time available to undertake analysis, the amount and type of data to support analysis, variations in analytical skills, organisation, and researchers' preferences (Dodgson *et al.* 2009). For instance, there have been some modifications in traditional MCA methods and techniques to address emerging problems. These methods and techniques have been modified as hybrids and have developed progressively based on the complexity of emerging decision-making problems (Kangas and Kangas 2005; Margles *et al.* 2010). The modification comprises the combination of Analytic Hierarchy Process (AHP) and a Strength, Weakness, Opportunity and Threat (SWOT) analysis (which analyses the internal and external factors influencing an organisation or plan of action) (Kangas *et al.* 2003), to form the hybrid method, SWOT-AHP. In addition, AHP and the Geographical Information System (GIS) are combined to analyse spatial MCA problems (Mansour *et al.* 2020).

5.2 Overview of the MCA Procedure

The MCA framework is composed of basic steps in a hierarchical order to identify and agree on the options to rank against a set of criteria, the method for ranking the agreed options, and preferences aggregated regarding the decision-making problem (Saaty 1996). Several scholars have identified and presented the basic stages and procedures of the MCA process in which experts and stakeholders are involved (e.g. Redpath *et al.* 2004; Hajkowicz and Collins 2007; Janssen 2001; Jeffreys 2009; Saarkoski *et al.* 2013; Khadka and Vacik 2012; Suh 2015; Zia *et al.* 2015). According to Hajkowicz *et al.* (2000), most MCA processes have similarities in the stages and procedures but the differences vary depending on the nature and details of the problem and the stakeholders involved in decision-making.

The MCA procedure is determined by the nature of the technique (e.g. spatial GIS technique) applied for the analysis (Chen *et al.* 2001; Mwasi 2001; Zhang *et al.* 2012; Perpiña *et al.* 2013). If the GIS technique is used, for instance, the stages of GIS analysis are integrated in the process before evaluation (Kumari *et al.* 2010; Scolozzi *et al.* 2012). Stirling (2006) suggested problem identification, exploration and evaluation in which recommendations from evaluation are carried forward for final selection and implementation. Some scholars recommend that the

steps be arranged based on the way in which stakeholders are involved in the MCA process and the software applied. As an example, the use of the DEFINITE software in MCA involves identifying and defining objectives, choosing the options and criteria, scoring the options, standardizing the criteria, weighting the criteria, and finally aggregating and ranking the options (Janssen *et al.* 2001). Belton and Vickers (1990) developed a cyclical model showing the steps of MCA with feedback loops, which signify that MCA is progressively evolving to provide room for further evaluation of options and criteria. Redpath *et al.* (2004) and Davies *et al.* (2013) presented an example of a comprehensive list of MCA steps used to tackle conflicts over wildlife hunting and conservation. These steps are as follows:

- 1) Establishing the context and identifying stakeholders
- 2) Choosing stakeholders
- 3) Defining the criteria
- 4) Ranking criteria by stakeholders
- 5) Defining management options
- 6) Scoring management options against criteria
- 7) Multi-criteria evaluation
- 8) Deliberating on the options based on the results

Generally, MCA steps can be summarised in three key processes 1) identify the problem and structure; 2) build and use a model; and 3) develop an action plan (Nordström *et al.* 2010). The first two steps are used to determine the choice of the MCA technique to answer a predetermined decision-making problem. It could therefore be discerned from the above that in the MCA framework the orientation of the process could be horizontal, vertical or cyclical. The choice of the procedure may be largely dependent on the researcher and the problem.

5.3 Stakeholder Analysis and Engagement in the MCA Process

Discrete MCA involves the process of defining the objectives, criteria and options, weighting and scoring the decision-matrix by analysts, decision makers and stakeholders (Schmold *et al.* 1994). According to Grimble and Wellard (1997), stakeholders include active and passive policy makers, planners, and administrators in the government and other organisations that have a common interest in decision-making. Harrison and Qureshi (2000) suggested that important stakeholders, namely the government, planners and administrators, researchers and

community groups should participate in the MCA process. However, the involvement of the government in MCA should be handled with care to ensure that the government does not promote its own agenda and introduce biases in the decision-making process. It is reported that this has happened in some developing countries where governments have shown a major interest in NRM decisions, in which they have allowed their preferences to influence MCA decision-making (Zia *et al.* 2011; Khadka and Vacik 2012). Therefore, for objective, informed, and rational decision-making, three types of stakeholders should be involved: 1) those affected by the decision; 2) those involved in making the decision; and 3) those involved in implementing the decision (Harrison and Qureshi 2000).

Involving stakeholders in MCA also promotes their participation in decision-making. MCA has been criticised for lacking a well-developed participatory framework. Yet, the participatory approach to evaluating multiple problems is crucial in the MCA process (Reed *et al.* 2009; Messner *et al.* 2006). Buchy *et al.* (2000) further stress the importance of effective stakeholder participation in the decision-making process as it contributes to achieving agreed objectives, transparency, equity and representation. Fortunately, the development of Deliberative Multi-Criteria Analysis (DMCA) has encouraged collaborative decision-making and ensured data consistency (Proctor and Drescher 2003; Fish *et al.* 2011). This collaborative approach involves stakeholders interacting during the decision-making process (Belton and Stewart 2002), in which participatory methods, such as a questionnaire, focus group discussion, interviews, nominal group technique, and the Delphi method can be used to elicit the opinions of stakeholders (Asafu-Adjaye 2000; Gül *et al.* 2006; Sell *et al.* 2007; Ananda 2007; Jozi and Ebadzadeh 2014). Experts and stakeholders are both involved in identifying the criteria and options, and evaluating performance of the options against the criteria, thereby making the process participatory.

5.4 Participatory Focus Group Discussions and Stakeholder Engagement in the MCA

A FGD ‘is a data collection technique in which a selected group of people discusses an issue in depth, facilitated by a professional external moderator’ to acquire detailed data from the participants (Van-Eeuwijk and Anghern 2017, p. 1; Lune and Berg 2017; Farinosi *et al.* 2019). The FGD is used as a standalone or multi-method research method, and its application can be less costly and more manageable than other research methods integrated into the MCA framework, such as the Nominal group and Delphi techniques (Morgan 1996; Mukherjee *et al.*

2018). It should be noted, however, that FGDs are not the same as structured interviews, although there are some similarities (Wilkinson 1998; Parker and Tritter 2006; Kumer and Urbanc 2020). The difference between the two methods is based on the role of the researcher and the relationship between participants. In structured interviews, the researcher acts as an investigator, while in FGD the role of the researcher is to facilitate without influencing the group members. Unlike in interviews, the researcher controls the dynamics of the discussion between individuals (Smithson 2000; Nyumba *et al.* 2018).

FGDs involve the four key steps of research design, data collection, data analysis, and reporting the results (Morgan 1996; Krueger and Casey 2000). Krueger (2014) asserted that the choice of the focus group stakeholders is critical, as it has to consider characteristics such as gender, education, language and experience. For effective FGDs, the number of participants in each group should be between six and twelve (Fallon and Brown 2002). One potential problem in FGDs is the members' unwillingness to participate in the discussion (Mukherjee *et al.* 2018). Thus, recruiting a skilled and experienced moderator is essential to facilitate and motivate stakeholder participation in the discussion (Creswell 2014; Krueger 2014).

During the FGD, data is collected mainly through notetaking, participant observation, brainstorming, video or tape recording and interviewing (Stewart and Shamdasani 2014). An interview schedule with semi-structured questions is a common technique for obtaining information from FGD participants. Such information, in MCA studies on NRM, includes people's perceptions of the social, cultural and economic outcomes of making decisions concerning natural resources (Nyumba *et al.* 2018; Nared and Bole 2020). The data from FGDs is mainly analysed through content or thematic analysis. However, it is recommended that stakeholders approve the results before disseminating them to ensure the credibility of the study's findings (Birt *et al.* 2016).

5.5 The Nature of MCA Decision-Making Options and Criteria

The term 'option' is used here to refer to an 'alternative' plan, policy, action or scenario (Janssen 1991; Yoon and Hwang 1995; Proctor and Qureshi 2005). This is the basic principle that guides MCA because the options are evaluated against a set of evaluation criteria (Saaty 1980). The options in NRM are mostly policy options, management options, or planning options chosen by a group of stakeholders (Nordström *et al.* 2010). The options normally

include the current option, the ideal plan, the hypothetically worst plan, and a compromise solution (Massam 1988; see also Zia *et al.* 2015; Favretto *et al.* 2016; Wam *et al.* 2016). It is important to note that the options should be chosen carefully to avoid being influenced by the interests of any stakeholder. For the best results in discrete MCA modelling therefore, feasible options should be identified and discussed by stakeholders before ranking, as any changes during scoring can affect the ranking of the options (Venn 2004).

A large number of MCA studies use ‘criteria’ as a synonym of ‘attributes’, ‘indicators’ and ‘objectives’ (Hajkowicz *et al.* 2000; Mendoza and Prabhu 2005; Favretto *et al.* 2016, Baral *et al.* 2019). Attributes are described as performance parameters, components, factors, characteristics and properties of a decision-making problem (Greco *et al.* 2000). According to the Center for International Forestry Research (CIFOR 1999), indicators are variables which are measurable and they are used to infer the status of a particular criteria. Thus, ‘criteria’ refer to ‘aspects of each option that needs to be assessed based on how each meets the desired objectives’ (Proctor and Qureshi 2005 p. 174). Criteria are characterised by qualities such as comprehensiveness, reliability and non-redundancy. Comprehensiveness requires that a dominating objective is comprehensively described by its underlying criteria. Reliability means that a hierarchy should remain reliable even if there has been a localised disturbance with some criteria and non-redundancy means there should be no duplication of information in a set of criteria (Hajkowicz *et al.* 2000). Non-redundancy is an important feature of criteria as it prevents duplication of information in a set of criteria, thereby avoiding the problem of double counting (Hajkowicz *et al.* 2000). Objectives are specific goals or values associated with a project to be achieved by a particular decision. One downside of MCA objectives and criteria is ‘non-commensurability’, which is the lack of one unit of measurement. For instance, biodiversity is assessed by the number of species, amount of land-use in hectares, and benefits of tourism income measured in currency (Hajkowicz *et al.* 2000; Venn 2004). However, evaluation techniques have been developed to enable the choice of the weight that represents the preference of the decision-maker, thereby addressing the ‘commensurability’ weakness in MCA (RAC 1992).

Decision makers use a hierarchical tree to structure criteria (Keeney and Raiffa 1976; Saaty 1980). Economic, ecological, social, political, land value, accessibility, cultural and institutional criteria are included and structured in MCA studies (see, for example, Mendoza and Prabhu 2004; Mendoza *et al.* 2004; Locatelli *et al.* 2008; Jeffreys 2009; Balana *et al.* 2010;

Favretto *et al.* 2016). Scholars have also used both quantitative and qualitative criteria in MCA in NRM (see Favretto *et al.* 2016). The use of such complex sets of criteria is a reflection of the complexity of NRM problems. However, of these multiplex criteria, the social criterion is the most important one to consider in MCA due to issues of social acceptability, job creation and social benefits (Wang *et al.* 2009).

There is no consensus on the number of criteria that a typical MCA problem should include. Buchholz *et al.* (2007) suggest five to seven criteria while Yoon and Hwang (1995) and Bouyssou (1990) reveal that most practitioners use between seven and twelve criteria. Further, Proctor and Drechsler (2003) suggest using only a few criteria to make the weighing process manageable. In this context, care needs to be taken in choosing the number of criteria to avoid counterfeit analysis since the number of criteria for each objective can influence the ranking of management options (Howard 1991). In the discrete MCA, for instance, each objective in a decision-making problem must have at least one criterion (Hajkowicz *et al.* 2000). To overcome the problem of too many criteria therefore, NRM decision-making problems need to be broken down into broad groups, such as ecological, economic, social and cultural criteria. In this study, twelve social-cultural, economic and ecological criteria are identified and evaluated against four wildlife management options in the LGCA. The criteria have been developed reflecting the nature of the study problem which involves loss of biodiversity, unequal benefits sharing and impacts on livelihoods, as will be described below in Chapter 8.

5.6 The Methods for Weighting Criteria

The MCA methods for weighting criteria require the interactive participation of stakeholders and decision-makers. The relative importance of the objectives and criteria is assessed through weights obtained from the stakeholders. Both direct and indirect weight estimation methods have been suggested (Nijkamp *et al.* 1990). These methods include fixed-point weighting, ordinal ranking, rating, and pair-wise comparison (Hajkowicz *et al.* 2000; Jeffreys 2004). They are described as follows:

- 1) The rating method obtains scores from a decision-maker to represent the importance of each criterion. A five-point Likert scale ranging from 1 to 5, and a ten-point Likert scale ranging from 1 to 10 can be used to indicate the order of importance. The values are normalised before ranking. The difference between the ranking and rating method is

that unlike ranking, rating gives the modeller the possibility of altering the weight of one criterion without adjusting the weight of the others (Nijkamp *et al.* 1990; Hajkowicz *et al.* 2000).

- 2) Fixed-point scoring is the most direct way of obtaining weight information from a decision-maker, who is then required to distribute a fixed number of percentage points among the criteria. Normally, percentages are used to score, and a criterion with a high score (i.e. 100) reveals that it is of greater importance, which forces decision-makers to make trade-offs in a decision-making problem. However, careful consideration needs to be given to determining the relative importance of each criterion in a decision-making problem (Nijkamp *et al.* 1990; Hajkowicz *et al.* 2000).
- 3) In Ordinal ranking, the decision-maker ranks the criteria in the order of their importance by stating the importance of each criterion in relation to the others to determine their weights. This method has the limitation of not allowing cardinal ranking algorithms such as weighted summation (Hajkowicz *et al.* 2000; Jeffreys 2004).
- 4) Pairwise comparison involves the comparison of each criterion against another criterion in pairs (Hajkowicz *et al.* 2000). For instance, the AHP uses pairwise comparison (Saaty 1980) on a scale of 1 to 9 to assign scores to each pair of criteria in order of importance where 1 stands for the least important and 9 stands for the most important. The total weight of each criterion is obtained through an effect table. AHP allows the decision-maker to consider all trade-offs in a decision-making problem (Saaty 1990). Mardani *et al.* (2015) stated that AHP is the technique most applied in NRM and public and corporate policy-making and planning. However, it has been criticised for its inconsistency and difficulty in interpreting the 9-point scale preferences (Velasquez and Hester 2013). Notwithstanding this, it is acknowledged that the application of AHP enables the decision maker to weight criteria pairwise.

The weighting procedure can be done through surveys, interviews, expert meetings and stakeholder workshops (Balana *et al.* 2010; Zia *et al.* 2015; Khadka and Vacik 2012). In fact, questionnaires, interviews, workshops, and group meetings are regarded as vital for selecting weighting criteria for the MCA process (Asafu-Adjaye 2000). Sometimes, GIS is used to select and weight spatial criteria (Mansour *et al.* 2020). Effat and Hassan (2013, p. 149) asserted that

‘GIS-based techniques allow for the incorporation of additional data sources and for developing additional criteria’. Yet, spatial MCA techniques only consider criteria which can be presented by a spatial variable (Lin *et al.* 2014). Below in Chapter 7 the procedure used to weight the scores in the current study is described.

Both quantitative and qualitative scales are used in MCA. Four different types of scales are used for assigning values to criteria in MCA. These are interval, ratio, nominal and ordinal scales. Another qualitative scale used in MCA is symbols. The literature is therefore replete with studies that have adopted either or both categories of scales in measurement. For instance, Kangas *et al.* (2005) measured criteria based on the ordinal scale in forest planning, while Janssen *et al.* (2001) used (---) scale for assigning negative values and (+++) scale for assigning positive values. However, it is argued that since most NRM problems are qualitative, the scale of 1–10 or 0–1 in discrete MCA does not necessarily represent the real measurement of the problem and therefore standardization is required (Janssen 1991). To address this problem, the current study used both qualitative and quantitative scales in assigning values to criteria and applied standardisation, and this is further detailed below in Chapter 7.

5.7 Methods for Aggregating and Ranking the Options

Aggregating and ranking in the effect table involves scoring options against the criteria in which the performance of the options is evaluated against each criterion. The effect table represents the MCA model in which both qualitative and quantitative weights are expressed depending on the nature of the method adopted (Hajkowicz *et al.* 2000). Figure 5.2 presents the examples of the MCA decision-making problem ($m \times n$) where m is criteria and n is decision-making options. Each element x_{ij} indicates performance score of option (i) when it is evaluated in terms of criterion (j). For example, the effect table representing an MCA model of wildlife management problem such as the LGCA involves evaluating the current option (status quo) against economic impacts such as financial returns. The other options and criteria in the evaluation matrix (effect table) represent a trade-off of criteria and alternatives in the MCA model.

Due to the development and availability of software packages for researchers and practitioners, the number of MCA aggregation and ranking methods has grown in the last few decades and is predicted to keep growing (Belton and Stewart 2002; Weistroffer and Li 2016). These

methods are categorised into multi-criteria value functions, the outranking approach, distance to ideal point method, pairwise comparison, fuzzy set analysis, and the tailored methods (Hajkowicz and Collins 2007). Keeney and Raiffa (1976) developed the multi-attribute decision-making method which is a utility method for deciding the best course of action in a given problem by assigning a utility to every possible consequence and calculating the best utility. The method is commonly categorised as a compensatory aggregation method as it involves aggregating criteria to achieve an overall utility function (Belton and Vickers 1990; Keeney and Raiffa 1993; Hayashi 2000; Jeffreys 2004). Multi-attribute decision-making method has been widely applied in NRM decision-making problems relating to forests, wildlife ecosystem, agriculture, water and energy, as they all have a degree of uncertainty. The following paragraphs summarise the four common aggregation methods used in NRM, such as multi-criteria value functions, and the outranking approach.

Figure 5.2 The effect table

(Criteria - j)		c_1	c_2	c_3	\dots	c_m
(Weights - j)		w_1	w_2	w_3	\dots	w_m
(Alternatives - i)	a_1	$x_{1,1}$	$x_{2,1}$	$x_{3,1}$	\dots	$x_{m,1}$
	a_2	$x_{1,2}$	$x_{2,2}$	$x_{3,2}$	\dots	$x_{m,2}$
	a_3	$x_{1,3}$	$x_{2,3}$	$x_{3,3}$	\dots	$x_{m,3}$
	\vdots	\vdots	\vdots	\vdots	\vdots	\vdots
	a_n	$x_{1,n}$	$x_{2,n}$	$x_{3,n}$	\dots	$x_{m,n}$

Source: Adapted from Hajkowicz *et al.* (2000).

First, Weighted Summation (WS) is a method that is widely applied to aggregate and rank MCA results (Nijkamp *et al.* 1990; Janssen 1991). The WS technique transforms all criteria into a scale, usually zero to one (0–1), where 1 represents the best performance that is multiplied by weights and then summed to obtain the results (Janssen and Herwijnen 2006). This is referred to as compensatory weighting, where low performing criteria are compensated for by high performing criteria (Jeffreys 2004).

In the WS evaluation matrix (x) with $n \times m$ performance scores, where X_{ij} denotes performance option i against criteria j the WS becomes:

$$v_i = \sum_{j=1}^m w_j s_{ij} \quad (5.1)$$

where:

v_i = the overall performance of the i^{th} alternative;

m = the number of criteria;

w_j = the percentage weight of the j^{th} criterion; and

s_{ij} = the standardised performance measure of the i^{th} alternative against the j^{th} criterion.

The weights (w_j) are non-negative and sum up to 1, and v_i, j is a transformed performance score for x_i, j on a scale of 0 to 1, where 1 represents the best performance. The overall performance score for each option is given by u_i (Janssen *et al.* 2001; Hajkowicz and Collins 2007; Hajkowicz 2008).

Second, the Preference Ranking Organisation Method for Enrichment Evaluation (PROMETHEE) is an outranking technique which involves the partial to complete ranking of options (Brans and Vincke 1985; Brans *et al.* 1986; Brans and Mareschal 1994). This technique is categorised as PROMETHEE I, PROMETHEE II, PROMETHEE III, PROMETHEE IV, PROMETHEE V, PROMETHEE VI and PROMETHEE-GAIA (Geometrical Analysis for Interactive Aid). It should be noted that though PROMETHEE II is the technique most preferred for ranking a finite set of options, it does not provide a clear method for assigning values and weights and interdependency of attribute is not obligatory (Velasquez and Hester 2013; Alinezhad and Khalili 2019). Also, the application of PROMETHEE requires specialised software, such as the widely accepted Decision Lab 200 (Mustajoki and Martunen 2017).

Third, Elimination and Choice Expressing the Reality (ELECTRE) is an aggregation method in which the performance of each criterion is reflected in the overall performance of each option (Roy 1990; Roy 1991). It is normally used to compare low performing criteria in MCA options in the categories of ELECTRE I, ELECTRE II, ELECTRE III and ELECTRE IV. ELECTRE II can be done using the DEFINITE software package. Each ranking method (for instance, ELECTRE II, ELECTRE III and ELECTRE IV) has unique characteristics for ranking the

options. Put together, ELECTRE is non-compensatory and takes into account uncertainty and vagueness (Figueira *et al.* 2005; Jeffreys 2004). It is also based on concordance analysis for outranking. As an outranking technique, ELECTRE uses specific options and criteria (Fülöp 2005).

Fourth, the EVALuation of MIXed data (EVAMIX) aggregation method is used to determine the dominant score of an option resulting from paired comparison (Vood1983; Nijkamp *et al.* 1990). This method is designed specifically for a mixed data. It uses both qualitative and quantitative data on the same effect table in evaluating preferred options. EVAMIX segregates qualitative and quantitative data from which the dominant score resulting from paired comparison is calculated (Hajkowicz and Higgins 2008). The dominance scores are combined into an overall score of each option to obtain the most preferred options (Qureshi *et al.* 1999). The advantages of EVAMIX include the ability to handle ordinal and cardinal data. Therefore, there is no need to express ordinal data quantitatively, and it also has the ability to solve complex MCA problems in a consistent manner. However, EVAMIX cannot consider interdependence between criteria during evaluation (Işık and Adalı 2016; Alinezhad and Khalili 2019).

A significant number of MCA studies in NRM have applied single aggregating and ranking methods to evaluate decision problem (Proctor 2005; Kanga *et al.* 2006; Sarikoski *et al.* 2013; Nyongesa and Vacik 2019; Baral *et al.* 2019). Although it is possible to use two or more aggregation methods in one study, this can lead to inconsistent results. Similarly, the use of complex methods can present a ‘black box’ that is unacceptable to stakeholders (Hajkowicz 2008; Hajkowicz and Higgins 2008). However, an exceptional combination of MCA methods, such as AHP and GIS, may help in evaluating a particular spatial problem (Locatelli *et al.* 2008; Hiltunen *et al.* 2009; Balana *et al.* 2010; Newton *et al.* 2012; Koschke *et al.* 2012). For this reason, studies dealing with NRM can incorporate spatial methods in the MCA framework, and as Stirling (2006) suggested, if a MCA problem is to be evaluated systematically, it must be structured to suit the pre-determined evaluation method.

It should be noted that the above MCA methods and techniques have been widely applied to optimise policy selection in the management of natural resources worldwide (Linkov *et al.* 2006; Hajkowicz and Collins 2007). However, the choice of the MCA aggregation method can be determined by factors such as transparency, familiarity, the effect on group dynamics, user

acceptance and availability, and easy use of the methods and associated software. Also, the choice of the method adapted to the decision context is determined by what type of results the method is expected to deliver by answering the MCA problem (Roy and Słowiński 2013). More importantly, the choice of a method is determined by its strengths over other methods in dealing with the problem at hand (Garmedia and Gamboa 2012). Considering the problems of wildlife and land-use conflicts in Tanzania, the rating weighting technique and weighted summation aggregation method was used to evaluate the preferred wildlife management options in the LGCA.

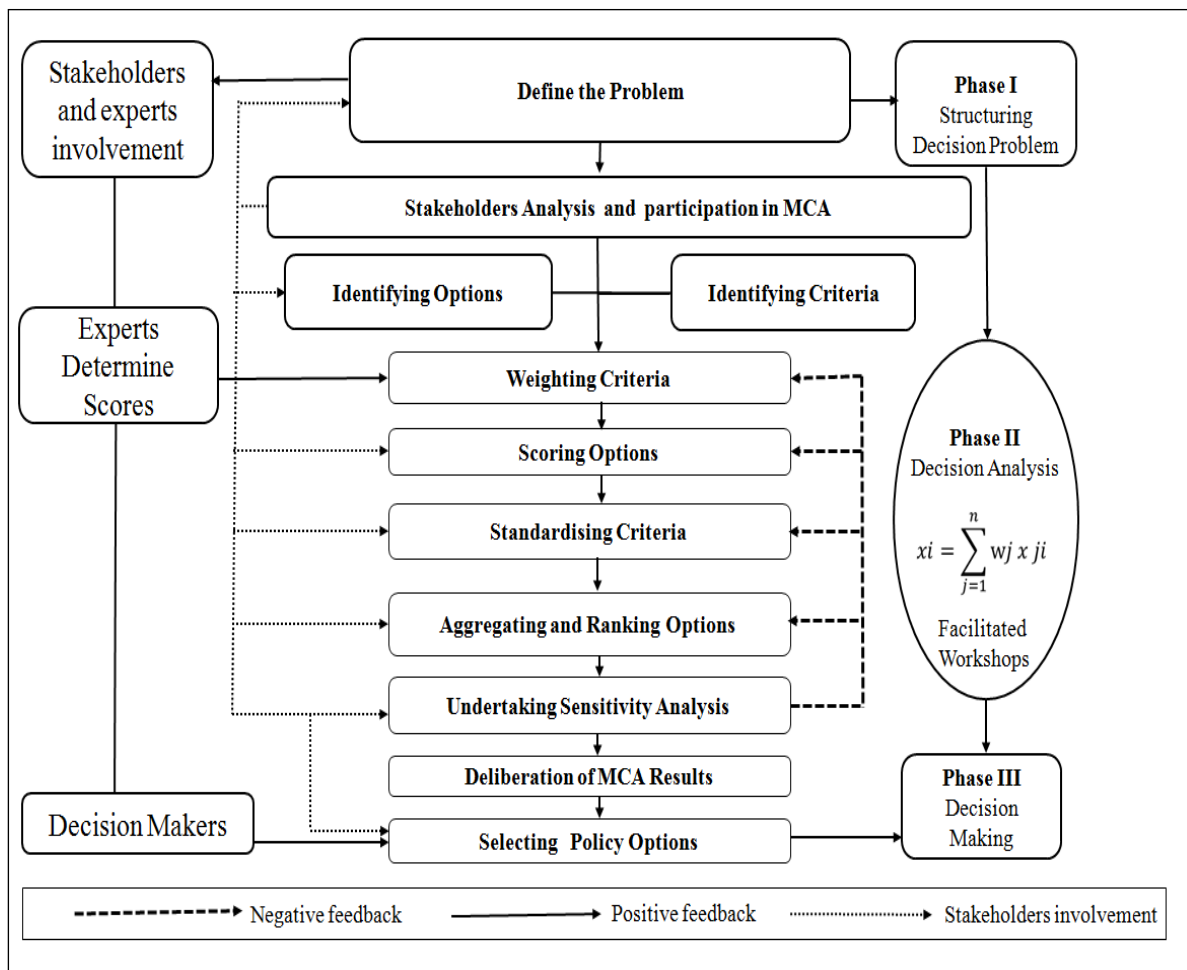
5.7.1 The use of DEFINITE software for MCA weighting and aggregation

The DEFINITE software package was used in this study (Janssen *et al.* 2001; Uran and Janssen 2003; Janssen and Herwijnen 2006). The software was found to be suitable for the problem in the LGCA since it comprises appropriate weighting and aggregation methods which are applied in this study. The software also contains a method for undertaking standardisation and sensitivity analysis, unlike other MCA software such as Plan-Eval. In addition, it is interactive, thereby promoting effective group dynamics in which experts and stakeholders can be involved in aggregating and deliberating on the results in FGD workshops. It has also been widely applied in similar NRM decision-making problems and is approved by scholars as an effective software package for analysing decision-making problems (Janssen and Herwijnen 2006).

5.7.2 Sensitivity analysis

Sensitivity analysis is done in MCA to determine the robustness of ranking with respect to uncertainty in assigning weight value functions and scores and exploring the decision-making problem (Belton and Vickers 1990; Proctor and Qureshi 2005). Janssen (1992) identified three methods of sensitivity analysis using the Monte Carlo approach to implementation, namely systematic variation of weights information, systematic variation of performance and measure, and systematic methods for weighting criteria and ranking alternatives (Janssen 1992). MCA sensitivity analysis is normally followed by deliberation on the results, involving both stakeholders and decision-makers. The below Figure 5.3 presents the MCA theoretical framework used in this current study, and will be detailed further below in Chapter 7.

Figure 5.3 Multi-criteria analysis framework



Source: Author's Construct (2018).

5.8 The Need for a Community Survey to Complement MCA Results

Participatory methods have recently been developed to aid decision-making using the MCA approach. Since traditional MCA methods involved only experts in evaluating problems, this recent development of participatory MCA methods has made stakeholder decision-making process transparent, equitable and representative (Proctor and Drechsler 2003). Although the number of participatory methods is growing, it is obvious that in current MCA studies, particularly those on NRM, some methods have failed to involve all stakeholders equally and transparently in the decision-making process. Some approaches often require the community to participate in multicriteria-evaluation only after the experts have made the technical decisions. This has created discrepancy between perceptions of the experts and local communities. For successful evaluation therefore, stakeholder involvement in structuring the problem and deliberating on the results are key stages in participatory MCA.

FGD is commonly used in MCA as it has vital role in involving stakeholders in the MCA process as highlighted above. However, the common FGD technique used for eliciting the opinions of stakeholders and experts on the decision-making process in MCAs has many limitations, which include stakeholder unwillingness to participate, the influence of the moderator, and dominant individuals. Another challenge of FGD in MCA is the lack of adequate representation of stakeholder groups such as members of the community from individual households since it allows only a few participants in the FGD workshop (including experts and stakeholder representatives). However, there is a general consensus in the literature that the MCA decision-making process can be improved markedly by including the opinions of members of the community and other under-represented stakeholders who corroborate MCA results (Beierle 1999). For these reasons, there is the need to go beyond FGDs to include more representative approaches such as a community survey to capture their interest in the MCA process.

The community survey method can be combined with an MCA FGD to elicit the views of individual members of the population concerned with the decision-making problem concerning NRM. This combination enables researchers to incorporate community values, assumptions and preferences into the decision-making process (Dryzek 1997). Further, the combination of a community survey and FGD is important because the latter involves stakeholders deliberating with one another to resolve the conflict, whereas the survey instrument enables individual members of the local communities to express their views about the status quo, and helps to ascertain the acceptability of proposed options by the general population. According to Beierle (1999) and Beierle and Cayford (2002), combining the community survey and FGD enhances the flow of information from the public to the government and vice versa. In addition, such a combination provides substantive information that will improve decision-making, increase the public's knowledge and ensure transparency in decision-making. This study applied a community survey and FGD through interviews and brainstorming to obtain information from stakeholders and experts, and further details are provided below in Chapter 7.

A community survey is a systematic method for gathering information from a sample of a large population (Groves *et al.* 2011; Creswell and Creswell 2017). Babbie and Mouton (2001) asserted that a survey is widely accepted as an effective method for collecting data on attitudes, feelings, behaviour, beliefs, values, decision-making, and the activities of local communities.

The study adopted the cross-sectional survey method since it helped the researcher to examine the perceptions of local communities on the wildlife management problem and their preferences. It was also chosen over other survey methods due to time and resource constraints (Babbie 1993).

Scholars assert that the validity and reliability of data are affected by the design of a survey (Saunders *et al.* 2003). Thus, designing a survey questionnaire with a clear and simple layout helps to avoid overburdening the cognitive capacity of the respondents. Similarly, proper wording of the survey questionnaire enables respondents to understand the questions (Boynton 2004; Fowler and Floyd 1992; Nared and Bole 2020). A poorly constructed questionnaire can lead to both response and non-response bias (Gideon 2012). Concerning the nature of the questions, both open-ended and closed-ended questions are commonly used in community surveys. Seliger and Shohamy (1989) asserted that closed-ended questions are very efficient and easy to analyse. For example, questions with a rating scale can include a Likert scale of 1 to 5 in which one (1) indicates (strongly disagree) and 5 (strongly agree). The ‘donot know’ category is included for respondents who do not have an opinion (Converse *et al.* 1986). Such are the questions used in this study. Also, care was taken in ordering the questions in the questionnaire. For instance, questions on wildlife management preceded respondent socio-demographic characteristics, as recommended by Mitchell and Carson (1989), to prevent response biases. All these strategies were adopted with the view of obtaining valid and reliable data.

A survey can be self-administered, mailed out or conducted through face-to-face interviews. Scholars recommend the latter because it provides quality data; it is easy to administer; the response rate is high; and it gives the researcher more time to interview participants (Fowler and Floyd 1990; Fowler and Floyd 2013; De Vaus 2013; Creswell and Creswell 2017). For this reason, this study adopted face-to-face interviews in administering the survey questionnaires. The survey data obtained were entered into and analysed using the SPSS.

5.9 Summary

A large number of MCA methodologies have been adopted and applied in MCA and NRM studies. MCA has been designed to support the decision-making process in a participatory manner where trade-offs exist. More participatory aggregation and weighting methods

involving stakeholders in the modelling process have now been successfully developed and applied to manage trade-offs. However, there are some theoretical, methodological and practical limitations. There was therefore a need to develop a MCA framework that would address the methodological gaps and contribute to the MCA theory. In this regard, the addition of a participatory FGD and community survey to the MCA framework was appropriate for incorporating community values, assumptions and preferences in the whole decision-making process. The application of the concepts discussed in this chapter to the Loliondo wildlife management problem is presented below in Chapter 7 of this thesis. However, prior to this, Chapter 6 will provide a systematic review of MCA studies in NRM.

Chapter 6. Systematic Review of MCA Studies in NRM

Globally, NRM is replete with numerous stakeholder conflicts. For this reason, various scholars have applied MCA to understand these conflicts. This chapter therefore presents results of a systematic review of many of these studies, focusing more closely on the strengths and limitations of applying discrete MCA for NRM problems. Section 6.1 presents the assessment criteria and sources of data for this systematic review. Section 6.2 introduces the application of MCA for NRM. Section 6.3 presents a review of studies on stakeholder analysis and engagement in participatory MCA studies on NRM, followed in Section 6.4 by a review of studies that applied deliberative MCA. Section 6.5 presents the options and criteria applied in the reviewed studies. In Section 6.5.1 the application of MCA methods for NRM decision-making is presented. Furthermore, Section 6.5.2 presents a review of studies applying the concept of property rights regarding NRM and land-use conflicts with a focus on wildlife, while those using MCA and GIS for tourism are presented in Section 6.5.3. Section 6.5.4 presents a review of studies on the integration of ecosystem services in the MCA framework, followed by those which applied a community survey to corroborate the MCA results. A discussion on the strengths and limitations, as well as the theoretical and methodological gaps that have emerged in the application of MCA for wildlife management, land use, ecosystem services, forest and ecotourism, are presented in Section 6.6. The research gaps identified in this review will contribute to the development of the MCA theory and methods and their application for the management of natural resources, particularly wildlife.

6.1 Assessment Criteria of the Systematic Review and Sources of Data

This chapter is a systematic review of empirical MCA studies published in English on wildlife management, forests, ecotourism, ecosystem services and land, found by keyword searches in the online search engines Scopus, Web of Science, Science Direct and Google Scholar. Using a careful and refined quality assessment, 36 articles and book chapters on NRM, published in international peer-reviewed journals and scholarly edited books between 2000 to 2019 were included in this review. The articles were obtained mainly from journals such as *Land-use Policy*, *Forest Ecology and Management*, *Ecological Economics*, *Environmental Management*, *European Journal of Operational Research*, *Forest Policy and Economics*, *Ecological Indicators*, among others. These studies were from the disciplines such as forest planning and

management, ecosystem services and land use, tourism planning and management, and wildlife management. Articles outside these disciplines were excluded from this review. Furthermore, dissertations, theses, conference proceedings and unpublished resources were not included in the review. The assessment criteria used in this review includes geographical location of the study, stakeholder involvement, methods of obtaining information from stakeholders, weighting and aggregation methods adopted, property rights, ecosystem services, and spatial MCA.

6.2 Application of MCA for NRM

There has been growing interest in the application of MCA for NRM, such as forests, water, wildlife and energy, shown by the growing number of publications. However, more studies have been published in forest management than other NRM fields (e.g. Mendoza and Prabhu 2003; Kangas *et al.* 2005; Mendoza and Prabhu 2005; Wolfslehner *et al.* 2005; Kangas *et al.* 2006; Balana *et al.* 2010; Khadka and Vacik 2012; Baral *et al.* 2019; Nyongesa and Vacik 2019). Many studies also applied MCA to land-use and ecosystem services after publication of the *Millennium Ecosystem Assessment* (2005) report (e.g. Newton *et al.* 2012; Koschke *et al.* 2012; Scolozzi *et al.* 2012; Srdjevic *et al.* 2013; Fontana *et al.* 2013). Similarly, MCA and GIS as a spatial technique have been widely applied in NRM studies. Here, a geographical database is created using available software to develop a proposed alternative map for the planning and management of natural resources (e.g. Kumari *et al.* 2010; Ok *et al.* 2011; Bukenya 2012; Bunruamkaew and Murayama 2011; Jozi and Ebadzadeh 2014). In contrast to forest and ecosystem services, there is a gap in the literature in which few published studies have applied MCA in wildlife management, particularly in African protected areas, where there is a lot of interaction between communities and wildlife (Zia *et al.* 2011; Sanare *et al.* 2015; see also Zia *et al.* 2015; Redpath *et al.* 2004 Mustajoki *et al.* 2011). In Tanzania for instance, only a few published studies have applied MCA for wildlife management, although NRM decision-making problems have been increasing (Kijazi and Kant 2011; Zia *et al.* 2011; Lin *et al.* 2014; Sanare *et al.* 2015).

6.3 Stakeholder Analysis and Engagement

Stakeholder analysis and engagement is an important component of the participatory MCA decision-making process (Ananda *et al.* 2007). In fact, participatory MCA came into being to

address the limitations of traditional MCA techniques such as cost and benefit analysis which lacks the participatory approach to decision-making. Empirical studies presented in this review put stakeholders in categories according to the nature of the problem analysed (Ananda *et al.* 2007; Ok *et al.* 2011). The studies revealed that both expert and non-expert stakeholders were chosen from NRM groups concerned with forests, wildlife, tourism and conservation, examples of whom were tour operators, tourists, ecologists, entrepreneurs, and community representatives (Proctor and Drechsler 2003; Rodriguez-Dowdell *et al.* 2007; Ok *et al.* 2011). However, almost half of the studies reviewed did not engage a wide range of stakeholders in the MCA process. Most of the studies involved less than 20 stakeholders in the MCA workshops. Exceptions to this are Ananda *et al.* (2007) who involved 106 stakeholders, and Khadka and Vacik (2012) who involved 72 stakeholders in their community-based forest management study. The above is not surprising seeing that involving a large number of stakeholders in MCA makes it difficult for stakeholders to express their preferences from all the criteria and indicators used in the evaluation. This makes it hard for a researcher to produce a suitable MCA model.

Reviewed studies used various means to obtain information from stakeholders. Most studies used questionnaires, interviews, Delphi surveys, FGDs, deliberative workshops, meetings with experts and public events (Newton *et al.* 2012; Scolozzi *et al.* 2012; Srdjevic *et al.* 2013). FGDs and meetings with experts are the methods most applied to explore the problem and obtain information from stakeholders in the MCA decision-making process (Zia *et al.* 2011; Khadka and Vacik 2012; Zia *et al.* 2015; Favretto *et al.* 2016; Baral *et al.* 2019; Nyongesa and Vacik 2019). Most studies dealing with wildlife conservation and ecosystem services adopted meetings with experts because assessing ecosystem services is a technical exercise that requires experts. For instance, Fontana *et al.* (2013) involved experts from the forestry and fishery department, a spokesperson for farmers and tourism, a carbon and vegetation scientist, and an agronomist, to agree on the criteria for evaluating forest ecosystem services. Also, Zia *et al.* (2011) used experts from the fields of economics, political science, ecology, sociology, biology, anthropology, and non-governmental and government organisations to evaluate National Park management in Tanzania. It is clearly discernible from the above that most MCA studies overly used experts at the expense of individual local communities. The lack of engaging individual local communities is a major weakness in many of the existing MCA studies because they miss the views and preferences of local communities.

Following stakeholder analysis and engagement is problem definition, an important stage in MCA application. Before advancing to other stages, the MCA analyst, stakeholders and decision makers are required to explore and define the problem. Although most reviewed studies adopted the MCA process described in Chapter 5, the problems were not well-defined, leading to ambiguity, inconsistency and a misunderstanding of how the decision-making process works (see for example, Fontana *et al.* 2013 ; Favretto *et al.* 2016).

6.4 Application of Deliberative MCA Approaches

In recent years, there has been growing interest among researchers in applying the deliberative approaches to natural resource planning and management. This is due to the fact that it has been demonstrated that combining MCA with the deliberative approach, assists in circumventing some difficulties in decision-making (Proctor and Drechsler 2003; Zia *et al.* 2011; Zia *et al.* 2015). For instance, Zia *et al.* (2015) applied it by organising two workshops on National Park management. The first workshop was for experts only, while the second involved only a few stakeholders who participated in the first workshop. A survey was distributed to all individuals in both workshops on criteria weighting. Similarly, Proctor and Drechsler (2003) applied deliberative MCA to determine recreation and tourism options in Australia. The Citizen Jury, as mentioned above which uses a deliberative approach, was adopted in which the stakeholders were composed of natural resource managers and both expert and non-expert stakeholders. One limitation of the deliberative MCA approach is that, although it is expected that stakeholders will be given an opportunity to express themselves, in reality this is not happening, as more powerful participants influence or weaken the participation of other stakeholders. This notwithstanding, the deliberative approach is to be preferred to traditional methods. This is because the approach demonstrates the strength of giving stakeholders a thorough understanding of how complex the decision-making process being explored is. Yet, out of the many MCA studies that have been published over the decades, very few have used participatory deliberative MCA methods (see Nordstrom *et al.* 2010). However, the participatory deliberative approach has the potential to make the MCA process legitimate, transparent and acceptable, since stakeholders are given the opportunity to present their own objectives and criteria.

6.5 The MCA Options and Criteria Developed and Applied to NRM

Options and criteria are important building blocks of the MCA to NRM decision-making problems. In most reviewed studies, the options were policy options, management options, or planning options (Locatelli *et al.* 2008; Newton *et al.* 2012; Koschke *et al.* 2012; Scolozzi *et al.* 2012; Fontana *et al.* 2013; Srdjevic *et al.* 2013). The options are developed and presented based on the subject of the study, such as land-use planning, National Park management, ecotourism planning, forest planning and management, ecosystem trade-offs, and conservation development (Redpath *et al.* 2004; Kangas *et al.* 2006; Balana *et al.* 2010; Khadka and Vacik 2012; Bukenya 2012; Fontana *et al.* 2013; Favretto *et al.* 2016; Heck *et al.* 2016). The average number of options in most studies as summarised in Table 6.1 was five, although studies on forest management used up to 46 options (Balana *et al.* 2010; Khadka and Vacik 2012). The options presented in these studies maintained the current option or used hypothetical options, which are ‘mutually exclusive’. However, the options presented in most studies are ‘non-exclusive’ because of the nature of the MCA problems analysed. For example, studies dealing with power and process dynamics faced challenges in developing mutually exclusive options (Zia *et al.* 2011). Also, the options representing benefits to local communities in most of the studies are not explicitly mentioned (Heck *et al.* 2011).

A unique system of developing options has been presented by Zia *et al.* (2011) in which options were developed based on IUCN categories of land use in Protected Areas. However, their study on National Park management in Tanzania revealed some difficulties in fitting the options into IUCN categories since most African protected areas occur on land where communities live without well-defined and enforceable property rights. Furthermore, Zia *et al.* (2015) developed four National Park conservation-development alternative options, which two were slightly different from those of the IUCN, namely total development and community owned. It was found that the ‘community ownership’ option which was not in the IUCN categories was not an appropriate option since communities do not have the experience needed to manage communal natural resources. However, the option was retained for further exploration during the preceding MCA workshops since communities in that area depended on the natural resources and ecosystem services of the National Park. In the same study (Zia *et al.* 2015) the business-as-usual option (current option) was rejected and stakeholders suggested alternative options, contrary to Khadka and Vacik (2012), who found that stakeholders hesitated in

developing new alternative management options since they wanted to maintain the current option.

Furthermore, Kijazi and Kant (2011) presented three socially acceptable forest regime options by different forest stakeholders in Kilimanjaro National Park in Tanzania, which were centralised, participatory and collaborative. The study found that the participatory forest regime option was preferred by local communities rather than the centralised or collaborative ones. Significantly, Kijazi and Kant (2011) found that a participatory regime enables a shift from bureaucratic centralised policy making to outreach programmes that address the issues of public education, benefit sharing and participatory planning that engages all stakeholders (Kijazi and Kant 2011). Thus, most options presented in the reviewed studies varied in terms of the type and number of the stakeholders involved, and the nature of the studies.

Apart from the options analysed above, most criteria presented in the reviewed studies on the decision-making problem were socio-economic, ecological, environmental and cultural. Table 6.1 below presents a summary of the number of criteria used in the reviewed studies on forest planning and management. The criteria are grouped as ecological, economic, social and cultural, the number ranging between three and six. Many studies, particularly those dealing with forests, have adopted criteria and indicators developed by the Center for International Forestry Research (e.g Kangas *et al.* 2006; Mendoza and Prabhu 2003; Balana *et al.* 2010; Khadka and Vacik 2012). The criteria involved compliance with laws under a policy framework, management systems, environmental and forest health, appropriate management plan, community wellbeing and monitoring and assessment. Furthermore, the indicators presented included enforcement and evaluation of laws, control encroachment and grazing, maintain wildlife habitat and biodiversity, ensure public participation; sharing economic benefits, and monitoring requirements (Khadka and Vacik 2012). Generally, the economic, social, cultural, ecological and political dimensions of MCA studies in NRM have helped in address NRM problems in a holistic manner.

Table 6.1 Forest planning and management

Author	Area of evaluation	Weighting and aggregation method	Number of Options	Number of criteria	Location
Ananda <i>et al.</i> (2007)	Forest Land-use policy	AHP (Pairwise Comparison)	3	3	Australia
Balana <i>et al.</i> (2010)	Sustainability Forest Management	AHP (Pairwise Comparison)	43	6	Ethiopia
Baral <i>et al.</i> (2019)	Community Forest Management	AHP	4	10	Nepal
Kangas <i>et al.</i> (2005)	Forest Planning and Management	SMAA-O	9	3	Finland
Kangas <i>et al.</i> (2006)	Strategic Forest planning	SMAA-2	20	5	Finland
Khadka and Vacik (2012)	Sustainable Forest Management	AHP	46	6	Nepal
Kijazi and Kant (2011)	Forest Management Regime	Fuzzy-Logic	3	3	Tanzania
Kurtilla <i>et al.</i> (2000)	Forest Planning and Management	AHP and SWOT	4	13	Finland
Lin <i>et al.</i> (2014)	Forest Management	GIS + Weighted Linear Combination	5	4	Tanzania
Mendoza and Prabhu (2003)	Sustainable Forest Management	AHP (Cognitive Mapping)	30	6	Zimbabwe
Mendoza and Prabhu (2005)	Community Forest Management	Participatory Modelling-static and dynamic	4	5	Zimbabwe
Nordstrom <i>et al.</i> (2010)	Participatory Forest Planning	AHP +Weighted Arithmetic mean	3	4	Sweden
Nyongesa and Vacik (2019)	Forest and National Park Management	AHP	7	21	Kenya
Proctor (2005)	Valuing Forest Resources	AHP	5	3	Australia
Sarikoski <i>et al.</i> (2013)	Forest conflict management	MAVT	5	6	Finland
Wolfslehner <i>et al.</i> (2005)	Sustainable Forest Management	AHP and ANP	4	43	Austria

Notes:

AHP = Analytical Hierarchical Process.

ANP = Analytic Network Process.

SMAA = Stochastic Multi-criteria Acceptability Analysis.

MAVT = Multi-attribute Value Theory.

SWOT = Strengths, Weaknesses, Opportunities and Threats.

6.5.1 Application of MCA weighting and aggregation methods

The application of MCA weighting methods in NRM studies has undergone changes over time. Out of the 36 studies reviewed, the AHP is applied in 12 studies, particularly on forest management (Kangas *et al.* 2005; Mendoza and Prabhu 2005; Wolfslehner *et al.* 2005; Proctor 2005; Kangas *et al.* 2006; Ananda *et al.* 2007; Kumari *et al.* 2010; Khadka and Vacik 2012; Koschke *et al.* 2012; Baral *et al.* 2019; Nyongesa and Vacik 2019). Others applied the ELECTRE (OK *et al.* 2006; OK *et al.* 2011); PROMETHEE (Proctor and Drechsler 2003; Fontana *et al.* 2013); Stochastic Multi-criteria Acceptability Analysis (SMAA), Measuring Attractiveness by a Category-Based Evaluation Technique (MACBETH) and Weighted Summation (WS) (Newton *et al.* 2012; Favretto *et al.* 2016). Others have used a combination of methods in weighting criteria. For instance, Kurtilla *et al.* (2000) applied AHP in the SWOT framework, a hybrid method. The application of MCA and other methods such as SWOT is referred to as hybrid MCA. The strength of applying the hybrid method is that it can be used to enhance strategic planning (Kurtilla *et al.* 2000). The study by Ok *et al.* (2011) on ecotourism planning also applied three separate techniques, ELECTRE I, ELECTRE II and AHP. However, the limitation of applying several techniques for analysing the same problem is that they may have similar results, but when applied to solving an unrelated problem the outcome may be different (see Wolfslehner *et al.* 2005). It was also found in the review that almost half of the studies applied the ranking and rating technique for criteria weighting. Also, the review on the use of software in the MCA process revealed that Expert Choice, Arc GIS, DEFINITE and Pro-Dec X were applied in most studies (OK *et al.* 2006; Kumari *et al.* 2010; Ok *et al.* 2011; Bunruamkaew and Murayama 2011; Jozi and Ebadzadeh 2014; Sarky 2017). However, most of these studies mainly relied upon experts in these methods at the expense of stakeholders.

6.5.2 Application of MCA for NRM and property rights

The application of MCA for addressing NRM conflicts requires a clear understanding of associated property rights. This is because most conflicts over the use of natural resources, such as forests and wildlife, concern the lack of well-defined property rights. Four out of the 36 studies reviewed addressed the problem of conflicts over natural resources together with property rights. These included Rodriguez-Dowdell *et al.* (2007), Mustajoki *et al.* (2011),

Saarkoski *et al.* (2013), and Favretto *et al.* (2016) (see Table 6.2). Mustajoki *et al.* (2011) conducted a study on property rights and forest conflicts in an area important for reindeer grazing and tourism. Similarly, in the study by Saarkoski *et al.* (2013) on forest conflict management, MCA was undertaken in an attempt to resolve the conflict over the Sammi people's right to graze their reindeer on winter pastureland. The attempt was however, unsuccessful. Favretto *et al.* (2016) also analysed rangeland-use types based on property rights, namely private fenced cattle ranching, communal livestock grazing, and private game farming. The study found that communal livestock grazing on private property provides a wide range of monetary and non-monetary benefits from ecosystem services compared to other options.

The study by Rodriguez-Dowdell *et al.* (2007) presented in Table 6.2 is the only study on MCA and property rights-based management of ecotourism in which the options were presented based on the characteristics of property rights including exclusivity, transferability, divisibility and duration. The property right options assessed by Rodriguez-Dowdell *et al.* (2007) are free access, a limited number of permits for local users, and concessions. The evaluation criteria involved efficiency, equity, transaction costs, acceptance and duration. It was found that concession is the best option as it is efficient, equitable, less costly, and more favoured by 73 percent of the local people. The concession was revealed to be exclusive, not transferable, it could be divided among users, and its duration of ownership could last up to 50 years, unlike permits for local users which were non-exclusive, not divisible, not transferable and could last for only one season. This study demonstrates how property rights characteristics are integrated in MCA decision-making framework to determine rights and obligations to access, use and manage natural resources.

Table 6.2 Protected areas management

Author	Nature and context of the problem	Weighting and aggregation method	Type of protected area	Location
Brown <i>et al.</i> (2001)	Ecosystem trade-offs in marine protected areas	MCA trade-off analysis	Marine Protected Areas	Tobago
Favretto <i>et al.</i> (2016) ^a	Ecosystem trade-offs in different rangeland uses	Weighted Summation	Adjacent to Kgalagadi Transfrontia Park	Botswana
Heck <i>et al.</i> (2011)	Management of marine protected areas	AHP	Marine Protected Areas	Canada
Mustajoki <i>et al.</i> (2011) ^b	Managing grazing in natural and wilderness areas	MAVT + DAI	Finnish Lapland Protected Areas	Finland
Redpath <i>et al.</i> (2004) ^c	Human-wildlife conflict decision	Weighted Sum	Uplands of the United Kingdom	Scotland
Rodriguez-Dowdell <i>et al.</i> (2007) ^d	Tourism Management	Surveys + MCA	Bahia de los Angeles Marine Park	Mexico
Zia <i>et al.</i> (2011)	Managing socio-ecological systems	Linear aggregation	Ruaha National Park	Tanzania
Zia <i>et al.</i> (2015)	Deliberative MCA of National Park management	Linear aggregation	Bai Tu Long National Park	Vietnam

Notes:

a= property rights and land use examined.

b = property rights and wildlife examined.

c= hunting tourism examined.

d= adopted characteristics of property rights.

DAI= Decision Analysis Interview.

6.5.3 Application of GIS for MCA of tourism planning and management

The GIS technique has been applied to MCA studies to evaluate the planning and management of natural resources. Table 6.3 presents the reviewed studies which applied spatial MCA in NRM. Eight of the 36 studies reviewed applied spatial MCA, with six of them for ecotourism planning and management presented in Table 6.3 (Kumari *et al.* 2010; Bunruamkaew and Murayama 2011; Bukenya 2012; Jozi and Ebadzadeh 2014; Sarky 2017). These studies used GIS in the MCA process because sensitivity analysis of the results can easily be done by employing a graphical user interface thereby allowing the decision maker to query individual options to obtain critical information (Bukenya 2012; Kumari *et al.* 2010).

Table 6.3 Tourism planning and management

Author	Area of evaluation	WA and spatial MCA
Bukenya (2012)**	National Park Management	GIS
Bunruamkaew and Murayama (2011)	Evaluation of Ecotourism site	AHP +GIS
Jozi and Ebadzadeh (2014)*	Land use planning	Delphi, GIS + AHP
Kumari <i>et al.</i> (2010)	Ecotourism Planning	AHP + GIS
Sarky (2017)	Ecotourism Planning	MCE +GIS
Sanare <i>et al.</i> (2015) **	National Park Management	AHP + GIS

Notes:

WA= weighting and aggregation methods,

* = three techniques were applied, and

** = spatial analysis of the core protected area.

6.5.4 Application of ecosystem services in MCA framework

Table 6.4 presents the studies that applied ecosystem services and land-use in the MCA framework. They include Locatelli *et al.* (2008), Newton *et al.* (2012), Koschke *et al.* (2012), Scolozzi *et al.* (2012), Fontana *et al.* (2013) and Srdjevic *et al.* (2013). The application of ecosystem services for NRM can be traced back to when the *Millennium Ecosystem Assessment Report* was published in 2005 (Fontana *et al.* 2013). Since then, research has focused on quantitative MCA modelling of ecosystem services, in which monetary and non-monetary goals are integrated. Fontana *et al.* (2013) used MCA with three land-use options in an ecosystem services framework to illustrate the implications of land-use types for ecosystem services. The study revealed that spruce-larch forest alternative was ranked first because the

forest provided more ecosystem services. This was followed by extensive larch meadow forest and intensive meadow forest alternatives. Similarly, Koschke *et al.* (2012) used the integrative approach to undertake land cover assessment of ecosystem services, combining experts' opinions and the literature. Fontana *et al.* (2013) applied a modified ecosystem assessment approach known as the economics of ecosystems and biodiversity, which contributed to the assessment of regional economic benefit of the biodiversity. The study found that the use of coarse Corine Land Cover data (a collection of information about land cover which was created during the programme implemented by the European Union), poses a challenge to investigating ecosystem services. In general, the review revealed that combining monetary and non-monetary goals has the potential to mitigate conflicts over ecosystem services (Brown *et al.* 2001; Fontana *et al.* 2013).

Table 6.4 Ecosystem services and land-use options

Author	Type of option	Weighting and aggregation method	Stakeholder engagement
Fontana <i>et al.</i> (2013)	Land-use options	PROMETHEE II	Questionnaire
Koschke <i>et al.</i> (2012)	Planning options	AHP and Arc GIS	Public event
Locatelli <i>et al.</i> (2008)	Policy options	AHP and Fuzzy Set Theory	Expert interviews
Newton <i>et al.</i> (2012)	Management options	Weighted Sum	Online Survey
Scolozzi <i>et al.</i> (2012)	Land-use options	GIS	Delphi survey + FGD
Srdjevic <i>et al.</i> (2013)	Planning options	AHP	Deliberative approach

Notes:

Stakeholder Engagement = methods used to engage stakeholders and elicit informations.

6.5.5 Application of a community survey in MCA

The overwhelming majority of the empirical MCA studies reviewed employed a survey and FGD semi-structured interviews to obtain information from stakeholder groups and experts. Heck *et al.* (2011) applied the survey technique using commercial, recreational and non-commercial user groups to determine their expectations of a proposed protected area. The survey was administered face-to-face with the stakeholders who were involved in an earlier workshop. Brown *et al.* (2011); Scolozzi *et al.* (2012); Fontana *et al.* (2013); and Srdjevic *et al.* (2013) also applied the survey technique to obtain information from stakeholders for MCA evaluation.

It should be noted, however, that these studies did not collect survey data from individual community members. Kijazi and Kant (2011) are an exception, as they used a community survey involving 93 local people from 14 villages and other stakeholders adjacent to Kilimanjaro National Park in Tanzania. The study found that the joint forest management regime was the best option and the most preferred by local communities. This finding emerged as a result of the involvement of a large number of community members from the villages adjacent to the National Park. Their findings demonstrate the veracity of the assertion that using a community survey to collect information to triangulate MCA data addresses the gap created when only a few stakeholders in focus group interviews are involved (Beierle and Cayford 2002). In this way, community members' preferences and interests are obtained and incorporated into the MCA decision-making process. Promoting individual participation in the MCA process through the survey also helps to inform, consult, involve, collaborate with, and empower individual community members in the decision-making process (Nordstrom *et al.* 2010). Through this, the decision-making process becomes more transparent, equitable and representative. The fact that a significant number of the studies reviewed in this chapter did not involve marginalised and under-represented communities is an indication that researchers and practitioners need to move beyond traditional and non-participatory MCA methods. Here is where more participatory approaches such as a community survey becomes useful as they provide the public with more knowledge, increased transparency, and improved decision-making.

6.6 Discussion of the Strengths and Limitations of Applying MCA for NRM

The review found that growth in the methodological and theoretical application of MCA has made a significant contribution to the management of natural resources. However, there are more studies on MCA and forest planning and management than on wildlife management. Most of the studies on forests were undertaken in developed countries, led by Finland (Kurtilla *et al.* 2000; Kangas *et al.* 2005; Kangas *et al.* 2006; Saarkoski *et al.* 2013). This is possibly due to the economic potential of forests, and conflicts among stakeholders, particularly communities using both wood and non-wood products. Furthermore, forests provide more ecosystem services which support the livelihoods of communities across the globe. Tourism planning and management in both marine and terrestrial protected areas were well covered in a number of reviewed studies. It is worth noting that MCA studies particularly in Africa, on wildlife management options, are scant, despite many communities living both in and outside

protected areas. It was found that using MCA to evaluate wildlife management options could potentially contribute to address the trade-offs, but also MCA theory and methodology.

Stakeholder analysis and engagement in participatory MCA featured in most of the studies reviewed. The preference for participatory MCA rather than traditional MCA, which involves a single decision maker, is due to the advent of participatory NRM, particularly in forests. Participatory MCA gives the researcher the ability to incorporate the views of the community members affected by NRM problems in decision-making. Stakeholders involved in these studies were chosen based on the nature of the study, and were engaged through questionnaires, interviews, Delphi surveys, FGDs, deliberative workshops, meetings with experts and public events (see for example, Zia *et al.* 2011; Newton *et al.* 2012; Scolozzi *et al.* 2012; Srdjevic *et al.* 2013). There has been a paradigm shift from using FGDs as the main participatory MCA method to more interactive methods, such as deliberative MCA using surveys and interviews. However, the review showed that there were still some limitations concerning how stakeholders were involved in the whole MCA process. This is because these studies involved fewer participants and this oftentimes resulted in disagreement on objectives and poor stakeholder expectations. It also resulted in less transparency and unequal representation in decision-making. The review, however, found that a community survey involving individual community members can be used as an alternative technique to enhance public participation in MCA studies. The perceptions of local communities in relation to NRM problems are more likely to be elicited and included in MCA studies through participatory methods such as community surveys.

Another important finding is that most of the studies reviewed failed to clearly define the problem, as they focused on developing options and criteria. They also presented the options and criteria to the stakeholders, rather than the stakeholders discussing the problem and coming up with evaluation criteria and options. This goes against the MCA theory, particularly participatory MCA. Procedures for developing options in participatory MCA should be explored by both experts and stakeholders, since presentation of the options to stakeholders is best suited to non-iterative rather than participatory MCA. It was found that the alternative options created in most of the reviewed studies were not mutually exclusive, contrary to MCA theory. For example, Nyongesa and Vacick (2019) presented forest management options, such as biodiversity conservation, climate change mitigation, research and education and community interests, which are not mutually exclusive.

Some studies have developed options based on the IUCN classification of land-use in protected areas (Zia *et al.* 2011, 2015). However, this is not viable in Africa, where there is a lack of well-defined property rights to communal land adjacent to protected areas. In this case, options for the LGCA need to be developed by taking into account existing property rights to land and other natural resources which can be discussed and presented by stakeholders and experts. Furthermore, the review found that most studies only presented socio-economic, ecological and cultural criteria, leaving out the political criterion. However, having a political criterion such as good governance in NRM is important because it ensures transparency and accountability (Zia *et al.* 2011). In addition, various names were given to criteria in most of the reviewed studies. There is therefore a need to adopt a common term, 'criteria', instead of terms such as attributes, because 'criteria' is the name most commonly used when using MCA in resolving natural resource and environmental management decision-making problems. The average number of criteria and options in the reviewed studies was five, but forest studies used up to 46 options. However, it was found that the use of large numbers of options and criteria was ineffective.

The main challenge for using MCA in natural resources decision-making is how to develop and rank criteria and options that are acceptable to all stakeholders. This is because some options have more negative ecological and economic implications than others. Common limitations of studies applying MCA for NRM are the lack of a representative set of options, and an excessive and unbalanced number of criteria for different objectives (Ademand Geneletti 2018). For example, in some reviewed studies, MCA encountered a challenge when options were being sought. A group of elites wanted to use their power to maintain the current option for their own benefit and because they thought that the introduction of new management strategies would affect the performance of the current option (Khadka and Vacik 2012). However, this is not feasible in the LGCA, since its current status is the preferred option among a few stakeholders, and majority of the local communities in particular are looking for alternative wildlife management options. The government has been insisting that a viable option for the LGCA is to become a Game Reserve. However, other potential options should be considered by stakeholders that would explicitly address the conflicts and improve local livelihoods.

The review also revealed that community-based natural resource options such as WMAs, communal livestock grazing areas, and participatory forest management, were more acceptable to local communities than non-participatory options (Kijazi and Kant 2011; Favretto *et al.* 2016). This implies that under co-management options the local communities are given more power to manage the natural resources around them than the state and private right-holders. However, some studies indicated that local communities did not have experience in managing natural resources while others revealed that community-based policy options were less preferred by stakeholders (Zia *et al.* 2015).

With regard to weighting and aggregation of MCA methods, AHP is widely applied in studies on MCA in NRM. This wide application stems from the fact that AHP is easy to use by both skilled and unskilled people (Ananda *et al.* 2007). Despite its wide application, AHP makes ranking difficult when many options are involved. Other widely applied methods comprise ELECTRE I, ELECTRE II and PROMETHEE, Weighted Summation, Stochastic Multi-criteria Acceptability Analysis and Multi-attribute Value Theory. On the other hand, ranking and rating were mostly adopted as weighting techniques in most reviewed studies. Despite the multiplicity of methods, no theory has been developed on choosing which MCA method is suitable for a certain problem (Hajkoviciz 2000). Other studies have combined AHP with other methods such as SWOT to produce a hybrid MCA framework (Kurtilla *et al.* 2000). Most of the reviewed studies on ecotourism and land-use planning and management adopted spatial MCA, a combination of MCA and GIS. With spatial MCA, sensitivity analysis of the MCA results can be easily performed by employing a graphical user interface. In terms of software, most studies applied Expert Choice and DEFINITE since they are easy to use and stakeholders can be involved in the whole process of MCA. In addition, both programmes can perform standardisation and sensitivity analysis of the MCA results.

The application of MCA for wildlife management received the least amount of attention in most of the reviewed NRM studies. The issue of property rights was also virtually ignored in MCA reviewed studies. It has been pointed out that it is important to address the problem of property rights otherwise the MCA results will be groundless and conflicts will persist after making any decisions (Mustajoki *et al.* 2011; Saarkoski *et al.* 2013). These studies demonstrate that, since MCA is not a decision-making tool but is designed to support decision-making, it is vital to gain an understanding of how conflicts over resources arise in order to make the MCA tool more effective (see Chapters 2 and 3). Rodríguez-Dowdell *et al.* (2007) presented a

better framework for integrating the characteristics of property rights in MCA for NRM while taking all the stakeholders into consideration. Thus, at the LGCA, it is imperative to address the question of property rights in each wildlife management option.

Apart from property rights, it was found that the concept of ecosystem services has been applied in MCA studies in NRM. Livestock grazing and wildlife hunting are mentioned as ecosystem services which have received a lot of attention in the reviewed studies (Saarkoski *et al.* 2013; Favretto *et al.* 2016). Ecosystem services have the ability to combine monetary and non-monetary options, which means they are more likely to be able to resolve conflicts associated with land-use. It was also realised that the application of property rights and ecosystem services has the potential to contribute to the future theoretical development of MCA in wildlife management. Thus, it is important to integrate ecosystem services in the MCA framework.

Despite the potential of MCA to resolve conflicts in NRM, Langemeyer *et al.* (2016 p. 54) have asserted that ‘MCA is not a silver bullet for all decision-making situations’ as it has its own limitations, such as inconsistency of the criteria weights and scores and the lack of a perfect method for obtaining information from stakeholders. Srdjevic *et al.* (2013) also noted that, although there is increased involvement of stakeholders in MCA, there is still no appropriate or acceptable decision-making framework. To overcome these shortcomings, few scholars have used community surveys to corroborate MCA results in order to support decision-making. This is a significant contribution to MCA as it is important to incorporate the perceptions and preferences of local communities in the decision-making process. Finally, due to the theoretical and methodological gaps identified in this review, it was considered important to develop an appropriate MCA framework for evaluating wildlife management options in the LGCA.

6.7 Summary

Many MCA studies have been undertaken over the years and these have helped to refine both the theory and methodology of applying MCA for NRM. Though MCA has proven to be an appropriate approach to solving NRM problems, the approach still suffers some weaknesses. One of these weaknesses is poor stakeholder participation in the decision-making process. Only a few MCA studies have been conducted on wildlife management options in African

protected areas where communities are dependent for their livelihoods. In addition, the issue of property rights in MCA is limited to a few studies, although this issue is central to most NRM problems in developing countries. Very few studies have used community surveys to obtain information to support decision-making and triangulate MCA results. There is therefore a need to develop an MCA framework that will address the issues of property rights and ensure the participation of local communities in NRM decision-making in a rational and transparent manner. This study addresses these gaps in subsequent chapters by adopting an MCA framework that incorporates the views of different individual community members on the underlying problems of wildlife management in the LGCA.

Chapter 7. The Process of the FGDs and the Community Survey

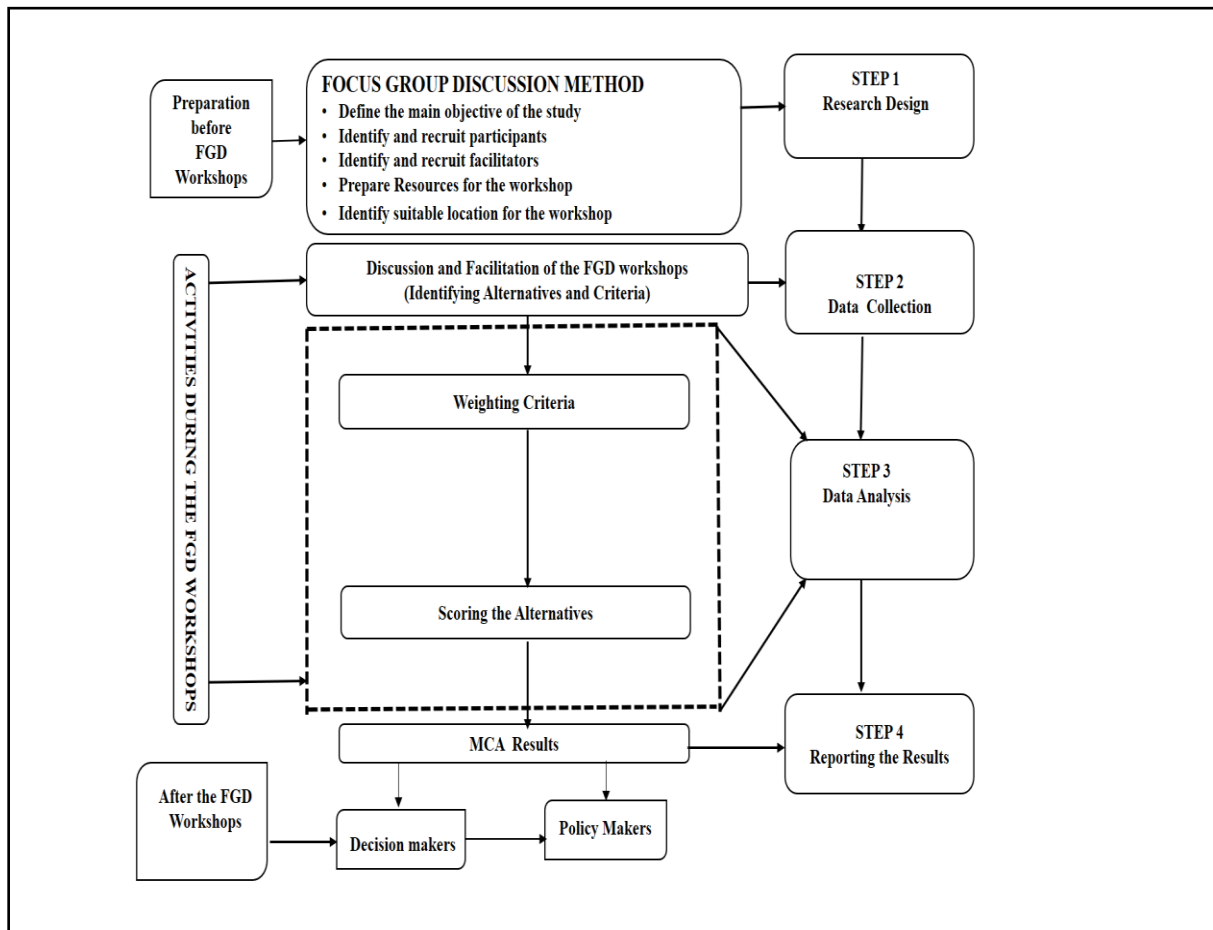
This chapter presents the methods that were applied to analyse the problem of wildlife management in the LGCA for this study. It details the practical application of the methodological concepts of the MCA and survey advanced in the above Chapter 5. Section 7.1 presents the process of applying a participatory FGD as the main method used for conducting MCA workshops. Section 7.2 presents the community survey method adopted to supplement the MCA data. The sources of survey data and the sampling procedure are described in Sections 7.2.1 and 7.2.2, while the survey data collection instrument is presented in Section 7.2.3. This chapter also presents the methods and techniques that were used for analysing data. The chapter is summarised in Section 7.3.

7.1 Focus Group Discussions in MCA Framework for the LGCA

The MCA framework was employed to analyse the preferable policy option for managing wildlife in the LGCA. This method helped to answer the primary research question and specific objectives of the study. This study adopted a participatory MCA framework due to the nature of the wildlife management problem in the LGCA in which multiple stakeholders with conflicting interests were involved. The participatory MCA involved stakeholder groups from sectors such as conservation, agriculture, pastoralism, hunting and ecotourism in evaluating the decision-making problems in the LGCA. The participatory FGD was the main approach for data collection in this thesis. This was done in a series of facilitated workshops using interviews. The FGD interviews were used to identify options and criteria, and also to evaluate the policy options for managing wildlife at the LGCA. The MCA evaluation focused on the effectiveness of wildlife management practices in the LGCA.

As described above in Chapter 5, the following Figure 7.1 illustrates the common procedures for undertaking MCA using FGD workshops was used for the evaluation.

Figure 7. 1 Focus group discussions in MCA framework



Source: Author's Construct (2019).

The following twelve steps were used to design, conduct, and report all FGDs in the LGCA

- 1) An experienced moderator was recruited to lead all MCA focus group meetings.
- 2) Stakeholders who signed the consent form and participants information sheet were invited to attend the FGDworkshop.
- 3) The moderator opened a workshop with a welcome note to the participants
- 4) The moderator and the principal researcher introduced themselves and the members were asked to introduce themselves to each other.
- 5) After the introduction, the moderator stated the aim of the workshop.
- 6) A general timetable was provided to all participants of the workshop.
- 7) Ground rules for the workshop were laid down by the moderator.
- 8) A list of semi-structured FGD questions was used to guide the discussions.

- 9) The FGD started by an opening question followed by transition, engaging and closing questions.
- 10) The principal researcher as an assistant moderator was responsible to welcome participants on arrival, take notes, set equipment, recording and provide feedback to the moderator during the workshops.
- 11) After the FGD, the discussions were transcribed and the original FGD record was stored in a safe backup.
- 12) The information elicited from focus groups were used in MCA to support decision-making process on wildlife management in the LGCA.

The process of developing MCA for wildlife management in the LGCA involved four separate stakeholders and experts' workshops. The workshops were held at Wasso in Loliondo Division between August and November 2018. The stakeholders were interactively involved in all stages of the multi-criteria evaluation. Details of the process of applying FGDs followed by community survey in the MCA framework in the LGCA are presented below.

7.1.1 Identifying stakeholders and experts for the FGD workshops in the LGCA

The process of identifying the stakeholders to be engaged in multi-criteria decision analysis is the first and most important stage in the MCA process. Different stakeholder groups in the study area were identified to participate in FGDs. Random sampling was used to identify the stakeholder groups affected socially, financially or administratively by the wildlife management problem in the LGCA. Both expert and non-expert stakeholders were selected by the researcher and invited to attend the workshops.

The selection of experts was based on professional background, and knowledge on administrative, technical, and historical experience regarding wildlife management in the LGCA. The experts were from a diverse range of disciplines such as environmental science, wildlife management, ecology, tourism, NRM, public policy, economics, sociology, agriculture and land-use planning in the LGCA. They were engaged as stakeholders but also consulted for technical advice during FGDs. Almost all the stakeholders invited to the workshop, both experts and non-experts, were well-informed with vast experience of the problems of wildlife management in the LGCA. The experts from the head office of the NDC at Wasso were experienced in wildlife management, while the non-expert stakeholder group

had long-term experience in NRM in the study area. Both experts and non-experts comprising those representing photographic and hunting tourism, pastoralists, farmers, conservationists and local government leaders were involved in the decision-making process. The selection enabled a better appreciation of perceptions on, and preferences of the stakeholders on wildlife management at the LGCA.

The stakeholders were also selected according to their gender, age, educational level, expertise, experience, socio-economic status, the group they represented, and affiliation. Stratified random sampling was adopted to ensure that individual participants selected represented stakeholder groups. Sixteen individual stakeholders were selected from four stakeholder groups in the LGCA. Two stakeholders were selected equally from the four groups to avoid bias during MCA FGDs (see Table 7.1).

Table 7.1 Stakeholder groups represented in LGCA

Stakeholder groups represented	Nature of stakeholders	Total Number	Affiliation
Photographic Tourism	Experts	2	Thomson, AndBeyond
Hunting Tourism	Experts	2	OBC, NDC
Pastoralists	Non-experts	2	Freelance
Farmers	Non-experts	2	Freelance
Conservation	Experts	2	NGOs and CBOs
Local government leaders	Non-experts	6	Villages in LGCA
Total	Stakeholders	16	

Source: Stakeholders Workshop, August (2018).

Purposeful sampling was also used to select experts including an ecologist, a land-use planner, a sociologist, a lawyer, an environmentalist, a district wildlife ranger, and an agricultural extension officer. Expert and non-expert stakeholders with affiliation were from NDC, Community Based Organisations (CBOs), and Non-governmental Organisations (NGOs) in the area. Conservation experts from NDC were involved since they have been working in the area with SNP, Ngorongoro Crater Conservation Area Authority, Frankfurt Zoological Society, TANAPA, and TAWA (the Tanzania Wildlife Conservation Organisations collaborating with NDC). The experts were involved in MCA as a technical reference group

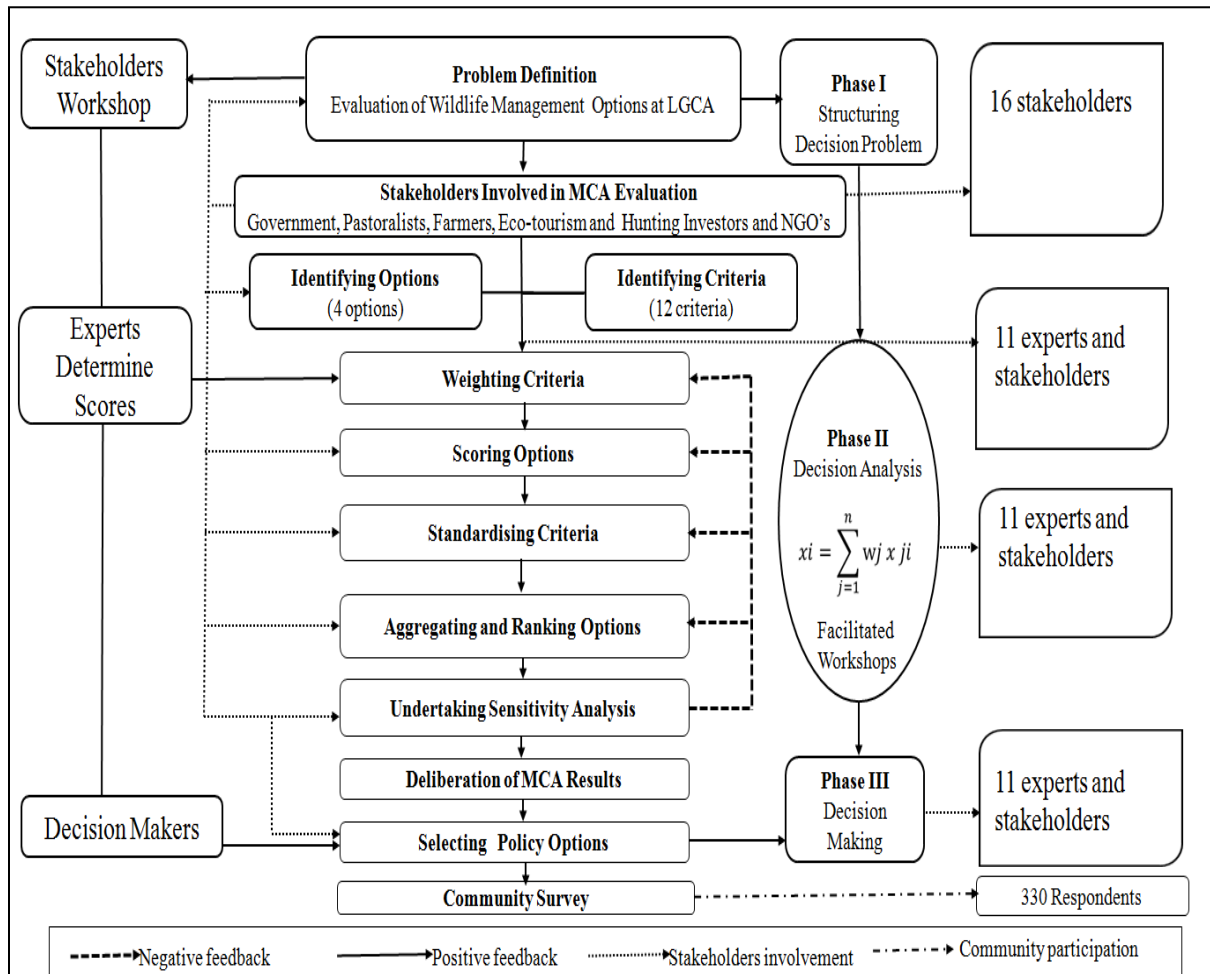
because they have skills and experience in ecological assessment and socio-economic management of wildlife and other natural resources in the study area. The roles and responsibilities of the participants were identified according to the MCA and FGD framework. A schematic framework of the MCA process adopted in this thesis for analysing the LGCA wildlife management options is presented in Figure 7.2.³

Non-expert stakeholders who participated in the meetings were pastoralists and farmers who represented local community groups in the LGCA. These were key village government leaders selected from the six most affected villages in Loliondo including Ololosokwan, Arash, Soitsambu, Olorien, Oloipiri and Maaloni. The presence of these village leaders were vital since they have been involved in developing policies and making decisions that affected the Maasai pastoralists in the LGCA villages in Loliondo. It should be noted that, although stakeholders such as pastoralists and farmers are usually viewed as ‘marginalised’ in the LGCA, they were able to contribute effectively and on an equal footing with experts during the workshop sessions. Indeed, their effective participation was important as wildlife and land-use conflicts significantly affected them.

Representatives of the NGOs and CBOs in Loliondo were also involved in the FGD workshops. The organisations represented include the Legal and Human Rights Centre (LHRC), the Loliondo Development Organisation (LADO), the Ngorongoro NGOs Network (NGONET), the Tanzania Natural Resources Forum (TNRF), the Pastoral Women Council (PWC), the Pastoralist Indigenous NGOs Forum (PINGOs Forum), and the Tanzania Pastoralists Hunter-Gatherers Organisation (TAPHGO). Two experts represented the NGOs and CBOs. These were all involved in developing options and criteria for evaluating wildlife management options for the LGCA.

³ The scoping session involved 16 stakeholders while the rest of the workshops involved 11 stakeholders and experts in evaluating the problem of wildlife management at the LGCA.

Figure 7.2 Multi-criteria analysis framework used at the LGCA



Source: Author's Construct (2019).

7.1.2 Defining the problem of wildlife management in the study area

Defining the problem of wildlife management in the LGCA involved exploring and identifying the issue that affects stakeholder interests or lifestyles. Semi-structured FGD questions were presented to all participants during the earliest FGDs (see Appendix 2). The first question invited the participants to discuss the current status of wildlife management policy involved in the LGCA. At this stage of exploring the problem the social, ecological and environmental dynamics of the management of wildlife and other natural resources were identified in the study area. Then, the current option was also analysed and clearly defined according to Tanzania's *Wildlife Management Policy 1998* and *Village Land Act of 1999*. This was done in a one-day FGD with stakeholders during the scoping session in the LGCA on 18th August

2018 in Wasso. A neutral moderator for the scoping session and scheduled MCA FGDs was recruited from an organisation working on community conservation projects in the LGCA.

7.1.3 Identifying options and evaluation criteria

The MCA options and evaluation criteria for wildlife management in the LGCA were identified and defined by stakeholders using local knowledge and personal experience through brainstorming and FGDs aided by secondary data. The secondary data were obtained from authorised published and unpublished sources such as reports, policy documents, and management plans from the Ministry of Natural Resources and Tourism and Wildlife Division available in regional and national libraries. At the local level, secondary data were obtained with permission from government offices at the district, wards, and villages. The researcher also reviewed acts, policies and by-laws related to natural resources particularly wildlife management and tourism adjacent to protected areas in Tanzania. The information which was obtained from the NDC included agriculture production data, the status of the land use, title deeds, investment contracts, socio-economic services, and gross regional income from tourism investments in the district. Other secondary data were obtained from the NGOs, CBOs, and tourism enterprises available in the study area. The data gathered included issues related to conservation, property rights, conflict management, and social-economic support from the projects undertaken by tourism investors in the study area. Most of the secondary data were used in developing criteria and options for the MCA.

The wildlife management options were developed based on the type of current land-uses as the problem of wildlife management in the LGCA involved land-uses. The researcher used maps and diagrams showing land-use types in the LGCA to develop management options. These maps and diagrams also informed the participants about MCA modelling during the FGDs. Procedures for carrying out the FGDs identified in Section 7.1 above were followed to avoid biases in identifying and choosing the preferred options. The process of identifying, discussing, and presenting the options was done by all stakeholders according to the current tourism and wildlife management policies. Property rights to land and natural resources and their characteristics were considered when developing wildlife management options. Similarly, ecosystem services such as food, water and biodiversity were considered in each type of options to determine their potential in supporting wildlife conservation and livelihoods in the LGCA.

The first procedure of multi-criteria evaluation involved analysing the current option in the FGDs. This was followed by an analysis of the existing land-use types and alternative wildlife management options. Six land-use types were identified from the stakeholders through the FGDs. The experts and some stakeholders were involved in revising and identifying feasible wildlife management options from the land-use types for evaluation against criteria. Each option, including the current option was clearly defined to avoid confusion with others among stakeholders. The current option was then compared with the other alternative wildlife management options. Finally, the participants settled on four wildlife management options for in-depth analysis including the current option: the LGCA; Game Reserve Area (GRA); Village-Based Independent Wildlife Management Area (VBIWMA); and Joint Venture Wildlife Management Area (JVWMA). Detailed descriptions of these wildlife management options for the Loliondo are below presented in Chapter 8.

The moderator then facilitated a FGD in which stakeholders identified and defined evaluation criteria based on the nature of the problem at the LGCA. Facilitation was vital because the process of developing criteria was more important for an effective MCA process. The criteria obtained from reviewed empirical research and policy documents were identified under the guidance of the moderator in the second stakeholder FGD meeting at Wasso. The criteria identification and definition were done in two phases.

The first phase identified the initial list of criteria such as economic, social-cultural, ecological, and environmental. The process was followed by brainstorming in which stakeholders were able to develop an initial list of criteria for evaluation. The FGDs included discussions on livelihood activities, biodiversity conservation, ecosystem services, and socio-economic and cultural factors, as well as stakeholder perception on land tenure and property rights to natural resources in the LGCA. The FGDs were organised into small groups of three to four participants for 30 minutes using structured questions. Criteria were identified and developed taking into consideration the main objective of evaluating the preferred wildlife management options for efficient and sustainable NRM in the LGCA. Both qualitative and quantitative criteria were developed to evaluate wildlife management options. A hierarchical diagram was used to analyse criteria on a flip chart under broad categories of ecological, social, economic, and cultural. These categories were then broken down into sub-criteria and sub-sub criteria (indicators). Evaluation criteria were identified and agreed on by the stakeholders in the

presence of experts using a value tree diagram. A flip chart was used for clarity and further consideration of the evaluation criteria. To avoid duplication, the facilitator and stakeholders agreed to eliminate criteria with similar characteristics. The selected criteria were set based on the objective of promoting wildlife management, sustainable natural resources use and livelihood of local communities in the LGCA. The facilitator, researcher and experts were involved in discussions with the stakeholders to regulate the number of criteria to a maximum of twelve as it is difficult to evaluate a problem with too many criteria.

In the second phase, criteria for evaluating wildlife management options were further analysed and refined during the meeting with experts held at Wasso in Loliondo on 22nd September 2018. In analysing and refining the criteria, the experts identified during the first meeting were used as a technical reference group. The team comprised a land-use planner, an economist, a sociologist, a lawyer, an agronomist and an ecologist. These were representatives of conservation organisations in the LGCA such as SNP, TANAPA, Frankfurt Zoological Society, Wildlife Division Ngorongoro Conservation Area Authority, TAWA, and NDC. The involvement of these experts was informed by the fact that criteria development requires expert advice for effective evaluation. The other stakeholders described in Section 7.1 above, were also involved in every stage of identifying and developing the evaluation criteria. A final list of comprehensive criteria was selected and agreed upon by experts and stakeholders presented in Chapter 8.

7.1.4 The process of weighting criteria

The process of weighting the criteria at the LGCA by the stakeholders involved the allocation of relative weights to the criteria based on their values and priorities. This was an important exercise as it allowed stakeholders to express their views independently. A weighting questionnaire survey with a table of all agreed criteria was supplied to all eleven individual stakeholders who attended the second workshop (see Appendix 3). The rating method was agreed upon and used in assigning weight to the decision criteria. A Likert scale of weighting criteria ranging from 1 (least important) to 9 (most important) was used to indicate the importance of each criterion. The process of weighting was done by comparing the importance of each of the social, economic, cultural and ecological criteria with one another. This was then followed by combining the weights of individual criterion from all stakeholders to obtain overall weights of the criterion. The individual criterion weights for each stakeholder were

aggregated to obtain mean relative weights. The results of the weighting exercise are presented in Chapter 8.

7.1.5 Scoring wildlife management options against criteria

The eleven stakeholders and experts were invited to a half-day pre-scoring information session held in Wasso, Loliondo, on 20th October 2018. The participants were provided with an empty effect table and both the moderator and researcher gave them systematic instructions on how to score the options using the evaluation criteria (see Appendix 4). Considering the fact that the stakeholders and experts were involved in the previous FGDs in identifying the wildlife management options and evaluation criteria, the pre-scoring information session gave them a clearer and deeper understanding of the scoring process. The meeting also enabled them to revisit the final agreed criteria and options before evaluation. The scale of measurement of each criterion against the options was discussed and agreed on by the participants during the pre-scoring meeting. For example, qualitative scores were measured on a plus and minus scale where (+++) described very large positive effects and (---) described very large negative effects. Using a quantitative scale, the ecological criterion of endangered species was measured in numbers, for example the number of endangered species while ground water supply and food production were measured in tonnes per km² per year. As food production and groundwater supply are ecosystem services, their estimated values were converted into monetary units measured in US dollars. For the economic criteria, financial returns were measured at US\$ 1000 per year; employment was measured by the number of additional jobs per year under each wildlife management option, while the Gross Regional Product (GRP) per capita was measured at US\$ 1000 million per year. However, criteria on social and cultural characteristics were measured qualitatively using a positive and negative scale. For instance, the conflict criterion was measured on a negative scale of (-, --, ---) representing a low, moderate and very low impact, or a positive scale of (+, ++, +++) representing a small, moderate and large positive effect. Zero (0) represented no effect. The details for the individual criterion scale are presented in Chapter 8.

During the pre-scoring information session, the participants were given an example of the choice of buying a Toyota car from the following models: 1) Hilux, 2) Noah, 3) Mark II, and 4) Premio. Four criteria were used to evaluate the models which are passengers' comfort, fuel efficiency, monthly payment, and cargo capacity. The criteria were scored against the options

using the direct scoring method on a scale of 1 to 100 percent. Following aggregation, Toyota Noah was identified as the best option since it obtained the highest weighted score of 50 percent while Premio was the least option with a score of 20 percent. This simple example of making a decision using criteria and options provided the participants the knowledge and skills for scoring the criteria against the wildlife management options at the LGCA.

After the pre-scoring meeting, the participants were given a hard copy of the scoring portfolio with a detailed description of the options, criteria, and the scale of measurement. The portfolio included an evaluation survey form with all agreed options and criteria in an effect table. Other resources with detailed descriptions of the criteria and options accompanied the evaluation survey form and money for postage. The resources were also sent to the participants by email after the FGDs as a backup copy. They were asked to contact the researcher if they needed clarification on scoring the criteria. The participants were also asked to complete the scoring task in three weeks and return the filled-in effect table by email to the principal researcher or send a hard copy to the research assistants in their area in which were later sent to principal researcher. The participants were asked not to mark the effect table by their names to maintain confidentiality. The eleven filled evaluation forms were completed in three weeks as agreed. The experts were involved in analysing and developing the final effect table based on the data obtained from the stakeholders.

7.1.6 Aggregation and ranking of the options

The wildlife management options were analysed against the criteria using the stakeholders and experts as decision makers at the final meeting held in Wasso in Loliondo on 17th November 2018. The participants were given the aggregated effect table developed by the experts. It was important for all the stakeholders to understand the sources of information on the effect table and the evaluation procedures before making a decision. Hence, the experts were invited to describe the sources of data for each criterion, particularly the ecological and economic criteria as presented in Chapter 8. The method for aggregating the scores and ranking the options was agreed by the stakeholders. The weighted summation method in the DEFINITE software was used to calculate weighted values based on combined scores and ranks that described the overall preference for each wildlife management option. The stakeholders were allowed to ask questions on the sources of information before the demonstration of the multi-criteria evaluation using a DEFINITE Software programme.

The stakeholders in the LGCA were aware of the options and criteria. However, it was necessary to involve them in the evaluation process using the DEFINITE software programme. The researcher acted as an analyst by demonstrating how the evaluation was done. The participants were taken through the first stage of defining the problem by entering the four options and twelve criteria into DEFINITE, together with the criteria weights and effect table scores, followed by standardization. It was necessary to standardise the criteria scores in a commensurable unit to overcome the problem of inconsistent scales. This is because the criteria identified involved both qualitative and quantitative scales. The maximum standardisation method in the DEFINITE software was applied where criteria scores were standardised on a scale of 0 to 1. The lowest score was assigned a value of zero (0), the highest a value of one (1), and the others were assigned a value between zero (0) and one (1). Thus, the best option was scored one (1) and the worst was scored zero (0). The standardised criteria scores were used to estimate the weight of each criterion. The formula presented in the following equation 7.1 was used for standardisation:

$$S_{ij} = \frac{x_{ij} - \min j}{\max j - \min j} \quad (7.1)$$

where S_{ij} = the standardised performance measure of the i^{th} alternative against the j^{th} criterion; x_{ij} = the performance measure of the i^{th} alternative against the j^{th} criterion; $\min j$ = the minimum performance measure of all options against the j^{th} criterion; and $\max j$ = the maximum performance measure of all options against the j^{th} criterion.

After standardising the criteria scores, the weights of the criteria obtained from the stakeholders in the previous workshop were entered into the matrix. Finally, the weighted summation method embedded in DEFINITE was used to aggregate the scores to obtain the results. Details of the weighted summation method are presented in the following section.

7.1.7 Weighted summation method adopted for aggregation

The application of weighted sum method in this study involved the allocation of weights to each criterion. The weights were multiplied by the standardised scores and summed up to obtain the total score for each option. The weighted summation method was then used to obtain the final ranking of the four wildlife management options in the LGCA. The advantage of this

method in evaluating wildlife management options in the LGCA was that it provided a sound measure of the overall performance of options. It was also simple to use and easy to understand by stakeholders. In addition, it allowed stakeholders in the LGCA to be involved interactively in evaluation, hence results were easily accepted by stakeholders. The four options were thus weighted to select the most preferable wildlife management option. The multi-criteria evaluation results are presented in Chapter 8. The evaluation was followed by undertaking sensitivity analysis and deliberation of the results.

7.1.8 Sensitivity and deliberation of the results

The sensitivity of the ranking to uncertainties in scores and weights was analysed. This helped to determine the robustness of the ranking for the uncertainty of the wildlife management options at the LGCA. The DEFINITE software was used to undertake sensitivity analysis interactively with decision-makers. The sensitivity analysis results revealed that the options are sensitive to the changes of weights and scores. The results were then discussed and agreed by stakeholders. The eleven stakeholders and experts then deliberated on the MCA results. Finally, the graphical presentation of MCA results on the most preferred wildlife management option from the DEFINITE was agreed on by decision makers during the meeting on 17th November 2018 in Wasso.

7.2 The Community Survey at the LGCA

A community survey was conducted at the household level in LGCA to triangulate MCA results. A set of predetermined and specific questions on wildlife management and land-use were used to obtain important information from household heads. The following sections describe the survey design used.

7.2.1 Sources of data

The study collected primary data from individual respondents using a structured household survey questionnaire. The data gathered include household demographic data, residents' status, occupation, economic activities and property rights. Also, data on wildlife management, livestock production, perceptions on ecotourism, trophy hunting, and wildlife conservation were collected in the LGCA.

7.2.2 Sampling procedures for the survey

This survey was conducted in the Loliondo Division, Ngorongoro District. The study population included pastoralists, farmers, agro-pastoralists, and ecotourism and trophy hunting individuals in the LGCA. Six villages out of the nine villages from the LGCA were purposively sampled for the survey. The six villages were selected based on the fact that they were the most affected by the wildlife and land-use conflicts in the LGCA. Furthermore, the villages were more engaged in wildlife conservation, pastoralism, trophy hunting, and ecotourism in the area than the remaining three.

The study aimed at ensuring fair representation of population sub-groups with different socio-economic backgrounds, ethnicity and residential characteristics in the sample. The total number of households from the six villages sampled was 14,753, and from this comprised the following totals from each village: Ololosokwan= 3,279, Soitsambu= 2,739, Olorienmagaiduru= 1,897, Arash= 2,605, Oloipiri= 2,057 and Loositomaalon= 2,177. A sample of 330 households was selected from the total number of households. The total sample was evenly distributed among the six villages. Hence, 55 households were selected from each of the six villages for the survey. The simple random sampling technique was used to select households for a survey using the village register. After selecting households from the register in each village, a survey of the heads of the household or representatives of the heads of household was conducted.

7.2.3 Tool for data collection

A structured questionnaire was used to collect empirical data on wildlife management and pastoral livelihoods at the LGCA. The questionnaire for this study was carefully designed with a simple layout to avoid overburdening the cognitive capacity of the respondents. The wording of the questionnaire for the survey and the Swahili language was simple and clear for the respondents to understand the questions as intended by the researcher. A clear difference between related wildlife management options such as the Joint Venture and the Village-Based Independent Wildlife Management were described in the questionnaire. The respondents were also given more clarification during face-to-face interactions.

The design of the questionnaire was guided by the literature review presented in the preliminary chapters of this thesis. A thorough literature review on wildlife management, land-uses and property rights was undertaken before constructing the survey questionnaire. The questionnaire was comprised of close-ended questions on wildlife management, property rights, wildlife management options, and the demographic characteristics of the respondents. The closed-ended questions involved rating scales. The rating scale questions involved a Likert scale of 1 to 7 in which one (1) indicates (strongly disagree) and 7 (strongly agree). A 'don't know' category was included for the respondents who did not want to answer respective questions. The questions without rating scales included the 'main variables' and other options such as 'don't know' and 'other please specify'. Also, the questionnaire included questions of 'yes' or 'no'. A follow-up question was followed based on the response indicated in the first question. This provided respondents with a room to answer only the questions they are aware rather than being forced to answer questions that they are not aware of. Also, it allowed respondents not to skip relevant questions in the questionnaire.

The questions were carefully ordered in the questionnaire. The main themes of the research objectives such as wildlife management, tourism schemes and property rights were placed at the earlier sections followed by personal information such as demographic characteristics of the respondents at the last section of the questionnaire (see Appendix 1). This was done to ensure that respondents gave valid and reliable responses to questions on the research objectives. Furthermore; anonymity was guaranteed to the respondents in order to allow free responses and fewer biases. A consent form was also developed according to the format provided by the Human Research Ethics Committee of the University of Adelaide. Approval was also obtained from the same committee for the research (see Appendix 5). Although local ethics approval was not required in Tanzania, the researcher was granted a Research Permit from the local authorities to conduct the study (see Appendix 6). This was followed by the piloting of the questionnaire before the main survey.

7.2.4 Piloting and administering a community survey questionnaire

A pilot survey was conducted for 15 household respondents from Ololosokwan, Soitsambu, and Oloipiri. The pilot survey helped to ascertain the content validity and reliability of the instruments. Also; it provided a better understanding of the problem of wildlife management and land-use to the researcher in the LGCA. The results of the pilot survey helped the researcher

to revise and update the questions in the questionnaire for the actual survey as indicated in Appendix 1. The research was undertaken within a six-month period. It was difficult for the principal researcher to reach all sampled households, therefore three research assistants were recruited from the LGCA villages and trained to assist in the data collection exercise. These research assistants were fluent in the English, Maasai and Swahili languages. The research assistants played key roles in communicating with heads of the households and translating responses for the principal researcher when needed.

The administration of a questionnaire took between 30 and 45 minutes. The researcher allowed a limited number of questionnaires administered by individual interviewers per day. This was to reduce the burden on research assistants which may influence the respondents' behaviour and create biases while collecting data. The questionnaires for this study were administered through face-to-face interactions with respondents. This was because of the time and costs of using other methods, types of respondents who were mainly pastoralists and the nature of wildlife management problem in the LGCA.

7.2.5 Data analysis and presentation of a community survey findings

The SPSS software version 25 was used to enter and analyse the survey data. The data were thoroughly checked using the completed questionnaires followed by data cleaning before analyses. Quantitative data from the household survey were analysed using descriptive statistics. Also, the study used chi-square to test the relationship between categorical variables, while *t*-test was used to compare the means. Mann–Whitney *U*-test was also used to determine the statistically significant differences between the Maasai and non-Maasai groups, hunters and non-hunters, and natives and migrants in relation to wildlife management and land-use in the LGCA. Chapter 9 below will present the results of this survey.

7.3 Summary

The MCA was applied as the main method of evaluating preferred policy options at the LGCA. The FGD method was used through interviews and brainstorming to elicit information from stakeholders. A questionnaire was used to obtain criteria weight from stakeholder and rating method was applied to obtain the average weight of each criterion. Weighted summation method was used to calculate weighted values based on combined scores and ranks that

describe the overall preference towards each option by using the DEFINITE software. Also the maximum standardisation technique was adopted by converting criterion scale from non-commensurable to commensurable units. Furthermore, a community survey was conducted to supplement the MCA results by addressing the research objectives of the study. The empirical results of the MCA and survey are presented below in Chapters 8 and 9 respectively.

Chapter 8. Results from MCA of Wildlife Management Options

This chapter presents the wildlife management options, evaluation criteria and the MCA results for the LGCA. The chapter further provides a detailed analysis of the options and criteria, and how they were developed in line with the MCA methodology presented in Chapter 5. The research gaps identified in Chapter 6 on the application of MCA for NRM are also addressed. Specifically, Section 8.1 establishes the context of the problem of evaluating the preferred wildlife management option for the LGCA. Section 8.2 describes the current status of wildlife management and associated property rights in the LGCA. The section provides empirical results on the impacts of the current trophy hunting scheme on all stakeholders in the LGCA . Section 8.3 presents the results of the exploration of alternative policy options. The six land-use types proposed by stakeholders in the first workshop are presented in this section. Section 8.4 reports a detailed description of the four wildlife management options selected by the stakeholders and experts for evaluation. The twelve relevant economic, ecological, and socio-cultural evaluation criteria are presented in Section 8.5. Sections 8.6 and 8.7 present the relative weights of the twelve evaluation criteria and the associated measurement scale. Further, Section 8.8 describes the process of scoring the options in an effect table along with the results obtained. The results of the MCA and the ranking of the four preferred wildlife management options based on the preferences of the stakeholders are also presented.

8.1 The Exploration of Wildlife Management Conflicts in the LGCA

Stakeholders involved in MCA FGDs explored and defined the problem by sharing their experience of NRM, particularly of wildlife management in the study area. Both the moderator and the researcher attended the FGDs and were involved in the discussions in order to guide stakeholders to be able to define the problem. The main problem was identified to be wildlife and land-use conflicts that emerged from pastoralists and wildlife managers competing for resources in the LGCA, as the latter wanted to conserve wildlife for trophy hunting and ecotourism. The lack of well-defined property rights and unequal benefit-sharing among stakeholders from the natural resources in the LGCA were identified as the main causes of the 25-year long conflict that has affected the economic and socio-ecological system that provides potential ecosystem services and livelihood opportunities in the area. The MCA was therefore undertaken in the LGCA to develop options for sustainable wildlife management and the

livelihoods of the local community. A brief explanation of the MCA process was given by the researcher to all stakeholders before initial discussions were held on how the land was currently being used (current option), which enabled them to gain an understanding of the problem in a wider context. The problem was discussed in such a way that the stakeholders were free to express their opinion, enabling them to develop sound and feasible wildlife management options and evaluation criteria. The framework for the MCA was structured from the stakeholder opinions given in the first workshop in Wasso.

8.2 The Current Status of Wildlife Management in the LGCA

The current status of wildlife management in the LGCA is described in this section. The objective was to gain an understanding of the current status from the perspective of the stakeholders. The discussion centred on analysing the challenges associated with the current wildlife management in the LGCA. Six different types of land-use were identified and presented by the stakeholders. Trophy hunting and ecotourism were identified as the main types of tourism activities, while livestock grazing and crop production were recognised as the main types of non-tourism activities in the area. The Sonjo undertakes crop production, while the Maasai are involved in pastoralism in the Loliondo division. The main livestock kept by the Maasai are cows, goats, sheep and donkeys. The traditional grazing system in the dry and wet grazing areas was reported as the main form of livestock grazing in some villages in the LGCA. During the wet season, cattle are grazed away from communal village land. With regard to crop cultivation in LGCA, the stakeholders reported that small-scale rain-fed agriculture is predominant in the area, while a small amount of land is irrigated. Maize and beans are the main crops cultivated in the area. The mechanization of agriculture has increased, which has transformed the landscape in the LGCA.

Wildlife conservation through hunting tourism was also reported by stakeholders as one of the major land-use activity that takes place in the LGCA. However, hunting tourism now only occurs in the Ololosokwan village adjacent to the SNP. The stakeholders confirmed during the FGDs that the government has leased the land to the OBC for hunting. Although OBC engages in several corporate social responsibility activities, the stakeholders reported that the villagers do not appreciate this, since more revenue from hunting tourism goes to the government, leaving local communities suffering from injury, death, damage of crops and livestock attacks as the costs of living with wildlife on the village land.

The stakeholders reported that ecotourism has been practised in the area in the form of photographic tourism through the provision of permanent lodges and tented campsites. Thomson Safaris, AndBeyond Safaris and Nomad Safaris ecotourism investors were reported to have entered into a contract with the villages to operate luxury-tented camps on village land that was leased to them. The camps are located in Ololosokwan and Soitsambu villages. According to the stakeholders, the villagers appreciate this ecotourism business venture because their villages receive some direct socio-economic benefits. Yet, the co-existence of livelihood activities and conservation activities on the same land has resulted in land-use conflicts, since the land-use types often overlap. Severe conflicts occur between pastoralists, farmers and tourism investors to gain the access to, ownership, control, and use of natural resources in the LGCA. These unceasing conflicts have rendered the current option unsustainable, inefficient, and unacceptable to local communities.

8.2.1 Challenges associated with the current land-use activities

According to the stakeholders, there are various socio-economic, ecological and cultural challenges associated with wildlife management, land-use and livelihood activities in the study area. There has been an increase in the livestock numbers in the LGCA leading to increased competition for food, especially in the dry season. The livestock has been illegally grazed in protected areas where wildlife occurs. This has resulted in the emergence and spread of zoonotic diseases such as rabies and anthrax between wildlife and livestock. There has also been a longstanding conflict between human and wildlife competing for resources in the study area. It was reported that several injuries and sometimes deaths have occurred in the local communities due to attacks by wildlife. Furthermore, the government has forcefully evicted some people in these communities to make way for wildlife conservation in the LGCA. This was reported for Ololosokwan and Soitsambu villages in 2017 and 2018 respectively. The stakeholders also reported that the increased human population has resulted in the transformation of the landscape in the LGCA, leading to the degradation of the land, water sources and biodiversity. The experts reported that there have also been anthropogenic challenges in the area, including the poaching of wildlife species, mining in protected areas and illegal logging, with the former leading to loss of endangered species and deforestation. Stakeholders reported that this has contributed to climate change and variability, which affects the availability of pasture and crop production. However, the greatest challenges associated

with the current option are the policy overlaps and the lack of well-defined rights to natural resources in the area.

The existence of the overlapping areas between the GCA and village land has been the main source of intense land-use conflicts. The legislation that concerns the areas exacerbates the conflicts of interests amongst stakeholders. The *Village Land Act of 1999* and the *Wildlife Conservation Act of 2009* stipulates contradictory policy directions. The government granted a licence to OBC for hunting in the same land that the village council leased to the ecotourism investors. Due to a lack of comprehensive and transferability rights to natural resources for the stakeholders in the LGCA, ecotourism, trophy hunting, and grazing concurrently takes place in the same area. The duration of the OBC lease contract for trophy hunting is questionable because the Maasai communities were not sufficiently involved. As a result, a significant amount of the benefits conferred from trophy hunting in the LGCA accrue to the government. This has left the Maasai communities with no exclusive rights to grazing areas and little economic benefits.

8.2.2 Impacts of the current status activities to conservation and livelihoods

The above-mentioned challenges to the current activities have adversely affected wildlife management and conservation efforts in the LGCA. The stakeholders and experts reported that the expansion of farming and livestock grazing areas has destroyed wildlife habitats affecting its ecosystems. Also, the increased human and livestock population has forced wildlife to migrate from the LGCA to the Serengeti and the Maasai Mara Reserve in Kenya. A change in vegetation and transformation of the landscape has led to the loss of biodiversity and an increase in invasive species in the area. It was also reported that for decades local communities have been reluctant to participate in conservation because of the human-wildlife conflicts and the poor benefits obtained from tourism in the area. The current construction of roads in conservation areas has compounded the problem of wildlife management, because this increased access had the unintended consequence of encouraging the illegal bushmeat trade in the LGCA. Moreover, it was reported that the land-use disputes and conflicts over wildlife and other natural resources resulting from policy overlaps has negatively affected wildlife management and the livelihoods of the Maasai in the study area. For example, the Maasai are no longer able to continue using their traditional system of wet and dry grazing. After discussion of the impact of the current status, the stakeholders were then guided to propose

alternative options for the LGCA to ensure efficient wildlife management and sustainable livelihoods.

8.3 Land-Use Types Proposed by Stakeholders

This section presents the results of the land-use types proposed by stakeholders invited to a one-day MCA FGD in the LGCA, where they were involved in identifying and describing the land-use types in order to develop alternative wildlife management options. The land-use types identified were based on the preferences and perceptions of the stakeholders, including the nature of land-use, size of the land, property rights to natural resources and their characteristics, and the policy framework. The positive and negative impacts of land-use types on the management of wildlife in the LGCA were also considered. Based on the land-use activities undertaken in the study area, six land-use types were identified as follows:

- 1) Private Livestock Grazing
- 2) Community Grazing
- 3) Private Farming
- 4) Community Farming
- 5) Photographic Tourism
- 6) Trophy Hunting

These land-use types were presented to and analysed by the technical reference group at the meeting of experts held in Wasso in Loliondo on 22nd September 2018. A detailed description of the six land-use types proposed by the stakeholders is presented below.

Type 1. Private livestock grazing

This land-use type emphasises the management of livestock grazing which competes with wildlife conservation in the study area. The stakeholders reported that private livestock grazing land-use refers to an area set aside on privately owned farms for grazing. Individual families have the right to own, access and use private grazing areas, guided by the *Village Land Act 1999*, customary rights of occupancy and village by-laws. These laws allow the growing of fodder on private farms during the rainy season to feed livestock during the dry season. The pasture may be used in both the dry and wet season. It was reported that this land-use type

would allow pastoralism, tourism and conservation to be undertaken concurrently, although the increased livestock population in the area would affect conservation. This is similar to private ranching areas, which are sustainable and saves time searching for pasture. The stakeholders suggested that private livestock grazing land-use is likely to promote conservation and control free movements of livestock, but would require a survey of the livestock in the LGCA to determine carrying capacity. It might also reduce deforestation, since some tree species, such as wild olives, have been harvested for feeding livestock during the dry season under current status. It is also likely that soil fertility in the area would be improved under this type of land-use, and the establishment of private livestock grazing land-use zones might allow the cultivation of different species of fodder during the wet season. This would require sustainable land-use plans to identify areas with the potential for growing fodder or for grazing. However, this type of land-use would not function well in open access areas where livestock are grazed in a free-range system. The adoption of private livestock grazing land would reduce human-wildlife conflicts and the transmission of diseases from wildlife to livestock in the area.

Type 2. Community grazing

Community grazing land refers to an area set aside on ‘communal land’ for grazing. The stakeholders reported that this land-use type gives customary rights to pastoralists to access livestock grazing areas in the LGCA, potentially involving both wet and dry areas on communal grazing land in one zone. Other activities such as crop cultivation, trophy hunting, ecotourism and conservation could be undertaken in other zones. Establishment of this land-use type for community livestock grazing would be guided by the *Village Land Act 1999* and customary laws. This land-use type would involve communities from each of the nine villages in the LGCA participating in livestock grazing, such as the Purko and Loita, which would provide for the traditional system of sustainable livestock grazing under customary laws. It would be important to address the challenge of human wildlife conflicts in this type of land-use since grazing in protected areas has revealed adverse impacts on humans and livestock in the LGCA. The stakeholders also argued that the community grazing land-use type would be unsustainable, as some uncooperative communities have been illegally inviting pastoralists from Kenya to graze in communal areas. Therefore, it was reported that since trophy hunting is undertaken in dry grazing areas, this would restrict the establishment of community grazing areas, as most potential communal land is currently occupied by settlements.

Type 3. Private farming

The stakeholders reported that, this land-use type assumes that a piece of land is set aside on privately-owned farms on which to grow crops. The *Village Land Act 1999* and village by-laws would guide the establishment of private farms. This land-use type would ensure sustainable farming, which would address the current system of shifting cultivation and the resulting degradation of land in the LGCA. It was revealed that currently, this type of land-use is dominating pastoral villages such as Arash and Soitsambu, in which the main crops cultivated are maize, sorghum, beans and fruits. While private farming would be possible in Arash and Soitsambu, stakeholders reported that it would be difficult for the villages bordering SNP because their crops are often raided by elephants. However, this type of land-use would help supply food for tourist campsites and enhance the food security of pastoral communities in the LGCA.

Type 4. Community farming

The stakeholders reported that this land-use type represents a policy of formal ‘communal’ farming areas in villages, which would be guided by the *Village Land Act 1999*. Establishment of this land-use type would allow crop cultivation under land-use zoning. It will also improve food security and prevent over-utilization of provisional ecosystem services. However, it was cautioned that this type of land-use might cause conflicts in some communal farming areas in LGCA, such as villages with a large number of people. Also, the villages in Loliondo are widely spaced apart, making it difficult to undertake community activities in large groups.

Type 5. Photographic tourism

The stakeholders reported that this land-use type is based on the idea of investing in photographic tourism in the LGCA. Six out of nine villages in LGCA could be designated for this purpose. Photographic investment would be guided by the *Village Land Act 1999*, non-consumptive tourism regulations and village by-laws. Areas for hunting tourism, livestock grazing, farming and settlements would be set aside under land-use zoning, while photographic tourism would be undertaken independently. It is likely that this land-use type would allow villagers to enter into contracts with investors thereby ensuring financial returns to the villages.

Villages with less tourism potential could be involved in the contract to ensure equity. The villages could adopt the photographic tourism investment model currently existing in Ololosokwan and Soitsambu. In addition to photographic tourism, ecotourism projects such as traditional beekeeping and cultural tourism could be established on land belonging to the six villages. This would markedly improve livelihoods in the villages and protect biodiversity in the study area. Furthermore, those with the capacity to invest in tourism would be allowed to establish tourism enterprises. The investment can be privately owned by local individuals or under control of village governments. More importantly, this type of land-use has enormous potential to resolve the conflict between wildlife and local communities, and between photographic tourism and trophy hunting investors

Type 6. Trophy Hunting

Trophy hunting as a land-use type is based on the policy of recreational hunting to aid wildlife management and conservation in the LGCA, and would therefore come under the *Wildlife Conservation Act 2009*. It was reported that this land-use type would be established in villages such as Ololosokwan with the potential for wildlife hunting. However, villages without this potential, such as Arash and Olorien, would be disadvantaged. Hence arrangements would need to be made to ensure that these villages benefit from the hunting concession. Since the hunting concession would be established on village land, agreement with local communities would be made under the *Village Land Act 1999*. Other livelihood activities could be undertaken based on the land-use plan of the villages. This land-use type has the potential to resolve land-use conflicts involving trophy hunting in the area.

8.4 Wildlife Management Options Identified for Multi-Criteria Analysis

The six land-use types were further analysed and developed during the meeting with experts held on 22nd September 2018 in Wasso. The land-use types were presented to stakeholders and experts (technical reference group) at the FGD for review. The experts were asked to consider the land-use types and to form comprehensive wildlife management options. The land-use types were analysed using maps and diagrams. Ecotourism, trophy hunting, livestock grazing, farming, and conservation were categorised into ‘compatible land-uses’. Property rights to land and natural resources were also considered in exploring wildlife management options. Following their analysis, four wildlife management options for the LGCA were identified and

agreed upon by the stakeholders and experts for evaluation (see Table 8.1). These options include the current option (Loliondo Gacontrolled Area), Game Reserve Area, Village-Based Independent Wildlife Management Area and Joint Venture Wildlife Management Area (a detailed description of the options is given in Sections 8.4.1 to 8.4.4).

Table 8.1 The policy options identified for multi-criteria evaluation

Option	Description
The current option (Loliondo GameControlled Area)	Current status (4,000 km ²) of mixed land uses
Game Reserve Area	The alternative which advocates conservation
Village-Based Independent Wildlife ManagementArea	Management of wildlife by individual villages
Joint Venture Wildlife Management Area	Joint venture land use (1,500 km ²) six villages

Source: Stakeholders and Experts Workshop (2018).

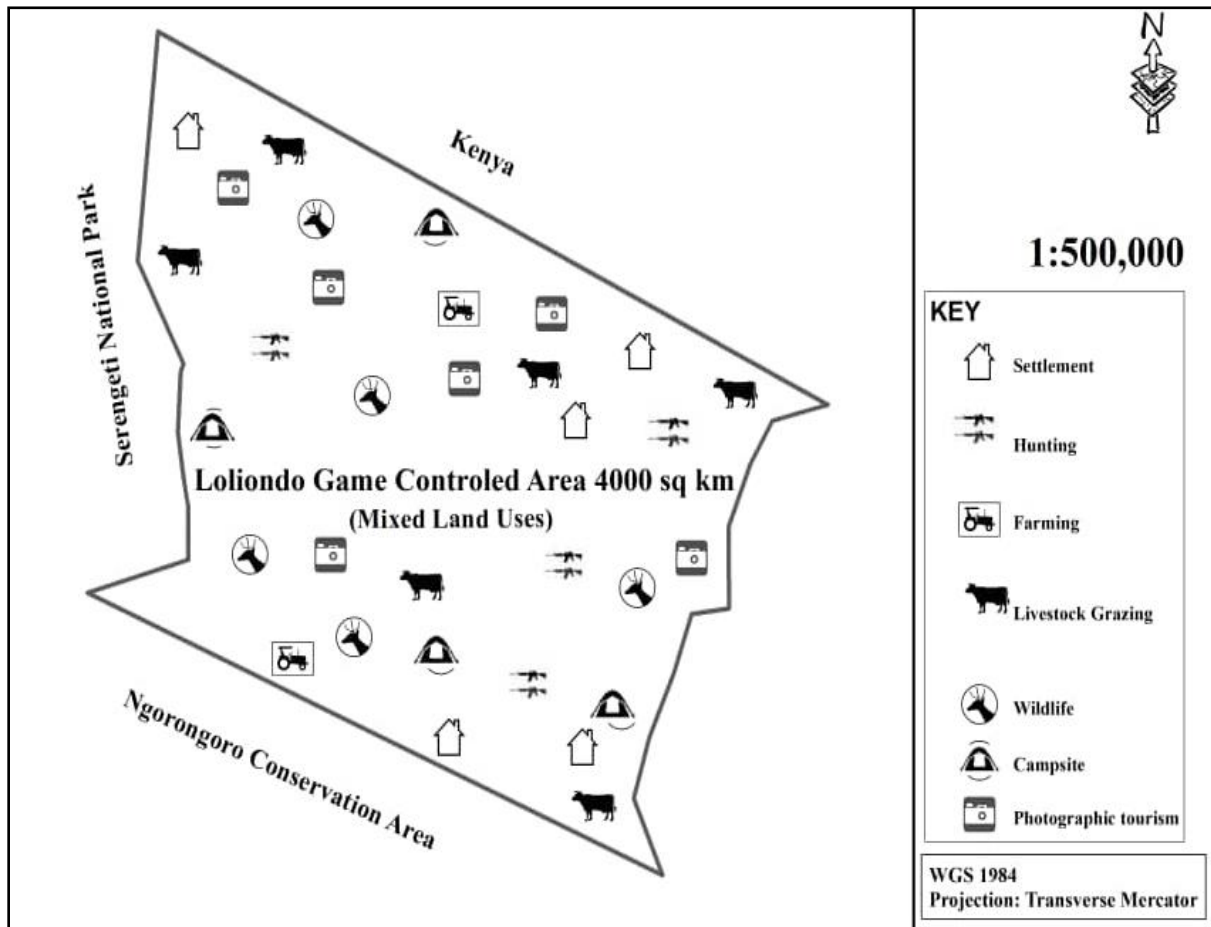
8.4.1 The Current Option: Loliondo Game Controlled Area (LGCA)

The current option in the LGCA involves using the land for both NRM and livelihood activities. It comprises 4,000 km² in Sale and Loliondo Divisions in the NDC In 1992, the whole of the LGCA was leased to the OBC for hunting in accordance with the *Wildlife Conservation Act 1975*. The land was leased for hunting when the whole LGCA area had already been declared as a village land. However, it was revealed that OBC has confined hunting to the Ololosokwan and Soitsambu villages because these villages have greater potential for hunting than other villages in the LGCA.

Currently, livestock grazing, farming, ecotourism, recreational hunting, conservation and cultural tourism takes place around the villages in the LGCA (see Figure 8.1). These activities occur without proper land-use plans. Only a few villages in the LGCA have been surveyed and have received village land certificates. However, the majority of villages do not have sustainable land-use plans. For this reason, the different land-use types overlap under the current option. For instance, there is an overlap between village lands and the GCA in the current option. Wildlife management under this option is guided by the *Wildlife Management Act 2009* which vests ownership in the state. However, the *Land Act 1999* states that village

land within GCAs such as the LGCA is owned by the villagers. Therefore, there is a conflict between the *Wildlife Management Act 2009* and the *Land Act 1999* in terms of access and ownership of land under the current option.

Figure 8.1 Current status in the LGCA



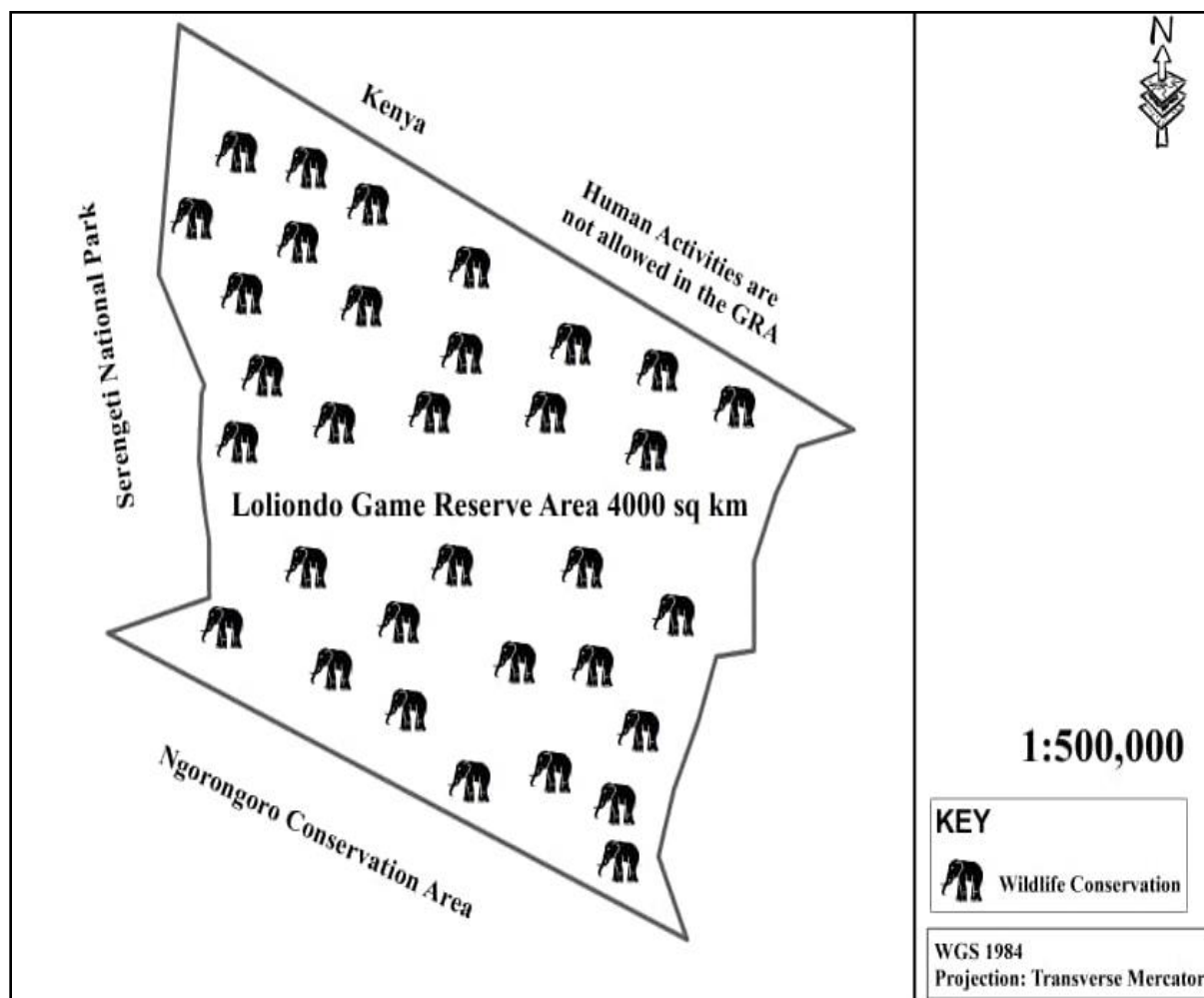
Source: Stakeholders and Experts Workshop (2018).

Furthermore, existing Maasai customary laws conflict with statutory laws. Whiles customary laws regard the LGCA as village land; statutory laws regard it as a statutory land. However, while the *Wildlife Conservation Act 1974* declares the land as a GCA, the *Village Land Act 1999* regards it as village land. It is therefore discernible from the above that the current option at Loliendo lacks well-defined property rights. Apart from this, other challenges persisted in the current option including conflicts, policy overlaps, and unequal sharing of benefits. These have combined to render wildlife management in the area inefficient and has resulted in poor livelihoods. Thus, stakeholders indicated that a more efficient alternative option is needed for the management of wildlife and sustainable livelihoods in the LGCA.

8.4.2 Game Reserve Area (GRA)

The Game Reserve Area option assumes that the whole area of Loliondo and Sale Divisions would be set aside for wildlife management and conservation with no access for any non-conservation activities (see Figure 8.2). According to the *Wildlife Management Act 2009*, the Minister of Natural Resources and Tourism has the authority to change a GCA to a GRA for the purpose of improving the management of wildlife and other natural resources. Management of the wildlife in the GRA would therefore be under the Wildlife Division and the Ministry of Natural Resources and Tourism.

Figure 8.2 Game reserve area



Source: Stakeholders and Experts Workshop (2018).

Human settlements, crop cultivation and livestock grazing are strictly prohibited in a GRA. In order to safeguard the wildlife, no traditional weapons, traps, or firearms would be permitted in the GRA. To access the GRA, written authority from the Director of the Wildlife Division is required, without which any person caught in the area is liable to either a fine or imprisonment. As this option advocates conservation as an independent ‘pure game reserve’, GRA exhibits the command and control approach through limited access to resources by local communities. It was revealed that this option would be more ecologically beneficial than the current option as it advocates wildlife management and conservation.

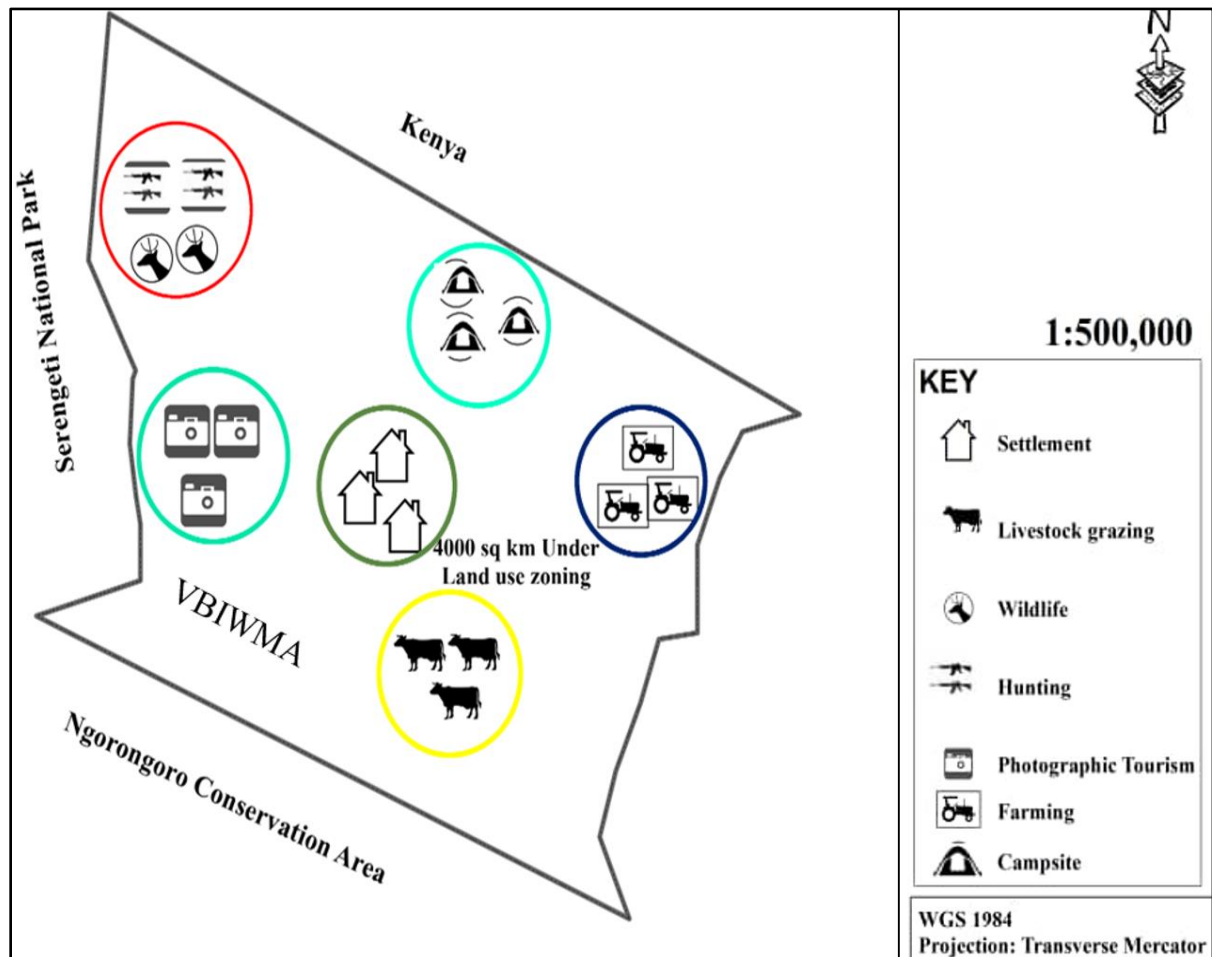
However, local communities who have been using this area for their livelihood activities would incur the cost of losing their village land for the establishment of a GRA. Considering the fact that local communities have the customary right to own land at Loliondo under the *Village Land Act 1999*, they would need to be compensated before a GRA could be established. In sum the main concern for this option is the protection of biodiversity and enhancement of ecosystem services in the area.

8.4.3 Village-Based Independent Wildlife Management Area (VBIWMA)

This option would establish a VBIWMA covering an area of 4,000 km² in an independent village in the LGCA (see Figure 8.3). For example, a VBIWMA could be established on Arash village land, with farming and grazing areas set aside. This option would be guided by the *Wildlife Management Area Regulations 2012*, *Wildlife Conservation Act 2009*, *Land Act 1999* and the *Village Land Act 1999*. The ownership and management of VBIWMA would be under the independent village assembly and chairperson.

Both hunting tourism and ecotourism would be managed by an individual village with a land-use zone. The land-use zoning in VBIWMA would avoid overlapping land-uses such as in the current option, which is the source of wildlife and land-use conflicts. Human activities such as grazing, farming and settlements might be allowed in specific zones within the VBIWMA. To allow this option to take place, the whole area of LGCA would need to retain its status of being village land as stipulated in the *Village Land Act 1999* and *Land Act 1999*. A proper institutional framework would be required to ensure that economic benefits are equally shared among members of the individual villages.

Figure 8.3 Village-based independent wildlife management area



Source: Stakeholder and Expert Workshop (2018).

8.4.4 Joint Venture Wildlife Management Area (JWMA)

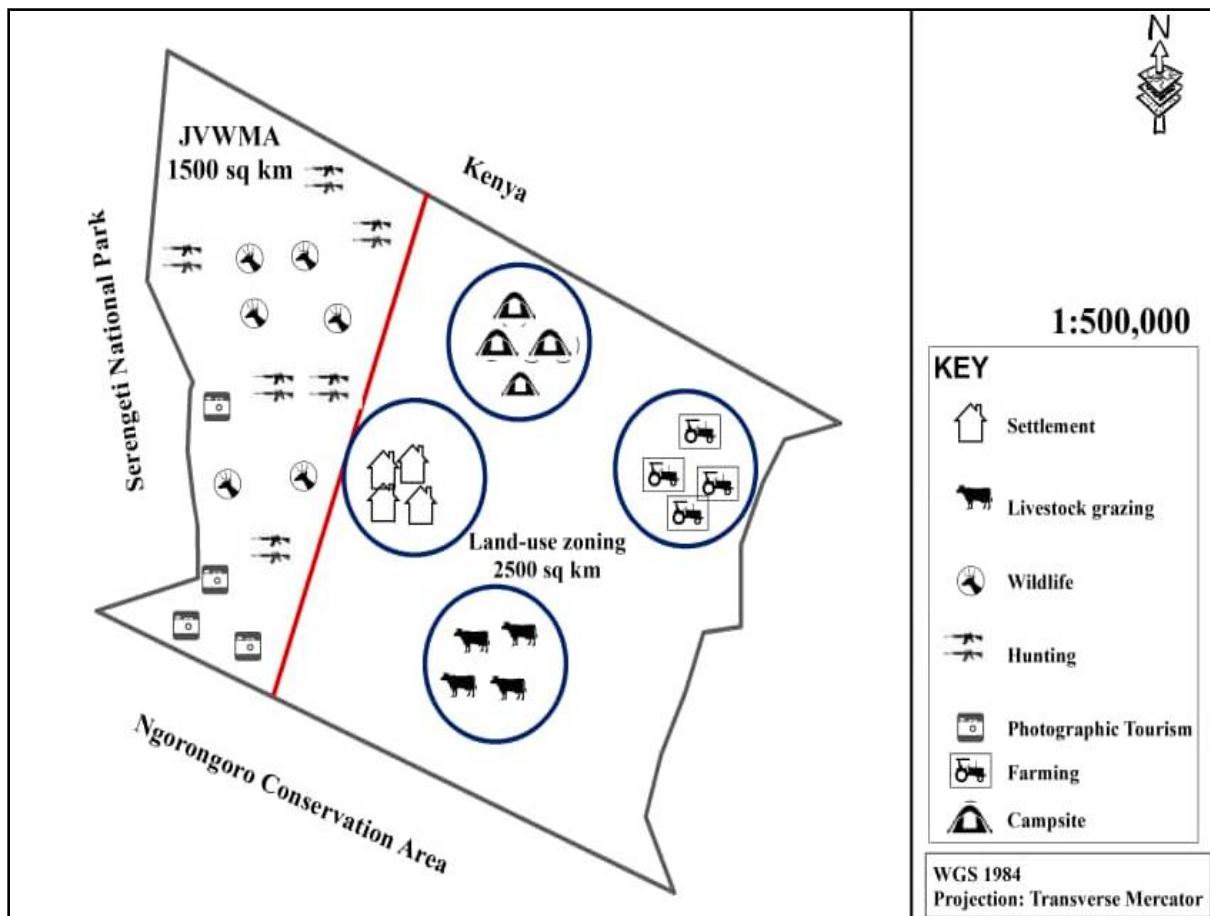
The establishment of a JWMA in an area of 1,500 km² out of the 4,000 km² was another option (see Figure 8.4). A JWMA would be a joint venture between investors and the six villages adjacent to SNP, namely Ololosokwan, Soitsambu, Oloipiri, Olorien, Arash, and Loosito. A JWMA would be established under the *Wildlife Management Areas Regulations 2012*, *Wildlife Conservation Act 2009*, *Land Act 1999* and *Village Land Act 1999*, outside the areas protected by local community members. Under the JWMA, wildlife would be managed jointly by the village assemblies, with representatives from each village.

Setting up a JWMA would involve establishing a CBO which would be granted user-rights to wildlife and other resources in the area. Human activities would not be allowed in the

JVWMA. However, in the case of a serious drought, communities might be granted partial user-rights to access dry grazing land in a designated area. Pursuing this option would allow both trophy hunting and ecotourism to concurrently co-exist in an area of 1,500 km² without land-use zoning. The remaining 2,500 km² would be used for human activities such as grazing, farming and settlements under land-use zoning.

The main goal of a JVWMA under a joint partnership with investors would be to conserve wildlife efficiently, enhance economic development, address conflicts and reduce the poverty of local communities in the LGCA. The option would also allow equitable distribution of costs and benefits among stakeholders in the JVWMA. Since the villagers claim they receive unequal benefits from the OBC under the current option, OBC’s current hunting lease would probably be revoked. JVWMA under the joint village assemblies could decide to sign a joint partnership contract with a new trophy hunting investor under a new institutional framework, the CBO.

Figure 8.4 Joint venture wildlife management area



Source: Stakeholder and Expert Workshop (2018).

8.5 Criteria Identified and Selected for Evaluating the Options

Stakeholders and experts were involved in developing criteria from the main characteristics of the wildlife management options for the LGCA. The stakeholders were put into groups of three to four for discussion. The characteristics of each wildlife management option were discussed and put into four categories to obtain criteria, aided by the input of the experts. Each FGD session lasted 30 minutes, after which each small group was given an opportunity to present their findings. Due to the multiplicity of criteria, some were combined to form new criteria. The experts were involved in refining the best twelve ecological, economic, social and cultural criteria. Following the FGDs, the experts presented the refined evaluation criteria. The stakeholders agreed on the twelve evaluation criteria, which represented the socio-cultural, ecological and economic concerns of wildlife management and land-use in LGCA. Table 8.2 presents the twelve criteria considered.

Table 8.2 Evaluation criteria for the wildlife management options

Objective	Evaluation criterion
Ecological	Endangered species
	Food (agricultural production)
	Groundwater supply
Economic	Financial returns
	Number of jobs
	Gross Domestic Product
Social	Natural resource conflicts
	Poverty level
	Social equity
Cultural	Rituals and ceremonies
	Dry and wet grazing practice
	Cultural and historic sites

Source: Stakeholders and Experts Workshop (2018).

8.6 Weighting of the Criteria

The rating method was adopted for weighting the criteria as discussed in Chapters 5 and 7. A 9-point Likert scale was used where '1' represented the least important criterion while '9' was the most important criterion. The results are presented in Table 8.3. As there were twelve criteria, the stakeholders were guided to rank the criteria in four groups, namely social,

economic, ecological and cultural. This was done to make the ranking more meaningful. The criteria weight values in Table 8.3 represent the relationship between all weighted criteria groups. Criteria weights were determined based on the opinion obtained from the 11 stakeholders and experts during the criteria weighting workshop in Wasso. Ecological, economic, social and cultural criteria were ranked accordingly based on their relative importance. All eleven criteria weighting forms filled in by the stakeholders were analysed to obtain the mean weights of the criteria. Generally, groundwater supply, financial returns, poverty level and cultural and historic sites were ranked highest, while stakeholders ranked rituals and ceremonies the lowest. For instance, the food production and ground water supply criteria obtained the highest weight in the ecological group, while the financial return criterion was assigned the highest value in the economic group. Also, the poverty level was ranked the highest in the social group, while the cultural and historic sites were ranked the highest in the cultural group.

Table 8.3 Criteria weights (n=11)

Objective	Evaluation criterion	Weights
Ecological	Endangered species	6.3
	Food (agricultural production)	7.8
	Groundwater supply	8.0
Economic	Financial returns	7.1
	Number of jobs	6.1
	Gross Regional Product	6.9
Social	Natural resource conflicts	6.7
	Poverty level	7.3
	Social equity	6.8
Cultural	Rituals and ceremonies	5.0
	Dry and wet grazing practice	7.0
	Cultural and historic sites	7.6

Source: Stakeholders and Experts MCA Workshop (2018).

8.7 Description of Measurement Scale of the Criteria

The experts and stakeholders were involved in discussing and identifying the unit of measurement for all evaluation criteria. Both qualitative and quantitative scales of

measurement were used. A detailed description of the scale of measurement for each criterion used to evaluate wildlife management options as discussed by stakeholders in LGCA is presented in Sections 8.7.1 to 8.7.4.

8.7.1 The Ecological criteria

Number of endangered species

The ecological criterion was assessed based on the number of endangered species in the LGCA, which included both endangered flora and fauna species. The District’s ecologist involved in the analysis as an expert in wildlife management reported that there has been a significant reduction in the numbers of wildlife species in the LGCA. The analysis found that twelve species, both flora and fauna, are currently endangered in the LGCA.⁴ Table 8.4 presents a list of species (both flora and fauna) in the LGCA that were identified as endangered. The numbers of endangered species were evaluated in each wildlife management option.

Table 8.4 List of endangered species in LGCA

English name	Scientific name
Elephant	<i>Loxodonta Africana</i>
Oryx	<i>Oryx gazellacallotis</i>
Lion	<i>Panthera leo</i>
Wild dog	<i>Lycaon pictus</i>
Long-tailed pangolin	<i>Uromaniste tradactyla</i>
Cheetah	<i>Acinonyx jubatus</i>
Hippo	<i>Hippopotamus amphibius</i>
Leopard	<i>Panthera Pardus</i>
Egyptian vulture	<i>Neophora percnopterus</i>
Lesser flamingo	<i>Phoenicoparrus minor</i>
African juniper	<i>Juniper procera</i>
Wild olive	<i>Olea Africana</i>

Source: MCA Expert Workshop (2018).

⁴The analysis of endangered species in LGCA by the ecologist was based on data obtained from the International Union for the Conservation of Nature, the Earth’s Endangered Creatures, the Tanzania Wildlife Research Institute, the Loliondo Wildlife Management Area Baseline Report 2003, the Serengeti National Park, the Maasai Mara Ecological Survey, and the Ngorongoro Conservation Area Authority. The reports are available in the Department of Wildlife Management at the Ngorongoro District Council.

Water resources

The data on water supply in the study area was obtained from an NDC water engineer and from an OBC (2016) report which included community projects supported since the 1990s. The information was presented to the stakeholders by an environmental expert from the NDC. It was reported that the total number of registered wells in Loliondo is 53 (32 of which were sponsored by the OBC). Each well can discharge about 5000 litres of water a day. The market price of water per 20-litre bucket in the region is TZS 200 (US\$ 0.1). The time spent on pumping water from each well was estimated between 8 and 12 hours. After obtaining the total estimate of amount of water from all 53 wells, 20 percent of the running costs were deducted from the estimated total costs. The financial value of the water supply as an ecosystem service was calculated at US\$ 1000/km². The value of ground water obtained as an ecosystem service for each wildlife management option is presented in the final effect table.

Food (agricultural production)

The data on crop and livestock production obtained from the Department of Livestock and Agriculture at the NDC were presented by an agricultural expert to the stakeholders at the workshop. The data were on crop and livestock production, the main agricultural livelihood activities in both the Sale and Loliondo Divisions for the year 2018. The total estimated number of livestock and their prices were obtained based on a NDC livestock population survey of 2018. The offtake was 20 percent of the total estimated number of livestock sold within the district cattle markets in 2018. With the average exchange rate of US\$ 1 = TZS 2000, the price for a goat or sheep was TZS 70,000 (US\$ 30) while that for a cow was TZS 200,000 (US\$ 87). Data from the NDC on maize and beans for 2018 were used to estimate and obtain the value of the food produced in the LGCA. The price of maize and beans used to estimate crop production in Loliondo was obtained from the regional market in the area. While there are other food crops cultivated in the area, these are in smaller quantities, therefore, maize and beans were used to estimate the value of food. Calculations were based on the number of tonnes produced in 2018 in the Sale and Loliondo Divisions in an area of 4,000 km². The total cost of producing crops and livestock production per square kilometre was calculated at the rate of US\$ 1,000/km²/year for each option. Running costs were also considered when calculating the cost of producing food as an ecosystem service in LGCA. The estimated value of agricultural food production in each option is presented in the final effect table.

8.7.2 Economic criteria

Gross Regional Product

The GRP of the LGCA was analysed and presented by an economist from the District Office. During the workshop, it was explained that GRP involves the estimate of value of goods and services produced in the LGCA based on the market price. The average GRP per capita for the Ngorongoro District was obtained from the NDC and multiplied by the total number of people in each area of the wildlife management options. The total estimated GRP per capita with significant statistical variations in each of the options was obtained. The GRP of the LGCA was calculated at US\$ 1,000 million per year with the total number of people being 206,888. The estimates of GRP per capita for each wildlife management option are presented in the final effect table.

Financial returns

An economist was involved as an expert to derive the financial returns for each of the wildlife management options. The estimated financial return for each option was calculated for a period of five years. The formula, $FV = PV \times (1+I)^n$, was used to derive financial returns for the options, where FV= future value, PV= present value, I= Interest rate per year and n= number of periods. The start-up capital for enterprises in the current option (the LGCA) was US\$ 0.00, in VBIWMA US\$ 150,000, and in JWMA US\$ 250,000, assuming that the initial capital for the status in the LGCA was unknown. The GRA was excluded as it advocates pure conservation without human activities; therefore there were no financial returns for this option. The interest rate was set 10 percent for the wildlife management options. The estimated present value of production per km² was obtained for the economic activities carried out in Loliondo which were hunting (US\$ 546 per km²), ecotourism (US\$ 240 per km²), livestock production (US\$ 2,870 per km²), and crop production (US\$ 4,000 per km²). The results were multiplied by the area of land in each of the options for LGCA. The estimated financial returns for each option were measured in US\$ 1,000 per year as presented in the final effect table.

Employment

The data on employment were obtained from the Department of Planning and Economics at the NDC, the corporate social responsibility reports of AndBeyond Safaris, Thomson Safaris and the OBC. The information was presented to the stakeholders by an expert from the department for social welfare at NDC. According to the OBC report, 102 people were employed as permanent workers in the hunting tourism concession in LGCA. About 150 people were employed in the ecotourism sector with an average of 50 people per campsite for the three camps currently operating in the LGCA, and 28 were employed by the NDC in the Environmental and Natural Resources Department. The size of the area available for economic activities under each option was used to determine the final number of additional jobs, as indicated in the effect table. For example, about 50 game rangers would be employed in a GRA. The number of employees would vary in the remaining wildlife management options as indicated above. The employment rate was determined by the estimated number of additional jobs per year in each option per square kilometre. The results are presented in the final effect table for evaluation.

8.7.3 Social criteria

Most of the qualitative criteria, such as socio-cultural, were scored by all stakeholders unlike quantitative criteria which were scored by experts. A scale of low, moderate, very low (-, --, ---) and high, moderate or very high impact (+, ++, +++) was used for scoring socio-cultural criteria.

Natural Resource Conflicts

The LGCA has experienced a 25-yearlong conflict over natural resources and land use. All the stakeholders were involved in analysing what the status of the conflict would be under each of the proposed wildlife management options, as to whether the conflict would get worse, abate or remain constant, and what the scale of the impact would be under each option. For example, the implementation of a GRA would probably have very high negative impacts on livelihoods in the study area.

Poverty level

The poverty level was examined under each option by both stakeholders and experts. Indicators of poverty such as income, education and health, were considered in assessing what the level of poverty of communities would be under each option. The scale of low, moderate or very low and high, moderate or very high was used to determine the level of poverty under each option, whether it would increase, decline or stay the same in the study area upon implementation of identified options.

Social equity

Social equity was assessed under each option based on the distribution of costs and benefits from the tourism scheme across all stakeholder groups without any discrimination. A scale of low, moderate or very low and high, moderate or very high impact was used to determine the level of social equity, as to whether there would be greater or less social equity under each option for the LGCA.

8.7.4 Cultural criteria

Rituals and ceremonies

Rituals and ceremonies were examined as cultural criteria under each wildlife management option. The Maasai in the LGCA conduct various rituals and ceremonies, such as circumcision (*Emuratta*), marriage (*Enkiama*), warrior shaving (*Eunoto*), milk-drinking (*Eokoto e-kule*), and meat-eating (*Enkangoo-nkiri*). These take place in designated areas in the LGCA. Both the positive and negative impacts of these rituals and ceremonies under each option were assessed and recorded for evaluating wildlife management options.

Dry and wet livestock grazing practices

Loliondo is dominated by Maasai pastoralists using the traditional practice of wet and dry grazing in the area. In this type of grazing, the pastoralists move their herds according to the

wet and dry season, which might be affected at different levels under each option. For example, grazing would not be allowed in a GRA, while in a VBIWMA grazing would be allowed under land-use zoning. However, in the current option both wet and dry grazing areas have been affected because of the wildlife and land-use conflicts. Under JVWMA, it is likely that the Maasai pastoralist would acquire partial user rights to access dry grazing areas during extreme dry period. This might provide relief because under current status the pastoralist does not have access to dry graze areas. The impact of each option on the practice of grazing was measured on a scale of low, moderate or very low and high, moderate or very high and the results are presented on the effect table.

Cultural and historic sites

This is another important criterion in evaluating wildlife management options for the LGCA. The Maasai land in the NDC has important cultural and historic sites. For example, Oldupai Gorge and Laetoli in the NDC, has been claimed as the ‘cradle of humankind’ in East Africa. The impact on cultural and historic sites in the LGCA was analysed under different management options. A scale of a low, moderate or very low and high, moderate or very high was used to obtain scores for what the impact would be on cultural and historic sites under each option. For instance, to what extent would a wildlife management option support the maintenance of cultural and historic sites in the study area? The scores for each wildlife management option for multi-criteria evaluation are indicated in the final effect table (see Table 8.5).

8.8 Multi-Criteria Evaluation Results

The previous sections 8.1 to 8.7 established the context of the problem in the LGCA in which options and criteria were identified by stakeholders and experts during the series of FGDs in Loliondo. This section presents the multi-criteria evaluation results of the preferred wildlife management options for LGCA.

8.8.1 Scoring the options

Scoring of wildlife management options against the criteria followed the development of options and criteria. At this stage, the performance of different options was scored against each

criterion in the effect table. Table 8.5 shows the effect table with scores on the performance of the wildlife management options against the criteria for the LGCA.

The process of scoring the effect table involved mostly experts and some non-expert stakeholders. For socio-cultural criteria, weights for all eleven stakeholders were analysed to obtain the average weight while for ecological and economic criteria the scores were directly undertaken by experts. After all the scored matrices had been returned, the data were entered into the DEFINITE software programme, and the final effect table was analysed by the researcher, stakeholders and experts. The results were presented to the decision-makers at the final evaluation meeting at Wasso.

Table 8.5 Evaluation matrix (effect table)

Evaluation Criteria			Wildlife Management Option			
Criteria	Individual criterion	Measurement unit	LGCA	GRA	JVWMA	VBIWMA
Ecological	Endangered species	Number of species	12	3	6	8
	Groundwater supply	US\$ 1000/km ² /year	141	0	88	115
	Food(agricultural production)	US\$ 1000 /km ² /year	133	0	108	93
Economic	Financial returns	US\$ 1000 /year	17	0	235	144
	Number of jobs	Number of employee/year	584	50	650	162
	Gross Regional Product	US\$ 1000 million /year	36	0	15	15
Social	Natural resources conflicts	+,++, +++, -, --, ---	--	++	--	--
	Poverty level	+,++, +++, -, --, ---	+	+++	+	++
	Social equity	+,++, +++, -, --, ---	---	---	+++	--
Cultural	Rituals and ceremonies	+,++, +++, -, --, ---	++	---	++	+
	Wet and dry grazing culture	+,++, +++, -, --, ---	--	--	--	--
	Cultural and Historic	+,++, +++, -, --, ---	+	--	+	++

Notes:

LGCA–Loliondo Game Controlled Area.

(-, --, ---) = Low, Moderate, Very Low

(+, ++, +++) = High, Moderate, Very High

GRA–Game Researve Area.

JVWMA–Joint Venture Wildlife Management Area.

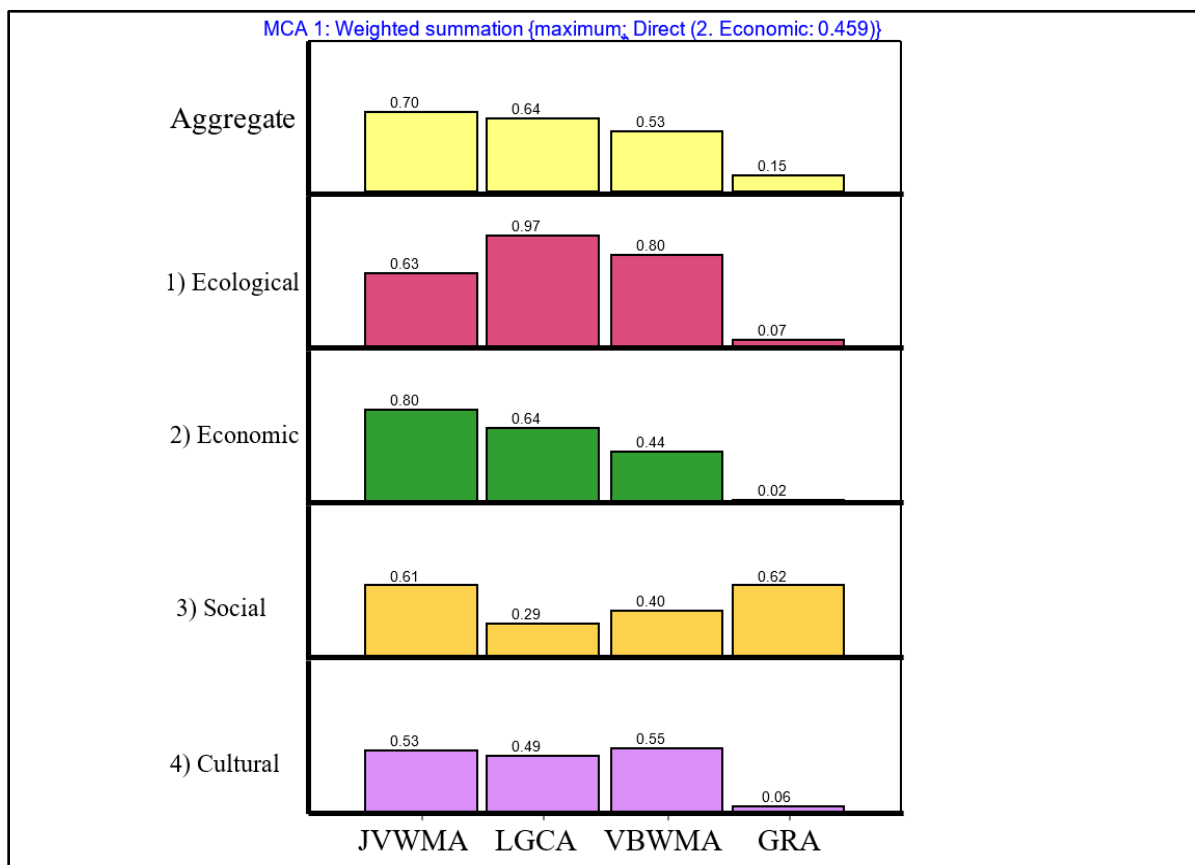
VBIWMA–Village-Based Independent Wildlife Management Area.

Source: Stakeholders and Experts MCA Workshop (2018).

8.8.2 Aggregating and ranking of options

The options were analysed against the criteria jointly by the stakeholders and experts at the final meeting held at Wasso in Loliondo on 17th November 2018. The weighted summation method in the DEFINITE software was used to calculate weighted values based on combined scores and ranks that describe the overall preference for each wildlife management option. The results of the MCA carried out by the eleven experts and stakeholders are presented in Figure 8.5. A simple bar graph is used to represent the weight for each wildlife management option. The JVWMA option was ranked the best due to its potential socio-economic, ecological and cultural benefits. The second option was the LGCA, followed by the VBIWMA, while GRA was the least preferred option. The results informed the stakeholders of the potential of each option for managing wildlife in the LGCA.

Figure 8.5 Results of the multi-criteria analysis



Source: Stakeholder and Expert MCA Workshop (2018).

8.8.3 Impacts of the alternative policy options

The MCA evaluation results from the experts and stakeholders revealed that the GRA option would not benefit the local stakeholders economically and would have a negative impact on regional financial returns. From the ecological aspect, this option satisfies the main goal of protecting endangered species, given that the MCA results showed that the number of endangered species would be reduced from 12 in the LGCA (current option) to 3 species in the proposed GRA. However, there would be less job opportunities with the GRA option, compared to the other options, because only a limited number of game rangers would be required.

The MCA analysis has found that that the VBIWMA option would result in a decline in terms of the number of endangered species from 12 with the current LGCA option to 8. Unlike the GRA option in which tourism activities would be restricted, the VBIWMA option would give the six local villages the exclusive right to natural resources, particularly wildlife, and allow livestock grazing and tourism activities. With the JVWMA option would create a number of employment opportunities via tourism enterprises. In addition, the MCA findings revealed that the JVWMA option would have a positive impact on the ecosystems reducing the number of endangered species. Furthermore, this option would promote social equity among the local communities in the LGCA. After all, the JVWMA option would generate the greatest total benefits in terms of the economic, ecological and socio-cultural criteria.

8.8.4 Sensitivity analysis of scores and weights

A sensitivity analysis of scores and weights was carried out to assess changes in the ranking of the wildlife management options. Firstly, the options were analysed to find out whether they would be sensitive to changes in weights, which revealed that the JVWMA, VBIWMA and the LGCA options are sensitive to changes in weights. For example, the sensitivity analysis results show that changes in the weights of financial returns from 0.09 to about 0.02 would not make joint venture the best option. Furthermore, it was found that an increase in the standardised weight of GRP from 0.35 to 0.55 would make JVWMA the worst option. For social criteria, the results show that reducing the weight of natural resources conflicts to less than 0.67 would make JVWMA the worst option and the LGCA best option. An increase or decline in the

weight for the endangered species and grazing culture criteria revealed no changes in the ranking of the options.

Secondly, the sensitivity analysis of the scores was undertaken to assess changes in the ranking of the options. The financial returns criterion scores were tested while maintaining the scores of the other criteria. Changes in the financial returns criterion scores revealed implications for the overall ranking of the wildlife management options in Loliondo. For example, the sensitivity analysis results of the scores show that, economically, changes in the number of employees from 650 to 339 in a JWMA would make the current option (LGCA) with 584 employees the best option. Changes in GRP from US\$ 36 mil/year to US\$ 8.29 mil/year at LGCA would make a VWMA the best option. The cultural criteria results revealed that changes in scores for rituals and ceremonies from (++) scale to (---) scale would make a JWMA the worst option whereas the LGCA would be the best wildlife management option. The results also show that a decline in the number of endangered species to 7 under the current option the LGCA would not make a JWMA the best option. The overall sensitivity analysis results show that the wildlife management options are sensitive to changes in weights and scores.

The final MCA results were presented to the stakeholders and experts (decision-makers) after undertaking the sensitivity analysis. The moderator asked for feedback on the final results from the participants. Commenting on JWMA as the most preferred policy option, the experts argued that the current wildlife management programme needs the community to be involved rather than the command and control exhibited under the current option (LGCA). Another stakeholder stated that the results on the current option might be due to conflicting policies in the area, while some stakeholders were of the view that the size of the LGCA, 4,000 km², contributed to the marginal difference between the JWMA and LGCA rankings. After the feedback session, the moderator invited the participants to vote on the final MCA results, as to whether they agreed or disagreed with them. The stakeholders unanimously voted to ratify the results.

8.9 Summary

This chapter presented a multi-criteria evaluation of wildlife management options for LGCA. It established the context of the problem which precipitated the need for a mutually beneficial

policy option. Six land-use types were identified and further analysed by the technical reference group. After the analysis, four wildlife management options were selected by stakeholders including current option, GRA, VBIWMA, and JVVMA. Twelve criteria relevant to the ecological, economic, social and cultural aspects of wildlife management were identified in the LGCA. The criteria chosen were the number of endangered species, food (agricultural production), groundwater supply, financial returns, number of jobs, GRP, natural resource conflicts, poverty level, social equity, rituals and ceremonies, grazing practice, and cultural and historic sites. The twelve qualitative and quantitative criteria were evaluated against four wildlife management options using an evaluation matrix and were scored by the eleven experts and stakeholders. The maximum standardization method was applied to standardise the scores. The weighted summation evaluation method in DEFINITE was used to aggregate the scores. Sensitivity analysis of the weights and scores was undertaken to determine the reliability of the four wildlife management options. The results were presented to the stakeholders and experts for them to make a decision, and they agreed that the JVVMA was the wildlife management option most preferred in the LGCA. The above results from the MCA are complemented and corroborated with cross-sectional survey in the next chapter.

Chapter 9. Results from Community Survey on Wildlife Management Options

This chapter presents the views and experiences of individual households in relation to the wildlife management options for the LGCA. The survey results presented here are triangulated with the results of the multi-criteria evaluation on the policy options in wildlife management presented in Chapter 8. Section 9.1 reports the demographic and socioeconomic characteristics of the 330 survey participants from the six villages. Section 9.2 presents the respondents' perceptions on trophy hunting and wildlife management in the LGCA. The survey results relating to land tenure, property rights, and wildlife management in the LGCA are presented in Section 9.3. Section 9.4 reports the respondents' views on the alternative options and their socio-economic, cultural and ecological impacts for wildlife management in the LGCA.

9.1 Demographic and Socioeconomic Characteristics of the Respondents

Table 9.1 illustrates the demographic and socioeconomic characteristics of the respondents. The majority of the survey respondents from the study villages were Maasai (about 89 percent), male (about 65 percent), aged between 31 and 50 years old (two-thirds), and had lived in the village since birth (about 71 percent). Nearly half of the respondents had no formal education (49 percent), just over a quarter completed senior high school, and only 6.1 percent had completed tertiary education. The majority (about 77 percent) were involved in livestock grazing as their main economic activity. Other economic activities engaged in were trophy hunting, small business enterprises, and ecotourism, while less than 2 percent were private or government employees. While a gender balance among survey respondents was hoped for, only 35 percent of respondents were female. Younger women between 20 and 30 years were less involved in the survey (13%) compared to elder women between 31 and 40 (22%).

For the Maasai respondents only, the survey results revealed that 70 percent were lacking formal education while 30 percent (mostly village leaders) had some formal education. The Maasai in the area were predominantly from Loitayok, Loita and Purko groups, which occupy a large part of the Ngorongoro District and Loliondo Division. The remaining 29 percent of the ethnic groups were migrants to Loliondo area and had lived in the villages for about 12 to

25 years. The migrants moved to the area in search of grazing pasture, farming, marriage, hunting, and other occupations.

Table 9.1 Distribution of socio-demographic characteristics of the survey respondents

Variable	Attribute	Frequency	Percent
Gender (n = 330)	Male	215	65.2
	Female	115	34.8
Ethnicity (n = 330)	Maasai	294	89.1
	Others (Chagga, Sonjo and Sukuma)	36	10.9
Age (n = 330)	20–30	95	28.8
	31–40	156	47.3
	41–50	61	18.5
	51–60	12	3.6
	60+	6	1.8
Highest level of education (n = 330)	No formal education	164	49.7
	Primary education	60	18.2
	Secondary education	86	26.1
	Tertiary education	20	6.1
Years residing in the village (n = 330)	Since birth	235	71.2
	Between 12- 25 years	69	20.9
	Between 1- 12 years	26	7.9
Main economic activity (n = 330)	Farming	15	4.5
	Hunting tourism	14	4.2
	Livestock grazing	255	77.3
	Private & government employee	6	1.8
	Small business enterprises	25	7.6
	Ecotourism	15	4.6

Source: Field Survey Data (2018).

9.2 The Current Status of Tourism and Wildlife Management at the LGCA

Descriptive statistics were used to understand the status of tourism and wildlife management in the study area. Non-parametric techniques such as the chi-square test for independence and Mann–Whitney *U*-test were employed to determine whether there are statistically significant differences in the median values in the 7-point Likert scale across the Maasai and non-Maasai groups, hunters and non-hunters, and natives and migrants both males and females respectively. The findings of the statistical tests are presented in Tables 9.2, 9.3 and 9.4 below.

The results show that 60 percent of the respondents identified ecotourism as the primary tourist activity while 34 percent mentioned that hunting tourism is the secondary tourist activity in the villages at the LGCA. About 6 percent of the respondents identified cultural tourism as a tertiary tourism activity in the area. Only 18 percent of the respondents were participating in tourism activities in the LGCA. That is, a large proportion (82 percent) of the respondents were not participating in any of the tourism activities. Instead, they were engaged in livestock grazing and crop production. The main reason for their non-involvement in tourism was that the current scheme does not favour their involvement in ecotourism or hunting. A chi-square test of independence was undertaken for the null hypothesis that there was no statistically significant difference between trophy hunting and ecotourism participants in the study area. It was found that the difference between participants in hunting and ecotourism was statistically significant ($\chi^2 = 132.7, p= 0.001$). About half of the respondents who were engaged in the tourist activities argued that ecotourism development had enhanced biodiversity protection. However, 26 percent of them perceived that such activities have intensified wildlife and land-use conflicts in the area. Also, 71 percent of all respondents agreed that ecotourism and hunting tourist activities in the study area have conservation value than socio-economic benefits.

A large proportion (89 percent) of the respondents had never been involved in planning and decision-making regarding tourism schemes, while about 11 percent of the respondents said that they have been involved. A chi-square test was undertaken to test the null hypothesis that there is no significant difference between involvement in planning and decision-making by leaders and non-leaders. The test results showed that the percentage of respondents that were involved in planning and decision-making differed and this was statistically significant according to their leadership position ($\chi^2 = 197.9, p= 0.001$). The small percentage of those who were involved included the village leaders and those who worked as managers for the tourism investors. Notwithstanding their non-involvement, the respondents acknowledge the contribution of tourism in the community development projects which involved the distribution of social services, including health, education, solar energy, water supply and road infrastructure. About 43.3 percent of the respondents confirmed that tourism investment supports health services more than any other community development services at the LGCA.

A chi-square test was performed to examine the null hypothesis that there is no difference in support for wildlife conservation between the Maasai and non-Maasai groups at the LGCA.

As can be seen by the percentage of respondents in Table 9.2, there is a statistically significant difference between the two groups concerning wildlife conservation in the LGCA ($\chi^2 = 55.5$, $p = 0.001$). This means that the non-Maasai group prefer socio-economic benefits from the tourism schemes to conservation despite their understanding about the role of tourism in wildlife conservation as stated above. It is important to point out that despite the fact that tourism schemes in the LGCA support community services, the non-involvement of a large proportion of villagers in tourism planning and decision-making has negative implications for the acceptability of the community development services and decision from tourism schemes.

About three quarters (74 percent) of the respondents mentioned that private investors own tourism schemes, while 16 percent of the respondents reported that the ownership of tourism schemes is under control of village leaders while a few (10 percent) said they are under the central government. Although tourist activities at the LGCA occur on the village land which is under control and authority of the village governance, there is a lack of ownership and limited opportunities for the villagers. For example, during the field survey, luxury safari tented camps were observed at both Ololosokwan and Soitsambu villages, with The Kleins Camp located outside the north-eastern borders of SNP at Ololosokwan, and the Thomson Safaris tented lodge located in Soitsambu village. Both camps were undertaking ecotourism activities, yet the villages were neither shareholders or owners of these camps.

The Mann–Whitney *U*-test statistics was performed to examine the respondents' perceptions on the challenges associated with land ownership in the concession areas using a 7-point Likert scale. The respondents were categorised into hunting and non-hunting groups that is according to their economic activities. The test was performed to evaluate the null hypothesis that there is no statistically significant difference between the hunting and non-hunting groups on the challenges of hunting tourism in the study area. The result of the test is presented in Table 9.3.

The mean rank responses indicate the level of agreement to the statements on the challenges of hunting among respondents. Overall, the majority of the respondents from hunting and non-hunting groups agreed that trophy hunting is facing challenges in the management and administration at the LGCA. However, the results of the Mann–Whitney *U*-test did not provide any evidence to reject the null hypothesis ($p > 0.05$). That is, there was no statistically significant difference between the two groups in terms of the challenges of hunting tourism as indicated

above ($p>0.05$). Both groups equally agreed the challenges facing hunting tourism in the area included corruption, malpractice, poor community involvement and lack of economic benefits.

Table 9.2 Tourism and wildlife management

Variable	Attribute	Frequency	Percent	χ^2	<i>p</i>
Primary tourism activity (n = 297)	Photographic tourism	177	59.6	126.1	0.001
	Cultural tourism	19	6.4		
	Hunting tourism	101	34.0		
Involved in tourism activities (n = 323)	Yes	58	18.0	132.7	0.001
	No	265	82.0		
The implication of expanding land for ecotourism (n = 58)	Enhanced biodiversity protection	29	50.0	7.2	0.022
	Increased conflicts	15	26.0		
	Increased revenue	14	24.0		
Involved in planning, decision-making (n = 326)	Yes	36	11.0	197.9	0.001
	No	290	89.0		
Ownership of the current tourism schemes (n = 314)	Village government	49	15.6	237.4	0.001
	Investors	233	74.2		
	State	32	10.2		
Ecotourism and hunting have conservation value than socio-economic benefits (n = 314)	Yes	223	71.0	55.5	0.001
	No	91	29.9		
Socio-economic services supported by tourism (n = 224)	Health	97	43.3	119.5	0.001
	Education	60	26.8		
	Water	43	19.2		
	Others	24	10.7		

Notes: χ^2 = chi-square test (Monte Carlo), Level of significance= p -value $>0.05^*$.

Source: Field Survey Data (2018).

Table 9.3 Challenges facing hunting tourism

Variable (statement)**	Economic activity				<i>U</i>	<i>p</i> -value*
	Hunting		Non-hunting			
	Med	M.R	Med	M.R		
No specified duration of ownership	6	160.2	6	161.6	2137.5	0.955
Lack of property rights for hunting	5	153.0	6	159.8	2037.0	0.779
Incompetent professional hunters	6	162.3	6	156.2	2004.5	0.793
Disregarding hunting laws	6	131.6	6	159.2	1738.0	0.249
Disrespect of government officials	6	141.1	6	161.4	1871.0	0.403
Uncontrolled wounded animals	6	140.8	6	161.9	1866.0	0.391
Corruption among officials	6	147.4	7	163.2	1958.0	0.492
Poor community involvement in decision-making	7	171.5	6	159.5	1974.5	0.613
Community benefits from hunting fees	5	183.2	5	161.1	1740.0	0.396
Lack of financial accountability and transparency in the contracts	6	143.4	6	162.8	1772.5	0.444
Lack of policy reform in wildlife management	6	152.0	6	160.4	2023.0	0.728

Notes: *U* = Mann–Whitney Test statistic, Md=Median, M.R= Mean Rank, *Level of significance $p>0.05$.

** Response scores on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Source: Field Survey Data (2018).

9.3 Land Tenure, Property Rights and Wildlife Management at Loliondo

In examining the land tenure, property rights, and wildlife management in the LGCA, this study employed the chi-square test to examine the associations of the attributes of the variables presented in Table 9.4. In Loliondo, there is a general disagreement among stakeholders about the ownership of the LGCA. The survey revealed that more than half (65 percent) of the respondents, predominantly the Maasai, reported that land tenure at the LGCA is under customary rights of occupancy while 35 percent said the land is under the granted right of occupancy. A chi-square test was therefore performed to examine whether there was a statistically significant difference between the perception of Maasai and non-Maasai groups regarding land ownership. The result showed that the difference in perception regarding ownership between the Maasai and non-Maasai groups was statistically significant ($\chi^2 = 28.55$, $p= 0.01$). The results indicate that the majority of the Maasai in Loliondo believe that the land is under customary rights of occupancy and they all have rights over land and resource use.

Concerning the category of land ownership in the villages, the land is made up of general land, village land, and reserve land. Half of the respondents (51 percent) agreed that the lands in the study area are under the ownership of the villages. About 36 percent of the respondents argued, that land ownership is both reserve and village land and few (12 percent) reported that it is a general land. A small proportion of the respondents (0.6 percent) reported that the LGCA is a pure reserved land. A minority of respondents indicate that most of the villagers are not familiar with such a category of land ownership in the study area.

Table 9.4 Land tenure and property rights to the Maasai and non-Maasai

Variable	Attribute	Frequency	Percent	χ^2	<i>p</i>
The current type of land tenure at LGCA	Customary right of occupancy	198	65.3	28.55	0.001*
	Granted right of occupancy	105	34.7		
Category of land-ownership under your village	General land	40	12.2		
	Village land	167	51.1		
	Reserved land	2	0.6		
	Both reserved and village land	118	36.1		
Accessing the areas not suitable for tourism activities	Accessible	23	7.8		
	Not accessible	27	9.2		
	Partially accessible	220	74.6		
	Highly accessible	25	8.5		
Where do you graze your cattle	At my private land	5	1.5	164.79	0.001*
	Dry graze area	67	20.3		
	Wet graze area	54	16.4		
	General reserved area	149	45.2		
	Away from Loliondo	55	16.7		
Ownership of a piece of land	Yes	167	53.2	1.27	0.284
	No	147	44.5		
Type of property rights possessed	State	9	2.7	265.08	0.001*
	Private	95	28.8		
	Common	28	8.5		
	Open access	198	60		

Notes: χ^2 =chi-square test (Monte Carlo), Level of significance=*p*-value >0.05*.

Source: Field Survey Data (2018).

The respondents were asked about their views on access to the areas that were not suitable for tourism in the villages. A significant number of respondents (75 percent) mentioned that the

areas not suitable for tourism were partially accessible, (8.5 percent) highly accessible, and accessible (7.8 percent). However, a few (9.2 percent) of the respondents had the view that those areas were not accessible for other socio-economic activities such as grazing.

The majority of the surveyed respondents were pastoralists and the results indicate that livestock grazing was their main socio-economic activity (Table 9.4 above). The respondents were asked to give their opinions about access to grazing areas. The analysis revealed that 45 percent of the respondents grazed their cattle on general reserved areas, and 20 percent grazed on a dry graze area, especially during the dry season. Other villagers grazed on wet graze areas (16.4 percent) and in private lands (1.5 percent). A chi-square test was performed to test the null hypothesis that the Maasai pastoralists did not have access to dry grazing areas where hunting is undertaken at LGCA. The result showed that there was a statistically significant difference between Maasai and non-Maasai with regards to access to areas for grazing cattle ($\chi^2=164.79$, $p = 0.001$). About 20 percent of respondents confirmed grazing their cattle in dry graze areas. Yet this is where hunting tourism is undertaken. It therefore seems that this group of pastoralists contributed to the wildlife and land-use conflicts between pastoralists and the hunting tourism investor in the LGCA.

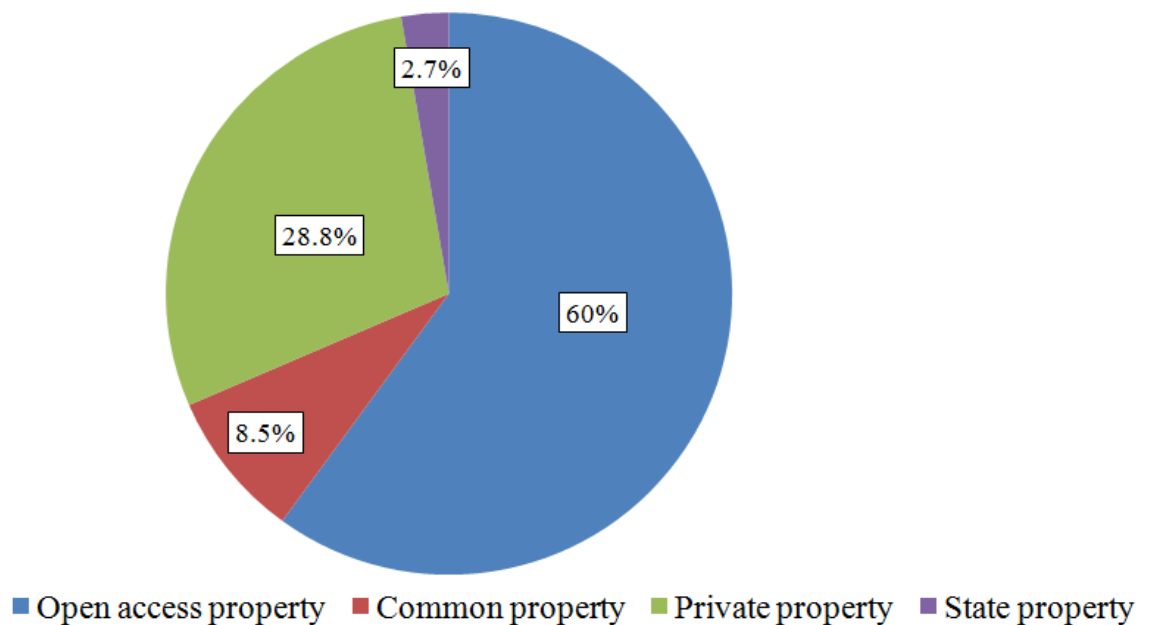
Respondents were asked about their perceptions of the status of the land ownership and associated types of property rights in the study area. The survey results indicated that four types of rights to land exist in the study area. These included state, common, private and no property (open access), as shown in Figure 9.1. Half of the respondents (53.2 percent) had village land registration document declaring ownership of their land, while 44.5 percent of the respondents were not aware of the ownership documents. Although around half of the respondents declared to own a piece of land, more than half of them (60 percent) had a perception that the land was open access (no property rights). Only 28.8 percent of the owners reported that it was private property, and 8.5 percent said it was common property. Meanwhile, the minority 2.7 percent reported that the land was under state ownership.

This perception by the large majority that the land in the LGCA is open access shows that there is lack of well-defined property rights to land and other natural resources in the area. Also, a chi-square test was performed to examine the relationship between ethnicity and type of property rights possessed. The null hypothesis was that there was no statistically significant difference in terms of the median values in the 7-point Likert scale for the types of property

rights held by the Maasai and non-Maasai groups. The results showed that there was no statistically significant difference between the types of property rights held by the Maasai and non-Maasai groups ($\chi^2=1.27$; $p = 0.284$).

The study further revealed the existence of both trophy hunting and ecotourism investment in the area. As for the institutions entitled to offer land for investment in their villages in the LGCA, the majority (82.5 percent) of the respondents agreed that the village government is responsible for offering land for tourism investment. About 10.2 percent of the respondents said that Tanzania Investment Centre in collaboration with the village government offers land for investment. Although the OBC acquired a lease for trophy hunting from the Central Government, only 7.3 percent of the respondents recognised that the state has the mandate to offer land for investment in the villages (see Table 9.5). This indicates that the majority in the villages do not recognise that the central government has the mandate to offer leases to investors in the LGCA. Instead, the majority of the respondents believed that the village governments' leadership is responsible for offering land for investment under a lease contract model particularly for ecotourism.

Figure 9.1 Respondents opinions on the types of property rights



Source: Field Survey Data (2018).

The respondents were asked if they had customary certificates of land ownership and title deeds for their land (responses summarised in below Table 9.5). What is interesting about the results is that majority of the respondents (91 percent) did not have customary certificates of the rights of occupancy. Only 8.5 percent of the respondents possessed customary certificates of ownership. The majority of those who had the certificates of ownership were acquired 15 years ago, while only a few obtained them 25 years ago.

Table 9.5 Descriptive statistics on the ownership of land certificates and title deeds

Variable	Attribute	Frequency	Percent
Institution responsible to offer land for investment (N=274)	State authority	20	7.3
	Village government	226	82.5
	Tanzania Investment Centre	28	10.2
Ownership of a certificate of customary right of occupancy (N=307)	Yes	27	8.8
	No	280	91.2
Years when a certificate of ownership was obtained (N=27)	5 years	1	3.7
	15years	24	88.9
	25 years	2	7.4
Ownership of the land title deed (N=309)	Yes	28	9.1
	No	281	90.9
Years when the title deed was obtained (N=28)	15 years	15	53.6
	25 years	13	46.4
Experienced resettlement (N=313)	Yes	233	74.4
	No	80	25.6

Source: Field Survey Data (2018).

Also, 90.9 percent of the respondents did not have title deeds for land ownership, and the few who did possess title deeds were leaders from the villages near the small town Wasso. Further, about 74.4 percent of the respondents had experienced re-settlement, while 25.6 percent said they had never experienced resettlement (i.e. being forced to move and resettle elsewhere to allow for wildlife conservation).

The *t*-test statistics were used to analyse the mean variation between the responses of Maasai and non-Maasai on the status of wildlife and land rights in the study area (see Table 9.6). Both Maasai and non-Maasai groups were examined based on the distribution of priorities responses in a 7-Likert scale concerning characteristics of property rights to land and natural resources

in LGCA. An independent sample *t*-test was undertaken to evaluate the null hypothesis that there was no significant difference between Maasai and non-Maasai in the level of priority to the rights to land and natural resources. The results revealed a statistically significant difference between the Maasai and non-Maasai groups on the level of agreement to the characteristics of property rights to land and natural resources ($p < 0.001$).

Table 9.6 Respondents' perceptions of rights they hold to natural resources

Attribute**	Maasai		Non-Maasai		<i>t</i> - statistic	<i>p</i>
	Mean	SD	Mean	SD		
Comprehensiveness	2.90	2.02	4.63	1.86	-5.134	0.001*
Transferability	3.08	2.05	4.69	1.79	-4.919	0.001*
Duration	3.80	1.96	5.06	1.47	-4.631	0.001*
Benefit conferred	3.91	1.92	5.03	1.46	-4.158	0.001*
Exclusiveness	3.24	2.18	4.80	1.83	-4.673	0.001*

Notes: *t*-test for Equality of Means, 95% Confidence Interval of the Difference, *Level of significance *p*-value > 0.05 , **Response scores on a 7-point scale 1= (Not a priority) to 7= (Essentially priority).

Source: Field Survey Data (2018).

The analysis showed that out of the five main characteristics of the property rights, duration of property ownership was given priority with the highest mean score of 5.0 for non-Maasai, while benefit conferred received a mean of 4.0 for the Maasai group. An independent sample *t*-test was performed for the null hypothesis that there are no significant benefits from tourism schemes to the households in the study area. The test revealed that the average level of the benefit conferred was significantly higher for non-Maasai ($t = -4.158, p = 0.001$). Thus, there is a statistically significant difference between Maasai and non-Maasai in the level of benefit conferred from natural resources in the LGCA. Additionally, a *t*-test was performed for the null hypothesis that there was no exclusive right to natural resources for Maasai and non-Maasai group in the study area. An independent sample *t*-test result revealed a statistically significant difference in the scores for Maasai (Mean = 3.24, Std. Dev = 2.18), and non-Maasai group (Mean = 4.80, Std. Dev = 1.83), $t = -4.673, p = 0.001$. Overall, the difference in response for all respondents in respective characteristics of property rights was statistically significant between the two groups of Maasai and non-Maasai in the study area where $p < 0.001$.

Furthermore, participants were asked to indicate the level of their agreement or disagreement on the impacts of the resettlement scheme on their livelihoods (noting that the resettlement at

Loliondo was forcefully undertaken by the government to allow expansion of conservation areas), on a 7- Likert scale. The Likert scale ranged from 1 (strongly disagree) to 7 (strongly agree). The stakeholders’ perceptions of resettlement were analysed and are presented in Table 9.7.

Table 9.7 Impacts of resettlements cheme on local communities in LGCA

Variable (statement) **	Residency status				U	p
	Native		Migrant			
	Md	M.R	Md	M.R		
Resettlement contribute to the erosion of informal safety nets	6	146.1	7	200.7	7122	0.001*
Eroded social networks are caused by poor resettlement programme	6	149.5	7	195.8	7810	0.001*
People became land-less in resettlement schemes	6	153.2	6	185.0	8743	0.004*
Resettlement for contribute to increased food insecurity	6	150.8	7	194.4	8042	0.001*
Family breakdown increased after resettlement	6	160.0	6	181.2	9385	0.028*
Impoverishment levels increased when there is resettlement	6	150.9	6	184.9	8462	0.002*

Notes: U = Mann–Whitney Test statistic, Md=Median, M.R= Mean Rank, *Level of significance $p>0.05$.

**Response scores on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Source: Field Survey Data (2018).

Participants who migrated to the villages (81.8 percent) agreed strongly with the statement that ‘resettlement contributes to the erosion of informal safety nets’ (mean rank level of agreement 200.7, median = 7). The Mann–Whitney U-test statistics was employed to determine whether there are statistically significant differences in terms of the median values in the 7-point Likert scale for the natives and migrants about the impacts of resettlement scheme on the local communities in the LGCA. The test results indicated that there was a statistically significant difference between those who migrated and those born in the village on eroded informal safety nets ($p=0.001$).

Furthermore, the survey results revealed that 95 percent of respondents who migrated to the villages in the LGCA agreed that ‘poor resettlement programmes contribute to the erosion of social networks’ (mean rank=195.8, median = 7). Also, 78.7 percent of migrants agreed to the statement that ‘impoverishment levels increased when there are resettlements’ (mean rank=150.9, median = 6, $p=0.002$). The overall statistical results indicated that, although all

study participants agreed with most variables on the impacts of resettlement scheme on livelihoods, migrants were observed to have a stronger level of agreement compared to those born in the villages.

9.4 Wildlife Management Options

This section presents the survey results about the stakeholder perceptions of wildlife management options in the LGCA. The results from the four wildlife management options are compared to determine the option most preferred by the local communities. Mann–Whitney *U*-test statistics were used to examine the perception of the respondents on the wildlife management options between hunting and non-hunting groups on a 7-point Likert scale. The Likert scale ranged from 1 (strongly disagree) to 7 (strongly agree) for the four options. The Mann–Whitney *U*-test was carried to evaluate the null hypothesis that there was no statistically significant difference in the opinions of hunting and non-hunting group about wildlife management options for the LGCA.

9.4.1 The Current Option: Loliondo Game Controlled Area (LGCA)

Table 9.8 presents the statistical results of the mean rank and median responses from the respondents. About 76 percent of the respondents agreed to allow wildlife to co-exist with livestock grazing in LGCA (mean rank level of agreement= 165.8 and median = 6). Though the majority agreed with this statement, there was no statistically significant difference between the two groups ($p = 0.436$, $U=1941$, $z = -0.779$, $r=0.044$). Similarly, the majority of the respondents (75 percent) agreed that the current option is on village land which is under control and authority of the village. This is because they have copies of the certificates of registration of village land as evidence that they have been living in the village for the duration of more than 12 years. This indicates that most of the respondents were residents in the LGCA following the *Village Land Act 1999*.

Concerning types of land uses, a significant number of non-hunting groups (82 percent) agreed that livestock production was the main form of land-use. However, they were of the view that livestock production was competing with wildlife conservation in the LGCA. Despite the fact that the majority preferred livestock production as the main land-use, it is interesting to note that 80 percent of the respondents agreed that regulating livestock grazing would enhance

wildlife conservation. However, the level of willingness to participate in conservation for the hunting group (M.R =163.8 and median = 5, $U= 1815$) did not differ statistically significantly from the non-hunting group (M.R 192.9 and median = 5.5, $r = 0.066$, $z = -1.175$, $p= 0.240$). These results show that both groups of respondents were willing to be involved in sustainable wildlife management in the study area.

Table 9.8 Respondents perceptions of the current option

Variable (statement) **	Hunting		Non-hunting		U	z	r	p
	Md	M.R	Md	M.R				
Allow wildlife to co-exist with livestock grazing in LGCA	5	146.1	6	165.8	1941	-0.779	0.044	0.436
Accept that LGCA is a village land and you have a certificate	5.5	156.6	6	163.8	2088	-0.286	0.016	0.775
Accept that livestock grazing competes with conservation	6	160.6	6	164.7	2144	-0.163	0.009	0.871
Allow the government to revoke OBC tourism lease and accept to lose US\$ 819,000 per year from hunting revenue	5.5	149.3	6	166.2	1985	-0.676	0.038	0.499
Accept to participate in wildlife conservation by regulating grazing	5.5	192.9	5	163.8	1815	-1.175	0.066	0.240

Notes: U = Mann–Whitney Test statistic, z = Z score, r =effect size, Md=Median, M.R= Mean Rank, *Level of significance $p>0.05$. **Response scores on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Source: Field Survey Data (2018).

Furthermore, the respondents were asked to present their opinions concerning the status of trophy hunting lease investment in the LGCA. The analysis of their responses revealed that 82 percent of the respondents agreed for the government to revoke the tourism lease to the OBC and accept losing US\$ 819,000 per year from trophy hunting (mean rank level of agreement 166.2 and median = 6). This will have negative impact on the government revenue and funds for conservation. These findings show that most respondents do not agree with the trophy hunting investment under the current option. Across variables, the analysis did not show any statistically significance difference between the hunting and non-hunting group on the level of agreement with this option ($p > 0.05$). The overall survey results revealed that the stakeholders

agreed with most statements about the current option as it seems to have more negative impacts on wildlife management and their livelihoods. Most notably, however, respondents were willing to accept other alternative wildlife management options in the study area.

9.4.2 Game Reserve Area (GRA)

Findings from the survey presented in Table 9.9 revealed that 75 percent of the respondents disagreed with changing the village land tenure to a reserved land. Only a small minority (22 percent) of them agreed. The mean rank level of disagreement for the non-hunting group was MR=162.3 and Median = 2. Both the GRA tenure and village land tenure were tested for statistical significance among hunting and non-hunting groups. The analysis revealed that there was a statistically significant difference on the opinions of changing the land-use tenure between hunting and non-hunting groups ($U= 1213.5$, $r = 0.171$, $z = -3.034$, $p= 0.002$). A majority of the respondents (72.4 percent) disagreed with pure wildlife conservation as a major form of land-use.

Although the majority of them disagreed with the changes in the land tenure from village land to the pure conservation area, about 38 percent of the respondents accepted to move to a new area if they would be compensated before the resettlement. More than half of the respondents (60 percent) disagreed to the option to leave their village area to allow for the establishment of a Game Reserve. The results showed that those who agreed to move were mainly non-pastoralists (mean rank level of agreement =192.0, Median = 3.5).

Also, the Mann–Whitney U -test results show a lack of statistically significant differences between the two groups on adopting pure conservation as a form of land-use in the study area as it would have positive ecological impacts and negative implications on their livelihoods ($U= 1654$, $r = 3.034$, $z = -1.829$, $p= 0.103$). These results indicated that adopting a game reserve option would lead to resettlement, which would have significant and negative impacts on the livelihoods on the Maasai communities, because 77 percent are dependent on the prospective GRA area for livestock grazing. The survey results also revealed that 70 percent of the respondents disagreed to revoking customary rights of occupancy, while the minority (23.6 percent) agreed (M.R =163.7, Median =2). The overall results for this option showed that a

majority of the respondents, mostly the Maasai, disagreed with the establishment of a Game Reserve in Loliondo.

Table 9.9 Respondents perceptions of the game reserve area

Variable (statement) **	Hunting		Non-hunting		<i>U</i>	<i>z</i>	<i>r</i>	<i>p</i>
	Md	M.R	Md	M.R				
Accept that pure wildlife conservation as a major form of land-use	2	208.2	2	163.1	1600	-1.829	0.103	0.067
Accept to move in a new area with compensation paid before relocation	3.5	192.0	2	163.8	1827.5	-1.110	0.062	0.267
Allow revoke customary rights of occupancy	2.5	205.4	2	163.7	1654	-1.671	0.094	0.095
Allow GRA tenure to replace village land tenure	3	236.8	2	162.3	1213.5	-3.034	0.171	0.002*

Notes: *U* = Mann–Whitney Test statistic, *z*= Z score, *r* =effect size, Md=Median, M.R= Mean Rank, *Level of significance $p>0.05$.

**Response scores on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Source: Field Survey Data (2018).

9.4.3 Village-Based Independent Wildlife Management Area (VBIWMA)

Table 9.10 presents the results obtained from respondents’ opinions on the establishment of a VBIWMA. The results show high levels of agreement with the establishment of the VBIWMA in an individual village land. Almost all the respondents (90 percent) agreed to accept part of 1,500 km² to be designated on their individual village land for wildlife management. However, 91 percent agreed that there should be no changes to the village land tenure and customary rights of occupancy if this option would be established (M.R=165.0, Med=6). Similar to the joint venture option, the majority of respondents agreed to accept limited user rights to wildlife for hunting and photographic tourism in the VBIWMA. The Mann–Whitney *U*-test results revealed a lack of statistically significant differences in agreement between the two groups on land tenure and customary rights of occupancy (mean rank 167.7, median *U*= 1519, *r* = 0.119, *z* = -2.110, *p*= 0.035). This means that both groups equally agreed to the establishment of a VBIWMA.

Table 9.10 Respondents perceptions of the VBIWMA

Variable (statement) **	Hunting		Non-hunting		<i>U</i>	<i>z</i>	<i>r</i>	<i>p</i>
	Md	M.R	Md	M.R				
Accept part of your village land set aside for wildlife management	5	126.8	6	166.7	1669.5	-1.611	0.091	0.107
Accept limited user rights to wildlife for hunting and photographic tourism in the VBIWMA	6	116.0	6	167.7	1519	-2.110	0.119	0.035*
Allow no changes on the village land tenure and customary rights of occupancy	6	140.6	6	165.0	1863	-1.005	0.057	0.315
Accept contracts with photographic tourism to exist in the VBIWMA	5	126.4	6	162.1	1665	-1.482	0.083	0.138
Allow new hunting contracts at the VBIWMA	5.5	135.4	6	164.2	1791	-1.166	0.066	0.244

Notes: *U* = Mann–Whitney Test statistic, *z*= Z score, *r* =effect size, Md=Median, M.R= Mean Rank, *Level of significance $p>0.05$. **Response scores on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree).

Source: Field Survey Data (2018).

Furthermore, it is worth noting that the majority of the respondents (90 percent) agreed to retain contracts with photographic tourism while 80 percent agreed to allow new contracts for hunting in the VBIWMA (M.R =164.2; Med=6). Thus, the overall results indicate that most respondents, especially those in villages with wildlife potential, agreed with the establishment of this option.

9.4.4 Joint Venture Wildlife Management Area (JVWMA)

The respondents were asked to rate their level of agreement about the Joint Venture Wildlife Management option on a 7-point Likert scale. The results presented in Table 9.11 indicate positive agreement among respondents for the establishment of the JVWMA. A large majority of the respondents (82 percent) agreed that an area of 1,500 km² should be designated on the land of six villages for wildlife management (M.R=164.0, Median = 6). The hunting group had the highest mean rank level of agreement (M.R=175.9, Median = 6).

Table 9.11 Respondents perceptions of the JVVMA

Variable (statement) **	Hunting		Non-hunting		<i>U</i>	<i>z</i>	<i>r</i>	<i>p</i>
	Md	M.R	Md	M.R				
Accept setting aside an area of 1500 km ² for wildlife management	6	175.9	6	164.0	2039	-0.479	0.027	0.632
Accept limited user rights to wildlife for hunting and photographic tourism	5.5	169.9	6	164.8	2137	-0.202	0.011	0.840
Accept partial access to grazing and water during the dry season in the area	6	166.7	6	164.9	2181	-0.073	0.004	0.942
Accept retaining the contract with photographic tourism in the JVVMA	5.5	138.1	6	163.1	1828	-1.037	0.058	0.300
Allow not OBC to invest in the JVVMA	6	157.2	6	163.8	2095.5	-0.274	0.015	0.784
Accept donors and government support to establish JVVMA	6	154.8	6	164.9	2062.5	-0.409	0.023	0.683
Allow a fair distribution of benefits and costs of conservation	5.5	131.7	7	162.9	1738.5	-1.329	0.075	0.184

Notes: *U* = Mann–Whitney Test statistics, *z*= Z score, *r* =effect size, Md=Median, M.R= Mean Rank, Level of significance $p>0.05$.

**Response scores on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Source: Field Survey Data (2018).

Further analysis shows that a large majority (83 percent) accepted limited user rights to wildlife for hunting and photographic tourism because there were positive economic impacts on communities in the area. Apart from wildlife user rights, a large majority of the respondents (93 percent) accepted partial access to livestock grazing and water in the JVVMA during the dry season (M.R=164.9, Med = 6 for non-hunting group; M.R=166, Med=6 for hunting group). Thus, the majority of non-hunting groups, mostly the Maasai, would prefer access to water and dry graze areas in the JVVMA during the dry season. Furthermore, the survey results on the contract with investors revealed that a majority of the respondents (89 percent) were willing to

retain the contract with photographic tourism in this option. Mann–Whitney *U*-test results revealed a lack of statistically significant difference between hunting and non-hunting groups on retaining contracts with ecotourism (MR=163, $U= 1828$, $r = 0.058$, $z = -1.037$, $p= 0.300$). On the contrary, 85.5 percent of respondents refused to allow the OBC to invest in the JVVMA.

Additionally, 92 percent of the survey respondents agreed that a new investor in JVVMA would allow fair distribution of benefits and costs of conservation while 89 percent of the respondents accepted donors and government support to establish JVVMA. The respondents were optimistic about strong property rights, efficiency, and social equity under co-management option as the majority revealed lack of well-defined property rights and unequal benefit sharing in the current option. The overall results did not show any statistically significant difference between hunting and non-hunting groups on the establishment of joint venture option ($p>0.05$). Both groups seem to agree with the establishment of JVVMA in LGCA.

9.5 Summary

This chapter has presented survey reports on the current situation and the alternative wildlife management options identified in the MCA. The majority of the respondents were the Maasai involved in livestock grazing at the LGCA. Ecotourism was the primary tourist economic activity compared to hunting and cultural tourism. However, the majority of the respondents were not involved in tourism. The Maasai held that the LGCA is a village land which is under control and authority of the villages. The survey results indicated that the Maasai considered LGCA land to be open access and that they have all the rights for the natural resources. The *t*-test results on respondents' perceptions of property rights characteristics revealed a statistically significant difference between the Maasai and non-Maasai groups on benefit conferred. Further analysis of the preferred wildlife management options showed that the majority of the respondents agreed that a WMA under joint venture was best. On the contrary, a significant number of respondents expressed disagreement on the establishment of the GRA. Findings from the stakeholders survey revealed that instituting pure wildlife conservation under the GRA as a major form of land-use will have negative impacts on land-use tenure. The resettlement of the local communities to enhance wildlife conservation will have impacts on the livelihoods of the Maasai pastoral communities. However, the stakeholders survey revealed

that the GRA will have positive ecological impacts. The stakeholders concurred that the JVVMA will offer the six villages an economic incentive to conserve wildlife. In addition, this option will provide communities with user rights to wildlife and other natural resources. These results support the MCA results on the preference of community-based wildlife management in the study area.

Chapter 10. Discussion of MCA and Community Survey Results

This chapter discusses the findings of wildlife management options in the LGCA obtained through the MCA and community survey. It addresses the primary research objective of the study that sought to determine the most preferable wildlife management option for the LGCA. The first section 10.1 discusses the problems of the current wildlife management and land use policy in the study area. It goes on to discuss the property rights of the Maasai to wildlife, rangeland, and tourism schemes in the study area, followed by a discussion on the socio-economic, ecological and cultural benefits to stakeholders, and the challenges associated with trophy hunting and ecotourism schemes in the LGCA. The second section 10.2 discusses the most preferable alternative wildlife management options and their impacts, followed by the institutional significance of the best option, its limitations and social-economic viability in the LGCA.

10.1 An Assessment of the Current Option: Loliondo Game Controlled Area

This section discusses the problems of the trophy hunting scheme as well as ecotourism and the rights to land and resources in LGCA. The survey and MCA results indicated that the current option has both negative and positive impacts on wildlife management and livelihoods in the study area. However, it was found that the negative socio-economic and ecological impacts outweigh the positive ones. The study revealed the lack of a well-structured institutional framework and poor participation of local communities in tourism schemes in the study area. These schemes are operated by different partnerships between investors and local communities, and the government. The schemes have been criticised for providing only a few direct socio-economic and ecological benefits to local communities and individual households. Also, the study revealed that there are policy overlaps and unenforced property rights in the LGCA which have affected natural resources and livelihoods in LGCA. Details of the above situation are provided in the following sections.

10.1.1 Community participation in trophy hunting and ecotourism schemes

The current tourism schemes in the LGCA involve trophy hunting concessions and ecotourism enterprises. Although trophy hunting is claimed to be the main tourism activity in the area, the

survey results revealed a high level of community agreement supporting ecotourism as the primary tourism activity, not trophy hunting. The results also supported Rurai (2012), Burgoyne and Mearns (2017), who found that communities perceive ecotourism as the primary tourism activity. Despite the fact that both trophy hunting and ecotourism occur in the study area, the survey results revealed that a significant number of the respondents (82 percent), mostly the Maasai, do not participate in either hunting or ecotourism, but are involved in livestock grazing and farming as their main livelihood activities. Mwakaje *et al.* (2013) had similar findings that the majority of local communities in the LGCA do not participate in tourism activities. These results provided the evidence that a large proportion of the Maasai, who are native to the study area, prefer keeping livestock to involvement in tourism activities; their relationship with stakeholders in tourism schemes is poor; they see no benefits coming from tourism schemes; they lack entrepreneurial skills; and tourism is only a seasonal activity. The finding resonated with Kileli (2017) who argued that local communities do not want to engage in tourism due to weak natural resource governance policies, the remoteness of the villages and mistrust of tourism investors. For these reasons, the current wildlife management policy governing in the LGCA is seen as lacking a mechanism for helping local communities to engage in wildlife management through trophy hunting and ecotourism in the area.

The study revealed poor involvement of the Maasai pastoralists in planning, managing and making decisions regarding natural resources in the LGCA. The survey results showed that 89 percent of the respondents had never been involved in tourism planning and decision-making. The study by Yesaya (2014) concluded that the Maasai are less involved in decision-making in tourism schemes and NRM in the LGCA because of their high illiteracy rates, and thus the lack of formal education among the majority of respondents in this study would support this finding. Despite the fact that most Maasai pastoralists in the area lack formal education, their village leaders (30 percent) have received enough formal and informal education to represent them. However, the MCA results show that, although they are key stakeholders, few are involved in making decisions on wildlife management and other natural resources. In fact, only government officials and investors are involved in decision-making. This finding is not surprising since the problem of poor community participation in making decisions regarding the management of natural resources in the LGCA has been a long-standing issue for decades (Rurai 2012; Shoo and Songorwa 2013; Mwakaje *et al.* 2013; Kileli 2017; Bartels *et al.* 2017). Many studies have argued that, despite the recent devolution of NRM, many communities adjacent to protected areas in Tanzania are still not involved in the decision-making process

(Nelson 2012b; Kisingo 2013; Sulle and Banka 2017). An example of where communities do fully participate is in Botswana, where community members are involved in making decisions about NRM on their village lands (Mbaiwa and Stronza 2010; Mbaiwa 2017), therefore it is not an impossible scenario. However, such poor community involvement adjacent to protected areas in Tanzania is the major underlying factor behind the current resource conflicts and the subsequent weak relationships among stakeholders in the LGCA.

The problem of poor participation seems to have evolved into a vicious cycle in the LGCA. This is because the poor relationship from wildlife and land-use conflicts caused by the lack of community participation probably caused the government and tourism investors to make decisions without involving the Maasai. These observations explain why the local communities did not prefer the outcome from decisions involving wildlife management, particularly trophy hunting. The situation unveils the need to engage local communities in NRM and decision-making in the LGCA. In fact, Benjaminsen *et al.* (2013) have called for the need to establish a better system to enhance decision-making in wildlife management and pastoral land-use. Similarly, Haule (2019) called for the need to review land tenure systems at the NDC based on community interests. Thus, incorporating local communities' interests in planning and making decisions in relation to NRM is imperative in the LGCA.

10.1.2 Local communities and their right to land in the study area

There is disagreement among local stakeholders concerning wildlife management and land ownership in the LGCA. Whereas some opined that the LGCA is a village land under control and authority of the villages, others were of the view that it is a conservation area owned by state agencies, a general land, or a combination of reserved and village land. According to *Village Land Act 1999* if the local communities have been living in an area for more than 12 years, the area is recognised as village land. The survey results show that half of the respondents (50 percent) agreed that the land in the LGCA is owned by the villages, where they have been living for more than 12 years. Surprisingly, less than one percent of all respondents considered the LGCA reserved land, owned by state agencies. In short, the study found that the local communities hold that the LGCA land is owned by the villages in Loliondo. Studies such as Shivji (2004), TNRF (2011), Rurai (2012), and Yesaya (2014) have also made similar findings. Particularly, Shivji (2004) maintains that about 70 percent of the land in Tanzania is village land. These results, combined by the consensus in the literature point to the

fact that the land in Loliondo is a village land, as also stipulated in the *Land Act 1999* and *Village Land Act 1999*. Yet, the *Wildlife Conservation Act 2009* recognises Loliondo as a conservation area for managing wildlife. The two *Acts* are therefore conflicting in relation to the status of the land at the LGCA. The above situation has therefore made the LGCA both a ‘private village land’ under customary ownership, and a ‘GCA’ under statutory ownership (state property). This notwithstanding, the evidence from customary sources, local opinions, and the *Land Act* and *Village Act 1999*, show that currently the LGCA does not qualify as a ‘GCA’ as defined by the first Tanzania *Wildlife Conservation Act 1974*. The existence of the ‘GCA’ has therefore made land and NRM in Loliondo a complex milieu of conflicts and failures. Some previous research also supports that NRM regulations are conflicting in Tanzania (Nelson 2012; Kicheleri *et al.* 2018). Therefore, 12 GCAs similar to the LGCA were de-gazetted in Tanzania on 23rd September 2019; however, the status of the LGCA is still unknown. Since GCAs occur on village land in which wildlife management and livelihood activities are allowed according to the *Wildlife Conservation Act of 1974*. The area is thus replete with land-use conflicts and characterised by natural resource degradation. This study takes the view that the LGCA is village land under the *Village Land Act 1999*, which gives villagers the right to manage wildlife and other natural resources in the area.

In terms of the right to own land in the villages in the LGCA, the study found that the majority of the Maasai respondents own a piece of land under customary rights of occupancy, while those who are not Maasai own land under granted rights of occupancy. The results from the MCA workshop also revealed the existence of both the formal and traditional system of land administration in the study area. There are similarities between the attitudes expressed by respondents in this study and those in the studies of Ndoinyo (2002), Ojalammi (2006), and Yesaya (2014), which suggest that the LGCA is a ‘communal Maasai village land’ under both customary and statutory rights of ownership. Although the respondents were found to have pieces of land in the communal village land under both customary and statutory rights, surprisingly, over half of the respondents (60 percent) perceived the LGCA as open access land. This situation stems from the fact that local communities have been using the LGCA as grazing ground due to over-exploitation and consequent loss of ‘communal grazing land’ resulting from increased human and livestock population and tourism investment in the area particularly trophy hunting. The loss of communal grazing land by Maasai pastoralists to tourism investment reflects weak property rights to land and natural resources in the study area.

For this reason, the current option may worsen over-utilization and degradation of the natural resources thereby adversely affecting wildlife management and livelihoods in the long term.

Contrary to expectations, it was found that 85 percent of the survey respondents from the study villages in LGCA possess neither *Certificates of Customary Rights of Occupancy* nor title deeds for their land. Furthermore, only a few village leaders have acquired title deeds for their land. These results support the findings of earlier studies (e.g. Shivji 1994; Shivji and Kapinga 1998; Yesaya 2014) that only a few villages have succeeded in obtaining title deeds and *Certificates of Customary Rights of Occupancy* as required by the *Village Land Act 1999*. It is through the Property and Business Formalization Programme (MKURABITA) that a certificate of customary right of occupancy is able to be offered to the local communities after registering their land. It was confirmed by village leaders during the MCA FGDs that the majority of villagers lacked the title deeds due to the bureaucratic process involved in acquiring the documents from the NDC, and the lack of information on the current policy framework on land ownership which considers LGCA as a conservation area and human activities not allowed. To secure their communal land, therefore, individuals in local communities are adopting informal ways to own land, such as building permanent structures and cultivating the area, thereby gradually transitioning from pastoralism to agro-pastoralism as a *de facto* means of securing their land. Indeed, fieldwork observations revealed an emergence of extensive farming in Wasso, Soitsambu and Arash villages. These results reflect those of O'Malley (2000), Kivelia (2007) and McCabe *et al.* (2010) who found that the majority of the Maasai living in the LGCA are changing from being pastoralists to agro-pastoralists. The same can be said about traditional Maasai pastoralists in Kenya who have adopted farming during the past few decades in order to secure their traditional land (Lamers *et al.* 2014; Nthiga *et al.* 2015). Despite the large proportion of villagers lacking a certificate of customary rights of occupancy and title deeds for their land, the study confirmed that the six villages in the study area have registered their village land. For example, in the 1990s, all six villages obtained certificates of land registration in recognition of their village land. Ololosokwan village held a copy of the village title deed offered by Ministry of Lands on 13th October 1990 and this was viewed during the survey fieldwork in 2018. TNRF (2011) revealed similar results, indicating that six out of nine villages in LGCA acquired certificates of land registration in the 1990s. However, these villages do not have sustainable land-use plans, which suggest that there might be more conflicts and increased pressure on wildlife and other natural resources in the near future under the current option.

10.1.3 Characteristics of property rights held by local communities

Previous studies have paid little attention to property rights in the LGCA (Rurai 2012; TNRF 2011; Bartels 2016; Kileli 2017; Haule 2019). To address this gap in the literature, this study sought to analyse the characteristics of property rights to wildlife and land in the study area using Pearse's (1990) framework. As noted by Pearse (1990), there are five main characteristics of property rights linked to NRM (refer to Chapter 3). The *t*-test results revealed a statistically significant difference between the characteristics of property rights of the Maasai and non-Maasai ethnic groups under the current option, which is discussed below.

The lack of comprehensive rights to resources

Rights to natural resources in the LGCA are unequally distributed among stakeholders. The survey results show that over half of the respondents (57 percent), mostly Maasai pastoralists, said that they lacked comprehensive rights to wildlife, land and other natural resources conferred by the *Village Land Act 1999* and customary rights. These findings supported the earlier observation that Maasai pastoralists in the study area had little access to rights to land and resources (Goodman 2002; Nelson and Ole-Makko 2005; Bartels 2016). Unlike the Maasai, trophy hunting and ecotourism investors have access to land and natural resources, particularly wildlife, in the LGCA. This lack of comprehensive rights to the Maasai could be attributed to the absence of a clear legal framework in relation to wildlife, land and natural resources in LGCA. It could also be attributed to a policy overlap that denied the Maasai access to land and wildlife resources. This denial is one of the key sources of incessant wildlife and land-use conflicts in the LGCA.

Competition for exclusive rights to resources by stakeholders

The study revealed that trophy hunting groups claimed to have exclusive rights to wildlife resources in the LGCA. According to the *Wildlife Conservation Act 2009*, the OBC has exclusive rights to consumptive wildlife resources, while the Maasai pastoralists in the study area have exclusive rights to land and resources under customary rights and the *Village Land Act 2009* (Nelson and Ole-Makko 2005; TNRF 2011). However, the existence of these divergent legislations suggested that neither the Maasai nor OBC have exclusive rights to land

and resources including wildlife and grazing areas. The lack of exclusive rights to natural resources in the study area has resulted in competition among stakeholders in the LGCA, leading to disputes over land with its attendant negative impacts on natural resources, ecosystem services and livelihoods (Eggerston 2005).

Lack of preference for transferability of property rights

The local communities differed in relation to transferability. The study revealed that the Maasai in Loliondo, who were the majority, were not in favour of leasing part of their village land, unlike the non-Maasai, who agreed leasing part of the land to ecotourism investors. These results contradicted those of Burgoyne and Mearns (2017) who held that the Maasai communities were willing to lease part of their village land to ecotourism investors. There are several possible explanations for this inconsistency. First, the results of Burgoyne and Mearns (2017) focused only on the Ololosokwan village, where the Maasai have a good relationship with ecotourism investors and so were willing to lease their land. However, villages like Soitsambu have poor relationships with investors like Thomson Safaris and were not willing to lease their land. Second, the current conflicts between OBC and ecotourism investors over rights to own land have made the Maasai unwilling to lease their land. There is also entrenched mistrust by the Maasai in investors, as most of them have not adhered to the terms and conditions stipulated in their contracts. These reasons, among others, have made the Maasai unwilling to lease their land to investors for wildlife tourism schemes.

The limited direct benefits from tourism schemes

The study found that the benefits accruing from tourism schemes in the LGCA are a deciding factor in local communities' preference for certain types of investors. This seems to be consistent with other research findings on this subject (Nelson and Ole-Makko 2005; TNRF 2011; Homewood *et al.* 2012; Rurai 2012). These studies found that local communities in the LGCA prefer ecotourism to hunting because the revenue from ecotourism accrues to their village government who use them to fund community development projects such as education and health services (Mwakaje *et al.* 2013). This situation differed for example, from that in South Africa, Botswana, Zimbabwe, Malawi and Kenya, where tourism enterprises directly benefit local households (see Manyara and Jones 2007; Mbaiwa and Kolawole 2013; Lamers *et al.* 2014; Nthiga *et al.* 2015; Mbaiwa 2017).

In contrast to the benefits from ecotourism, the study found that the hunting concession in the LGCA did not benefit the community households, as they were not directly engaged in tourism. The fee paid by the OBC to the government is not shared equally among stakeholders, as the investors and the government received more than the villages. For example, in a Tanzanian GCA, 75 percent of the annual trophy hunting tourism fee goes to the Wildlife Division, 25 percent to the District Council while individual villages receive less than 5 percent. This situation was not different from several other African countries where governments and investors receive the ‘lion’s share’ of the revenue from hunting concessions on village land at the expense of local communities (Kiss 2004; Mayaka *et al.* 2004; Lewis and Jackson 2005; Sachedina 2008; Leader-Williams 2009). This unequal sharing of benefits from tourism schemes in the LGCA is due to the weak government policies on how revenue from trophy hunting and ecotourism is distributed. An alternative community participation model is therefore required to enhance efficiency and ensure equitable distribution of economic benefits from hunting tourism in the LGCA.

Ill-defined duration of the licence in tourism concessions

The duration of tourism concessions in the LGCA were ill-defined and lacked transparency. This was found to be a source of concern for local communities. Local communities, especially the Maasai, were concerned about the duration of the licences of OBC and Thomson Safaris as they were not clearly defined (TNR 2011; Kileli 2017). In contrast, however, the MCA FGDs stakeholders revealed that the local communities in the LGCA were not concerned about the duration of the leases for other ecotourism schemes. In fact, the majority of households in the study area wanted OBC’s hunting lease to be revoked by the central government because the signing of the contract lacked transparency and community involvement (Rurai 2012; Nelson 2012b). Apart from the hunting lease, the results of this study indicated that a few of the villages such as Ololosokwan are willing to renew the contracts with existing investors in ecotourism enterprises. This is because the contracts were transparent and local communities enjoyed good relationships with investors.

10.1.4 Socio-economic and ecological impacts on all stakeholders

This section discusses the socio-economic and ecological impacts on all stakeholders from the current tourism schemes in the LGCA. Both trophy hunting and ecotourism provide socio-economic and ecological benefits to the stakeholders including community development projects. The study found that more support is given to health services and care facilities than other socio-economic activities supported by tourism schemes. The MCA results revealed that the hospital at Wasso and dispensaries at Olololosokwan, Soitsambu and Oloipiri villages received support from tourism revenue including, but not limited to, medical services and equipment. Other support from tourism investors took the form of boreholes, electricity supply, educational infrastructure, and scholarships. For instance, 32 solar-powered water boreholes have been drilled, and a few students from Ololosokwan have received bursaries and scholarships for colleges or universities from ecotourism enterprises. These findings mirror those of previous researchers, which show that tourism schemes provide socio-economic benefits to the government, investors and local communities in the area (e.g. Nelson and Ole-Makko 2005; Rurai 2012; Mwakaje *et al.* 2013; Burgoyne and Mearns 2017; Kileli 2017, Melubo and Carr 2019; Melubo and Lovelock 2019). The findings also concurred with those of Yesaya (2014) that the majority of health facilities in LGCA received revenue from tourism schemes.

Despite the above, the relationship between local communities and tourism investors in the LGCA seemed to be poor. The benefits provided by the schemes were characterised by unequal distribution. Only a few villages in the LGCA received medical support despite the multiplicity of tourism activities in the area. Particularly, the majority of the Maasai had no access to these health benefits. Moreover, the few scholarship and bursaries were found to be given to wealthier families and village leaders. Such unequal distribution of benefits may be one of the underlying causes of conflicts in the area similar to other community protected areas may need to be addressed by efforts to resolve the long conflict in the LGCA (see also Bluwstein *et al.* 2016; Moyo *et al.* 2017; Kicheleri *et al.* 2018).

Apart from socio-economic impacts, the study revealed that ecotourism enterprises in the LGCA provided some communities with socio-cultural benefits. For example, a few Maasai women were allowed to sell their traditional handicrafts at the lodges, and tourists were able

to pay to visit some traditional Maasai enclosures (*bomas*). A few villagers were also paid to perform traditional dances at the lodges as part of the ‘cultural tourism’. However, the beneficiaries of these schemes were in the minority. The situation therefore affirmed the finding that less than 2 percent of villagers households directly benefitted from tourism in the LGCA (Mwakaje *et al.* 2013).

The current option has both positive and negative ecological impacts in the LGCA. In fact, the survey results showed that tourism schemes under the current option had some ecological benefits. For instance, in the Ololosokwan village, the local people were involved in a beekeeping project which plays an important role in biodiversity conservation, income generation and poverty alleviation. These findings echo those of Kileli (2017), who found that tourism schemes support wildlife management and biodiversity conservation in villages in the LGCA, although only a few are involved in such conservation projects.

Despite these positive ecological benefits, the MCA results revealed that the current option (LGCA) has negatively impacted the socio-ecological system. Currently, there is a growing number of endangered species (an animal or plant that is considered at risk of extinction), with the most important being Wild Dogs (*Lycaon pictus*), Elephants (*Loxodonta Africana*), Buffaloes (*Synceus caffer*), Lions (*Panthera leo*) and Leopards (*Panthera pardus*). These species are endangered within the LGCA because of human-wildlife conflicts, encroachment and poaching (Lindsey *et al.* 2006; Lyamuya *et al.* 2014). Interestingly, it was found that the majority of respondents were willing to control the number of livestock kept to conserve wildlife habitats due to the alarming ecological threats under the current option. However, it is uncertain whether this can result in efficient wildlife management and sustainable livelihoods under the current option since the livestock will continue to interact with wildlife in the constrained natural resources and ecological systems in the LGCA (Bartels *et al.* 2017).

An alternative to the current option was the imperative to bring about positive socio-economic and ecological impacts, and to ensure the involvement of local communities in managing natural resources. This study thus argues that retaining the current option would not address the problem of wildlife management and the livelihoods of the Maasai because of the lack of well-defined rights, poor participation in decision-making, land-use conflicts and unequal benefit sharing from tourism. Subsequently, the following sections present and discuss the results of the MCA of the alternative wildlife management options.

10.2 Evaluation of the Alternative Wildlife Management Options and their Socio-Economic, Ecological and Cultural Impacts on Loliondo

This section discusses the preferred wildlife management options identified in Chapter 8 above, considering the socio-economic, ecological and cultural impacts of each of these options with regards to wildlife management and livelihoods in the study area.

10.2.1 Game Reserve Area

The findings from the survey show that the Game Reserve Area (GRA) as an alternative wildlife management option was least preferred by local communities. Although GRA is the least preferred option due to having the lowest scores in the socio-economic and cultural criteria, it had the best ecological performance because it advocates for pure wildlife management and biodiversity conservation. This means it would probably address the ecological threat to the endangered species that was revealed in the current option. Therefore, this option would achieve the main goal of the state, which is to protect endangered species in the study area.

According to the *Wildlife Conservation Act 2009*, this option would only conserve wildlife, making it a state property. Although the findings indicated that this option would have a positive impact on wildlife conservation, it would take a state-centred approach, which is against the devolution of wildlife resources stated in the *Wildlife Policy of 1998* (see also Benjaminsen *et al.* 2013; Bluwstein *et al.* 2018). With this approach, the state would be able to acquire Maasai communal land for conservation purposes. For example, the implementation of a GRA would allow the Wildlife Division to set aside all the LGCA land of about 4,000 km² for conservation, thereby revoking the customary rights of land occupancy existing in the area. The six villages would therefore lose the land they use for farming, livestock production and ecotourism. However, it was observed that the Maasai would in no way trade their customary rights of occupancy to conserve state property. This is the main reason for rejection of this option by the majority of stakeholders especially the local Maasai communities. For local communities, converting the village land into a GRA would affect their livelihoods leading to more impoverishment.

The study revealed that the GRA option would also not benefit the local stakeholders economically. For this reason, the survey showed that 72 percent of the respondents would not accept the conversion of the village land to a pure wildlife conservation area. Not surprisingly, the results of the Mann–Whitney test revealed a significant difference between the hunting and non-hunting groups in relation to agreement to changing the tenure of the land from being a village land to a GRA. The non-hunting group anticipated that there would be less income from ecotourism and livestock production in the area upon changes in land tenure. The MCA results further indicate that there would be fewer jobs in a GRA than in the other options, as only a few game rangers would be required. As a result, a GRA would have a huge economic impact on the study area to the local stakeholders.

The MCA findings also showed that the implementations of a GRA would have a negative impact on financial returns in the area, which could induce illegal poaching and environmental degradation by the local communities in Loliondo (see also Mbaiwa 2016; Mbaiwa 2017). The MCA results also showed that the GRA option would have a negative impact on ecosystem services, particularly on water and the production of food, as agriculture and livestock production would be prohibited in a GRA. Adopting pure wildlife conservation under a GRA by excluding human activities would negatively affect the livelihoods of the Maasai. Therefore, these results imply that a GRA would increase the level of food insecurity and the migration of local people from villages to cities (see also Tan and Guo 2009; Mbaiwa 2016), and the health and social networks of the communities would be affected. A GRA would also reduce access to natural resources and increase poverty. The results concur with those of Mbaiwa (2004) that reduced access to natural resources affects the livelihoods of families adjacent to protected areas. Therefore, these results suggest that the establishment of a GRA would have a negative socio-economic impact on the area. Nonetheless, it should be noted that other game reserves in Tanzania such as Selous Game Reserve does provide substantial socio-economic benefits from trophy hunting for example, because they were established as part of the core protected areas without any human settlement.

This study found that the GRA option might have a negative impact on the feeding behaviour of wildlife if livestock were to be excluded, because ecological studies (e.g. Homewood and Rodgers 1991; Campbell 1999; Sitters *et al.* 2009; Bartels *et al.* 2017) have found that wildlife

and livestock coexist in the Maasai rangelands in a mutually beneficial relationship. Hence, excluding livestock completely from the GRA might have a significant impact on the wildlife ecosystem in the area.

Moreover, the establishment of a GRA would require the relocation of the villagers in the LGCA, which would be very expensive for state conservation agencies to implement (TNRF 2011), because those relocated would need to be compensated and resettled. Even if the government were to be able to fund this, it would still lack legitimacy and be fiercely resisted by the villagers, since the majority of them (60 percent) were unwilling to relocate even with compensation. Though there may be other reasons, two main reasons for local communities' resistance to vacate for the establishment of a GRA are worth mentioning. The first reason was their previous experience of forceful evictions without compensation under the current option. The second reason was the inadequate compensation given for wildlife attacking human beings, livestock and raiding crops. Furthermore, the *Wildlife Conservation Act 2009* is not certain about compensation as it is not categorically stated that communities would be compensated, rather it just mentions 'consolation'. Forceful evictions of the Maasai from the villages in the LGCA to establish a GRA would result in more wildlife and land-use conflicts with its attendant repercussions on natural resources and livelihoods (see also Nelson 2012; Mabele 2017; Weldemichel 2020). Hence this study argues that, although the GRA option has some positive ecological impacts, it does not satisfy the social, economic and cultural criteria that would ensure sustainable benefits to the Maasai and other stakeholders in the area. Given these results, the GRA option would not enable policymakers to effectively address the problem of wildlife management in the study area.

10.2.2 Village-Based Independent Wildlife Management Area

The VBIWMA option is a form of CBNRM undertaken by independent villages. A VBIWMA would allow the setting aside of an area of the villages in LGCA for wildlife management and biodiversity conservation (refer to Chapter 8). The findings from the MCA evaluation revealed that VBIWMA was ranked third, with a slight difference in performance against the criteria scores, although the survey results revealed that there was no significant difference between hunting and non-hunting groups on the level of agreement to this option. The analysis revealed that ecologically the number of endangered species would likely decline under a VBIWMA.

Unlike the GRA option where tourism and certain activities would be restricted, the findings show that the VBIWMA option would allow human activities to take place in a land-use zoning area within the 4,000 km² area. Establishing areas for other livelihood activities zoned under a VBIWMA would address the negative impacts on Maasai livelihoods while dealing with the problem of overlapping land-use types found in the GRA and the LGCA options. This option would also involve developing sustainable land-use plans for the VBIWMA member villages, which do not exist in the GRA and LGCA options. These plans would enable efficient wildlife management and livestock production, the main livelihood activity of the Maasai on village land. The option would also provide exclusive grazing rights in the general reserved area instead of grazing in the conservation area. Although this option would involve land-use planning and zoning, the results obtained from this study suggested that the number of livestock would need to be regulated to address the problem of livestock exceeding the carrying capacity of the zones (Bartels *et al.* 2017). However, regulating the number of livestock to fit carrying capacity would affect natural livestock grazing systems practiced by pastoral communities.

Furthermore, the MCA results revealed that the VBIWMA option would be established under an institutional framework in an independent village in the LGCA. Although the *Wildlife Management Regulations 2012* allow for the establishment of a CBNRM within a single village, this approach is not practical in Tanzania due to weaknesses in the policies of the country. In fact, NRM scholars have confirmed that there is no WMAs in Tanzania involving an individual village model (although single village models do exist in GCAs in lease contracts with individual villages and an investor). This is in sharp contrast to CBNRM in countries such as Namibia, Botswana, Zambia, and Zimbabwe where the individual village models are common and successful (Child 1996; Campbell *et al.* 2000; Stone and Nyaupane 2014). A notable example is the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe. Yet, while these African CBNRM programmes are successful, each country has its own strengths and weaknesses in implementing them, and as such they also experience incomplete devolution, land tenure insecurity and increased human wildlife conflicts (Boudreaux and Nelson 2011).

In this study, the MCA findings revealed that implementing a VBIWMA in the LGCA would require an institutional framework that is in accordance with the wildlife management regulations. A CBO would need to be established in each village, which would allow the

Maasai in each village to choose the best way to use and manage the natural resources in the area, as the current tourism scheme under the current option lacks a clear institutional framework. These findings were consistent with Stone and Nyaupane (2014), who suggested that under a CBNRM, the villages should not be grouped in a ‘one-size-fits-all’ approach, but that each village in a CBNRM should be treated individually. This would allow contracts to be made between an investor and an independent village in a WMA. Given the nature of the current tourism schemes in the villages in LGCA, the study results revealed that 90 percent of the respondents would be willing to retain contracts with ecotourism but not hunting investors under the VBIWMA option. Thus, instituting a VBIWMA would be the obituary of OBC trophy hunting investor.

It should, however, be noted that experiences elsewhere show that such a move would be detrimental to both the local and national economy. For example, Mbaiwa (2017) revealed that the banning of trophy hunting in Botswana in 2014 led to detrimental impacts on conservation and local livelihoods (see also DiMinin *et al.* 2016; Lindsey *et al.* 2016; Saayman *et al.* 2018). In fact, retaining only ecotourism contracts would have a direct impact on the two villages with abundant wildlife in the LGCA, the Ololosokwan and Soitsambu villages. However, the Ololosokwan villagers have a good relationship with the ecotourism investor whereas the relationship between the investor and the Soitsambu villagers has been sour. Hence, while a VBIWMA would potentially address the problem of wildlife management and provide a livelihood for the Ololosokwan village, other villages in the LGCA were more likely to be adversely affected. Therefore, an alternative option would benefit all local communities in the LGCA and would be needed to ensure equity and efficient wildlife management in the area.

10.2.3 Joint Venture Wildlife Management Area

The JVWMA option is a form of CBWMA that would occur jointly between the six villages and an investor. A Joint venture in CBWMA involves contractual partnership between a community and private investor to work together in establishing and operating a single ecotourism or hunting enterprise (Ashley and Jones 2001; Ashley and Roe 2002; Long 2002; Manyara and Jones 2007; Mitchel and Ashley 2010; Torres *et al.* 2011; Snyman 2012; Kaswamila 2012). The JVWMA was ranked first, both in the MCA and survey, as the most preferred wildlife management option for the LGCA. The overall MCA results showed that this option would have the greatest positive impact on the economic criteria, followed by the

ecological, social and cultural criteria. According to the *Wildlife Policy of 1998*, the establishment of a JVWMA would be under the institutional framework of a CBO, which would provide comprehensive user rights to land and wildlife resources to local communities through an Authorised Association. These rights would allow a JVWMA to be economically efficient and ecologically sustainable. The MCA results show that under a JVWMA, a diverse number of employment opportunities would likely be created through tourism enterprises. Also, local community members of the JVWMA would be directly and equally involved in ecotourism enterprises such as arts and crafts, beadwork, and traditional dancing groups. Joint ventures would also help in maintaining and strengthening social networks and providing social safety nets (see Long 2002). In this context, a JVWMA would support both community projects and households with financial benefits. These findings were consistent with other studies (e.g. Mbaiwa 2011; Mbaiwa and Kolawole 2013; Stone and Nyaupane 2014; Kipkeu *et al.* 2014; Stone and Nyaupane 2015; Moyo *et al.* 2016; Kaaya and Chapman 2017), which provided evidence that communities acquired knowledge and skills when they participated in tourism projects. For instance, in Botswana, a similar practice has generated employment for over 6,000 people nationwide (Mbaiwa 2004). As opposed to the current option and GRA in Loliondo, therefore, the study revealed that the implementation of a JVWMA would develop skills, provide more jobs, contribute to GRP, provide financial returns from trophy hunting and ecotourism, and improve the livelihoods of the local communities.

In addition, the MCA findings revealed that the JVWMA option would have a positive impact on the ecological systems. If this option were to be implemented, the number of endangered species under the current option would be reduced. Under a JVWMA, endangered species would be protected. Although the JVWMA option is not as good as the GRA option in terms of positive ecological benefits, it would address the problem of wildlife management and biodiversity conservation in the area. Being part of the GSE, this option is likely to protect the disputed wildebeest migration routes between the Serengeti and Maasai Mara which pass the study villages. In addition, this option would raise awareness of the need to conserve biodiversity, since the communities would be involved in conservation projects while maintaining their pastoral livelihoods (Burgoyne and Mearns 2017; Kileli 2017; Bartels *et al.* 2017). This option would also allow for the provision of ecosystem services such as food and water in the study area. Nevertheless, livestock production and farming would be more regulated than under the current option the LGCA.

The MCA results on the JVVMA resonated with those of the survey, which showed that 82 percent of the participants were willing to designate an area of the six villages for wildlife management, and so 1,500 km² would be set aside for conservation by excluding human activities such as farming and livestock grazing. Stone and Nyaupane (2014) suggested that in establishing CBNRM projects in an area, each village should be treated as a complete unit and not grouped together to form a large community because villages have different interests and ethnicity, and different economic statuses, culture and history. This study thus argues that due to the nature of the geographical location of the villages and the culture of the Maasai in the LGCA, a single village-based model would not be viable. Combining six villages under a joint venture would be more appropriate for the LGCA as the Maasai who comprise 95 percent of the villagers have common interests, traditions and customs. Taking into account their grazing tradition, a JVVMA would allow partial access to grazing land and water during the dry season, as agreed by 93 percent of the survey respondents. This would help circumvent current problems associated with grazing in the dry season. Furthermore, the study findings revealed that this option would promote social equity among the local communities in the LGCA more than the other options, because the CBO members would obtain equal benefits directly from the natural resources in the area. Studies in Botswana where such schemes have been implemented (e.g. Gujadhur 2001; Mbaiwa 2004; Mbaiwa and Kolawole 2013) revealed that individuals, households and communities directly benefitted from tourism joint ventures, which have improved both local livelihoods and wildlife conservation. However, across Africa, joint venture partnerships tend to lack transparency and have weak institutional frameworks (Booth *et al.* 2000; Ashley and Jones 2001). Despite the weaknesses, it is believed the JVVMA option may have enormous potential for ensuring efficient wildlife management and sustainable livelihoods for the marginalised Maasai. It was the most preferred because of this socio-economic, ecological and cultural viability.

10.3 Institutional Significance of the Joint Venture Wildlife Management Option

The MCA and survey results revealed that the JVVMA is the most preferred option for efficient wildlife management in the study area. In Africa, a CBNRM for wildlife management occurs in different models involving both trophy hunting and ecotourism. However, trophy hunting has been the primary source of revenue to support conservation in African CBNRMs despite the growing debate (Baker 1997; Leader-Williams and Hutton 2005; Campbell 2013; Mbaiwa 2017; Saayman *et al.* 2018). In Tanzania, CBNRM programmes established for the

purpose of managing wildlife are known as CBWMAs, in short WMAs. They are formed on village land adjacent to protected areas to promote wildlife management, biodiversity conservation, poverty alleviation and rural development (Stolla 2005; Nelson 2012b; Kaswamila 2012; Bluwstein *et al.* 2016). As shown above, the MCA results also revealed that the JVWMA model would be comprised of six villages (Maaloni, Arash, Olorien, Soitsambu, Oloipiri, and Ololosokwan in Ngorongoro District Council) in a joint venture with both ecotourism and trophy hunting investors. According to the *Wildlife Policy 1998* and *Wildlife Management Regulation 2012* of Tanzania, this option would enable the establishment of a CBO, called an Authorised Association of a JVWMA, representing the six villages. According to the regulations, decision-making power and authority over natural resources would be vested in the CBO (Armitage 2005; Nelson *et al.* 2007; Nelson 2012b; Bluwstein *et al.* 2015). Therefore, the CBO leaders and village councils would have the mandate to develop and implement rules on land, wildlife management and other natural resources in the JVWMA. Also, the CBO would be responsible for overseeing CBWMA administration and conservation activities using the participatory approach.

This CBWMA model is common in Tanzania and is present in the 18 approved WMAs countrywide (WWF 2014; Kicheleri *et al.* 2018). The *Wildlife Policy of 1998* also grants communities the benefit of establishing tourism concessions on their village land. The model serves as a form of decentralising management of wildlife resources and empowering local communities to manage them. However, governance of this model has been weak at best. For this reason, scholars (e.g. Nelson *et al.* 2006; Mwakaje *et al.* 2013; Bluwstein *et al.* 2015; Kiwango *et al.* 2015; Noe and Kangalawe 2015; Bluwstein *et al.* 2016; Moyo *et al.* 2017; Kicheleri *et al.* 2018) have long called for communities to be supported to ensure a full mandate and enhance good governance in the management of wildlife adjacent to protected areas in Tanzania. Much of the success experienced in other African countries implementing this model can be attributed to good and supportive legislative frameworks (Long 2002). Hence, providing a legitimate institutional framework to support a JVWMA would be needed to help the communities to efficiently manage the wildlife on their land in the study area.

A JVWMA would involve trophy hunting and ecotourism in joint ventures with investors, but since they come under different legislative frameworks, a unified planning and monitoring system would be required including a General Management Plan for the WMA and land-use plans for the partner villages. Although the communities agreed they would set aside 1,500

km² for the WMA, the CBO would be required to approve part of each of the village lands of the six villages for establishing the JVWMA, which would help it to prepare the GMP of the JVWMA. However, due to the spatio-temporal and ecological differences among the six villages, the model would also involve the voluntary participation of members to ensure that no village would feel coerced into joining the JVWMA. Research has shown that including villages with less wildlife potential, such as Olorien, without their consent would likely create an imbalance in revenue sharing and conflicts within the proposed JVWMA (Doyle 2014; Homewood *et al.* 2015; Bluwstein *et al.* 2016; Kicheleri *et al.* 2018).

Furthermore, this JVWMA model has greater potential for equitable benefit-sharing and fair distribution of the costs. About, 92 percent of the participants in the study were optimistic that the JVWMA would help reduce the unfairness associated with the current option in the LGCA. According to the *Wildlife Management Area Regulation 2012*, the CBO under a JVWMA will receive 75 percent of the block fees for trophy hunting with the government receiving 25 percent, and 65 percent of the non-consumptive (ecotourism) revenue will go to the CBO, 20 percent to the Wildlife Division and 15 percent to the District Council. With this revenue sharing formula and a legitimate institutional framework, a JVWMA in Loliondo would allow the equitable sharing of revenue from trophy hunting in the study area (see Booth *et al.* 2000; Booth 2017; Sulle and Banka 2017). Moreover, to ensure that revenue received by the CBO trickles down to individual villages, 50 percent of the portion for the CBOs could be shared among village members based on the proportion of land and resources contributed to the JVWMA (Kaswamila 2012; Homewood *et al.* 2015). This would allow equity at the village level for successful wildlife management and improved livelihoods of members in the proposed JVWMA. To this end, the establishment of a JVWMA in Loliondo would address the conflicts existing in the current option, especially those emanating from unfairness in benefit-sharing, as this option would address the rights to land and wildlife resources (see also WWF 2014; Homewood *et al.* 2015). This would allow the Maasai and others to benefit equitably from hunting and ecotourism while supporting efficient wildlife management and conservation in the area. Therefore, the implementation of the JVWMA option in Loliondo would produce a ‘win-win’ situation among stakeholders.

The establishment of a JVWMA would address the problem of the lack of transparency in making contracts with trophy hunting and ecotourism investors existing under the current option the LGCA. According to the *Wildlife Management Regulations 2012*, individuals or

villages under a JWMA are not allowed to enter into a new contract with other investors in the same area. Therefore, only the CBO as an Authorised Association of a JWMA would be allowed to sign a joint venture contract with an investor in the proposed WMA. A joint venture management committee would be formed by villages and partners in the LGCA to manage the process with minimal supervision from the district as under current option the power is vested mostly to the district authority. The survey results revealed that 90 percent of the respondents would be willing for their villages to retain the current contracts with photographic tourism investors in the new JWMA, which would allow the good relationship between the ecotourism investor and Ololosokwan village to continue. However, it should be noted that all ecotourism investors would deal with the CBO of the six villages and would not be allowed to sign or renew contracts with individual villages in the JWMA. A well-crafted constitution would be required stipulating all terms and conditions for such contracts to be retained in the new JWMA. Although the majority of the respondents agreed to retain the contract with ecotourism investors, whether a village with a conflict with investors (such as Soitsambu) would be satisfied with this decision is uncertain. It would be imperative for the CBO to move in to resolve such conflicts with immediate effect during establishment of the CBWMA in Loliondo.

In contrast to ecotourism, the study revealed that 80 percent of the survey respondents would be unwilling to retain OBC as their trophy-hunting contractor under the JWMA option. This means that OBC's licence would be revoked and a new contract entered into for trophy hunting. Yet, it is doubtful whether the government would allow the OBC lease to be revoked since it would lose a substantial amount of revenue. The government would receive only 25 percent of the revenue accrued from trophy hunting under the JWMA, as opposed to the 75 percent it receives under the current option. A well-defined institutional framework with comprehensive and exclusive rights to land and wildlife resources is required for a successful JWMA in Loliondo.

10.4 Limitations of the Joint Venture Wildlife Management Area

Although the JWMA is the most preferred option for efficient wildlife management in the LGCA, it has some limitations. First, it is likely that JWMA option would entail the government engaging in a bureaucratic process that would side-line communities (Benjaminsen *et al.* 2013). Also, it would be expensive to implement as the MCA results

revealed that it would cost at least US\$ 250,000 to implement (see also USAID 2013). Considering the poverty in the communities in the LGCA, the households in each village might not be able to technically and financially support the establishment of a JWMA.

The second limitation is that the JWMA could become a white elephant programme to the communities because the state owns all the wildlife, and both the central and district government seem to retain most of the authority in administering the existing CBWMA (Wilfred 2010; Kaswamila 2012; Benjaminsen *et al.* 201; Loveless 2014; Moyo *et al.* 2016; Bluwstein *et al.* 2016; Kicheleri *et al.* 2018). For example, the Director of Wildlife is responsible for allocating hunting blocks and selecting investors, even within a JWMA, while the CBOs remain inactive in many of the decisions concerning wildlife management (Robinson and Makupa 2015; Kicheleri *et al.* 2018). This may pose a challenge to decentralising the management of wildlife resources and empowering local communities, in which case the CBO might have limited user rights to wildlife and natural resources. Other limitations include the lack of transparency during planning and implementation of JWMA, incomplete devolution, insecure land tenure and inefficient management plans which would act as a barrier for a successful JWMA (Boudreaux and Nelson 2011; Bluwstein *et al.* 2016; Mbaiwa and Hambira 2019). Without well-defined property rights and legitimate involvement of the local communities in a JWMA, conflicts will continue to persist in Loliondo.

10.5 Economic and Social Viability of a JWMA in Loliondo

The proposed JWMA would address the problem of lack of benefits to the local stakeholders from ecotourism and trophy hunting schemes as highlighted above. This is because under the current option, as stated above, the government receives US\$ 819,000 from the trophy hunting concession, but only about US\$ 350,000 is paid to the villages from ecotourism schemes (TNFR 2011). The establishment of a JWMA would allow the six villages under the CBO to benefit more from trophy hunting and ecotourism because the CBO would receive 75 percent of the block fees, 45 percent of the game fees, 45 percent of the conservation and observation fees, and 15 percent of the permit fees (Booth *et al.* 2000; URT 2012). Also, under a JWMA, the villages would probably receive more revenue from trophy hunting than ecotourism as the area has potential wildlife species for trophy hunting than any other concessions in Tanzania. These findings suggest that for equal benefit-sharing from tourism schemes under a JWMA, a mechanism would be needed to ensure the benefits are distributed fairly (Booth *et al.* 2000;

Bluwstein *et al.* 2015; Bluwstein *et al.* 2016; Moyo *et al.* 2016; Salnero *et al.* 2016), thereby enabling these financial benefits to trickle down to individual households and improve the livelihoods. It is therefore discernible from the above that though a JWMA is the most preferred option for the LGCA, the experience and drawbacks of other wildlife management programmes in Tanzania should be taken into consideration before implementing it (see also Wilfred 2010; Loveless 2014; Homewood *et al.* 2015; Booth 2017).

10.6 Summary

This chapter has discussed the problems of the current wildlife management in the LGCA. It also discussed the alternative policy options for efficient wildlife management in LGCA thereby addressing the primary research objective of the study. The study revealed that under the current option, there is poor participation in decision-making, weak institutional framework, ill-defined property rights, unequal benefit sharing, and lack of direct benefits going to the local communities in the study area. Thus, there is a need for a policy option that would address the interests of the stakeholders in Loliondo. The study revealed that a JWMA is the most preferred option to address the problem of wildlife management, land use and the livelihoods of the Maasai. It would provide a strong institutional framework which would enable the equitable sharing of revenue from tourism schemes. Furthermore, a JWMA would give the CBO the exclusive right to manage the resources, instead of the state, thereby addressing the problem of weak property rights to natural resources in the study area.

Chapter 11. Conclusion and Policy Implications

This chapter presents the conclusions on the evaluation of wildlife management options and their policy implications. The primary aim of this thesis was to find an appropriate option for the management of wildlife in the LGCA in the northern part of Tanzania. Four specific objectives were presented to address the main research question of the thesis. The specific objectives were : first, to examine the impacts of the current trophy hunting scheme on all stakeholders in the LGCA; second, to explore the alternative policy options for sustainable trophy hunting; third, to assess the impacts of each of the alternative options for the LGCA; and fourth, to analyse which option would benefit the stakeholders in the study area the most. The study adopted the MCA methodology described in Chapter 5 to evaluate wildlife management options for the LGCA using data from focus group workshops and a cross-sectional community survey as applied in Chapter 7. Chapters 8 and 9 presented the results of the MCA and survey, respectively. Chapter 10 presented a discussion on the MCA and survey results in relation to the current option and alternative policy options. In this chapter, Section 11.1 presents a summary of the findings on each of the research objectives and summarises the contribution of the study to the current body of literature in Section 11.2. This is followed by policy implications for wildlife management, the limitations of the study and recommendations for future research in the following sections.

11.1 Summary of the Research Results

This study provided empirical evidence on the preferable option for managing wildlife resources adjacent to protected areas. The main issues existing in Loliondo were the unequal sharing of benefits among stakeholders from trophy hunting schemes occurring on village land and the lack of well-defined property rights. Using MCA and a community survey, the study analysed alternative policy options and established that the JVVMA option would be appropriate for supporting wildlife management and equal benefit sharing. Although the JVVMA is the most preferred option, the management of wildlife adjacent to protected areas in Tanzania has not been legitimately decentralised, which would need to happen to ensure that local communities are empowered and economic benefits would be shared equally among stakeholders. Policy reforms, a clear institutional framework and well-defined property rights to land and natural resources would bring about a ‘win-win’ situation for stakeholders and the

efficient management of wildlife in the LGCA and other areas adjacent to protected areas in Tanzania.

11.1.1 Assessment of the current option

Trophy hunting as well as ecotourism both occur in the LGCA. However, majority of the local communities were not involved in planning, managing and making decisions on tourism schemes and this situation was the major reason for multi-decade conflicts over the current use of land and natural resources in the LGCA. Further, it was observed that community rights to land and resources were lacking. Also, the majority of the Maasai did not recognise the LGCA as a reserved area but as a village land as stipulated in the *Village Land Act 1999*. The village land in the study area was owned under either statutory or customary rights, but few community members possessed a certificate of customary rights or title deeds. As a result, most of the Maasai perceived the LGCA as an open access land, although all six villages had certificates of land registration. The above findings implied that the LGCA did not qualify to be a GCA, as defined by the first Tanzania *Wildlife Conservation Act 1974*.

The study adopted the framework of property rights proposed by Pearse (1990) to assess the current option and alternative policy options. Using this framework, it was found that rights to the natural resources in the LGCA were unequally distributed among stakeholders. The Maasai lacked comprehensive and exclusive rights to land and natural resources. The OBC claimed it had exclusive rights to the land used for trophy hunting, although the local communities grazed their livestock on it. Moreover, OBC claimed to have exclusive rights to wildlife resources, while the Maasai, based on the existing institutional framework and customary rights also claimed to have exclusive rights to land and natural resources. This lack of exclusive access and user rights among stakeholders is the main source of conflicts between stakeholders, and has led to the degradation of the natural resources in LGCA.

Furthermore, the study found that local communities were not involved in preparing and signing trophy hunting and ecotourism contracts. In terms of ecotourism, only a few village leaders were involved in signing contracts, which made local community members unwilling to lease their village land to some tourism investors. Furthermore, this lack of community participation in the contracting process was the reason why they mistrust the government and investors. The study also found that the lease for trophy hunting and ecotourism was not secure

under the existing institutional framework, as both parties could transfer, allocate and reallocate land for trophy hunting and ecotourism. This uncertainty has prevented the complete transfer of land and resources, making the management of wildlife and other natural resources in the LGCA inefficient.

In relation to the benefits from the current tourism schemes available to the Maasai, the study revealed that under the current option, both trophy hunting and ecotourism schemes provided limited economic, ecological and socio-cultural benefits, as most of the benefits were directed at community development projects and did not trickle down to individual households. However, the study revealed some ecological benefits were obtained through cultural tourism and beekeeping projects in some villages in the LGCA, but these were incomparable to the enormous benefits obtained by the government and investors from the wildlife resources in the area. This lack of direct benefits from tourism schemes for the majority of local households made them resistant to government and investors advocating conservation, as they saw no benefit from either hunting or ecotourism compared to livestock production. The lack of direct benefits from trophy hunting resulted in increased poverty, loss of biodiversity, and negative community perceptions on wildlife management. This study thus argues that retaining the current option will not address the problem of inefficient wildlife management, land-use conflicts and livelihoods of the Maasai, because of the lack of well-defined property rights, poor participation in decision-making, and unequal benefit-sharing among stakeholders.

11.1.2 Alternative wildlife management options

The Game Reserve, Village-Based Independent Wildlife Management Area and Joint Venture Wildlife Management Area were all alternative options preferred by stakeholders from the multi-criteria evaluation. These options are briefly described below.

Game Reserve Area (GRA)

This option assumed that the whole area of 4,000 km² under the LGCA would be set aside for wildlife management with no non-conservation activities. This option would be declared by the Minister of Lands under the *Wildlife Management Act 2009*, and the state conservation authorities would manage the wildlife. To access a GRA, written authority from the Director of the Wildlife Division would be required, without which any person caught in the area could

be liable to either a fine or imprisonment. As this option advocated conservation in a 'pure game reserve' with no human activities, it exhibited the command and control approach, and local communities who have been using this area for their livelihood activities would lose their village land for the establishment of a GRA. Given that they have the customary right to own land under the *Village Land Act 1999*, they would need to be compensated before the establishment of a GRA.

Village-Based Independent Wildlife Management Area (VBIWMA)

The VBIWMA option is a form of CBNRM established on village land under a CBO, which would be granted user rights to access land and other natural resources. This option would set aside part of the 4,000 km² for trophy hunting and ecotourism under land-use zoning. Grazing, farming and settlements would be allowed in specific zones within part of the 4,000 km². The CBO leadership, which includes the Village Council, would decide the best way to manage resources on the land of each village, guided by the *Wildlife Management Area Regulations 2012*, *Wildlife Conservation Act 2009*, and the *Village Land Act 1999*. To allow this option to take place, the whole area of LGCA would need to retain its status of being village land as stipulated in the *Village Land Act 1999* and *Land Act 1999*.

Joint Venture Wildlife Management Area (JWVMA)

The JWVMA is a form of CBWMA, which would be established under the *Wildlife Management Areas Regulations of 2012* and a CBO of the six villages, which would be granted user rights to wildlife and other natural resources. This model involves a joint venture between the six villages in LGCA and tourism investors. The study found that a general management plan and land-use plans for the villages under a JWVMA would be required. Pursuing this option would allow both trophy hunting and ecotourism to take place in an area of 1,500 km² without land-use zoning, while grazing, settlements and agriculture would be permitted in the remaining 2,500 km². Generally, the main goal of a JWVMA is to conserve wildlife efficiently, enhance economic development through equal access to resources, and reduce poverty among local communities.

11.1.3 Impacts of the alternative policy options on LGCA

The study analysed the economic, ecological and socio-cultural impacts of the alternative policy options for wildlife management in the LGCA. Below is the summary of findings.

Game Reserve Area (GRA)

The GRA is the option least preferred by the local communities. This is because it would exclude human livelihood activities and would lead to the Maasai losing their customary right to own land, resulting in food insecurity and migration. This would affect the health and social networks of local communities, leading to more conflicts in the area. The study also found that the GRA option would adversely affect employment since there would be no ecotourism activities, and so the local communities would lose the revenue they hitherto enjoyed. Since this option would involve resettling local communities, the government would need to compensate them, which would be expensive. It was revealed that forceful evictions were likely to intensify conflicts in the area. Socio-culturally, a GRA would adversely affect the dry and wet grazing culture of the Maasai as the GRA would occupy the area currently used by them for grazing their cattle, and thus as a result their livelihoods would be negatively affected. Ecologically, this option satisfies the main goal of protecting endangered species, but the complete exclusion of human activities would lead to poaching by the excluded local communities. Therefore, adopting this option would require addressing such negative economic and socio-cultural impacts.

Village-Based Independent Wildlife Management Area (VBIWMA)

The VBIWMA was the second option preferred by stakeholders and would give the six villages the exclusive right to natural resources, particularly wildlife, and allow livestock grazing and tourism under land-use zoning. However, it was observed that the number of livestock kept by the Maasai would need to be regulated to ensure that the livestock do not exceed the carrying capacity of the zones. This is likely to negatively affect the natural pastoral grazing systems. In addition, under a VBIWMA, the communities would be willing to retain the contracts with ecotourism companies but not with OBC, and thus a new investor would be required for trophy hunting. This move would economically affect OBC and the government because they obtain substantial amount of revenue from hunting. The VBIWMA option would benefit the village

of Ololosokwan, which has a lot of wildlife and a good relationship with investors, but not the other villages that do not have good relationships with investors. Therefore, unequal benefits would persist, which might lead to more conflicts among the villages.

Joint Venture Wildlife Management Area (JVWMA)

The MCA evaluation and community survey revealed that the JVWMA was the most preferred wildlife management option for the LGCA with potential social-economic, cultural and ecological benefits among stakeholders in the area. The next section summarises the findings on the JVWMA.

11.1.4 The Joint Venture Wildlife Management Area: the Preferred Option

The study found that the JVWMA option, a form of CBWMA, would be economically feasible, as the CBO would receive 75 percent of the hunting block fees and 65 percent of the annual revenue from ecotourism, better than what the communities would receive under the current option in the LGCA. The study also found that trophy hunting would be more economically viable than ecotourism under a JVWMA, although both trophy hunting and ecotourism would provide equal benefits to individual households and the community, while supporting wildlife conservation and making a substantial contribution to the GRP. This option would have the potential to address the problem of wildlife and land-use conflicts through community-based conservation projects. It should be noted, that although the results show that the JVWMA is the best option, like many other WMAs in Tanzania, it may lead to re-centralisation instead of decentralisation as it lacks a legitimate institutional framework and governance structure under the current legislative and policy framework. This study therefore argues that providing the CBO with comprehensive and exclusive rights to land and wildlife resources would be a ‘win-win’ situation that is more likely to benefit the local communities and motivate them to take part in conservation.

11.2 Contribution of the Study

This study has contributed to the MCA methodology and the wildlife management literature on participatory community conservation approach. Firstly, it has demonstrated that participatory MCA is appropriate for supporting decision-making concerning wildlife

management because it engages stakeholders and experts at each stage of the analysis. This study applied MCA to address the problem of wildlife and land-use conflicts in the LGCA, and so contributed to MCA studies on wildlife management in Africa where wildlife are present in areas adjacent to protected areas, where local communities also live. Previous studies using MCA did not consider how to get more participants involved in the process of making decisions. To address this gap, this study applied the participatory approach to MCA, in which a substantial number of stakeholders and experts (16) participated interactively in the decision making process in the LGCA.

Secondly, the application of a community survey by this study contributed to the MCA methodology by complementing and corroborating the MCA results with cross-sectional survey data from local communities. This is rare in MCA studies focused on NRM as they mostly use surveys in weighting criteria and scoring the options which only involves a few stakeholders. This combination of participatory methods is all the more germane considering the circumstances surrounding the study area, as the literature has reported a long history of poor community participation in decision-making in the LGCA (Benjaminsen *et al.* 2013; Nelson *et al.* 2006; Sachedina 2008; Sulle 2011; Mwakaje *et al.* 2013). The application of the MCA FGDs and community survey explored the extent of the NRM problem in the LGCA, which helped the participants to see that a JVWMA would be the best wildlife management option as it would minimise conflicts. The application of the community survey in the MCA framework is a considerable advance compared to traditional approaches which have only involved experts. In sum, the combination of the participatory MCA and a community survey in identifying preferable wildlife management options in areas adjacent to core protected areas has contributed to addressing a critical methodological gap in MCA in NRM.

Thirdly, the study contributed to the literature on natural resources particularly wildlife management, by adopting the framework of property rights described by Pearse (1990) to analyse the problem of wildlife management in the LGCA. This is the first MCA study that has addressed the issue of property rights in Loliondo during its 25 years long conflict. The characteristics of property rights such as comprehensiveness, transferability, exclusiveness, the benefit conferred and duration (Kundhlande and Luckert 1998; Pearse 1990) were applied in the MCA framework to explore and analyse NRM issues in the LGCA, which led to a better understanding of the problem from the property rights perspective, and demonstrated that this approach has the potential to help prevent conflicts that may arise due to ill-defined rights to

resources. It also helped by focusing on the security of land tenure and rights to resources as criteria on which to base decision-making.

Fourthly, the study has made a substantial contribution to the community-based wildlife management literature by helping to settle some debates on CBNRM in the literature. Although most CBNRMs in Africa have a partnership agreement with investors, these partnerships lack transparency and have an unequal benefit sharing. Scholars have been critical of the 'one-size-fits-all' approach of combining villages and communities in a CBNRM. This study has established that a joint venture partnership with six villages under structured institutional framework would allow equal benefit-sharing from wildlife and other natural resources among stakeholders and village members of a JWMA. Thus, this study has contributed to this debate, as it found that since the Maasai in the LGCA is a homogeneous community, a CBO of the six villages in a joint venture would be effective and appropriate. Therefore, establishing a JWMA in the LGCA would address economic, ecological, and socio-cultural problems and resolve wildlife and land-use conflicts.

The study also contributed to the growing concerns about trophy hunting, conservation and the welfare of indigenous people adjacent to protected areas. This is because it showed that the establishment of a JWMA would seem to be a better approach to getting local communities and the government to agree on how to manage wildlife, particularly involving trophy hunting, which is a viable form of wildlife management and conservation. It also contributed to the debate on the economic and ecological viability of trophy hunting to areas adjacent to protected areas (see Baker 1997; Lindsey *et al.* 2007; Kaswamila 2012; Loveless 2014; Bluwstein *et al.* 2016; Moyo *et al.* 2016; Muposhi *et al.* 2017; Mbaiwa 2017; Kicheleri *et al.* 2018), as it revealed that under a clear institutional framework and with complete devolution, trophy hunting would generate more revenue for community projects and households than ecotourism under a JWMA in Loliondo.

11.3 Policy Implications

The findings from this study are important for the policy and practice of wildlife management in the LGCA and other protected areas in Tanzania. Although establishing a JWMA was the preferred wildlife management option, it has some economic, ecological and socio-cultural implications. For instance, the wildlife management regulations do not empower local

communities to legitimately participate and benefit equitably from the wildlife and other natural resources on village land. Therefore, the *Wildlife Policy of 1998* and its associated legislation would need to be revised to allow the devolution of the management of wildlife resources to local communities, especially in areas with ecotourism and trophy hunting undertaken adjacent to the core protected areas.

At the CBO level, devolution would help the formation of a constitution for the CBO, which would allow the local community to participate in governance and decision-making in managing natural resources on village land (Homewood *et al.* 2015; Kicheleri *et al.* 2018). For instance, having a JVWMA in the LGCA would mean developing a constitution, with guidelines and regulations to which the local communities would be allowed to participate in decision-making. The proposed revision of the *Wildlife Policy of 1998* would need to include the important tenants of good governance for a CBO under JVWMA, which is currently missing in WMAs in Tanzania. Accountability and transparency within a decentralised NRM governance at the local level would promote the success of the JVWMA (Kicheleri *et al.* 2018). A policy reform would enable the legitimate participation of communities in wildlife management that does not take place under the current option.

The study also established that under the current option there is unequal benefit-sharing from tourism schemes on village land. Although the wildlife regulations state how communities should benefit from a JVWMA, these regulations were not adhered to at the local level. To ensure equal benefit sharing among stakeholders, the *Wildlife Conservation Act of 2009* and *Wildlife Management Regulations of 2012* need to be amended to state explicitly the benefits communities would receive and the costs they would incur as members of a JVWMA. This is because currently, the benefits from trophy hunting and ecotourism on the village land are insufficient (Kaswamila 2012; Bluwstein *et al.* 2016; Sulle and Banka 2017; Kicheleri *et al.* 2018). Given the fact that some villages in the LGCA such as Ololosokwan have more wildlife than others, the regulations on benefit-sharing would need to be clearer, to ensure that the benefits are to be shared equally among the six villages involved in the proposed JVWMA. In this regard, the *Wildlife Management Regulation of 2012* would need to incorporate a clause concerning the agreement on joint venture contracts with ecotourism and trophy hunting investors.

Further, it was found that making contracts with investors on village lands particularly for trophy hunting, is not done transparently and they are not enforced properly (TNRF 2011). Although it is assumed the CBO would collect all the revenue from the already established ecotourism enterprises in the LGCA that pay revenues to individual villages, it is believed that reforming the regulations would validate the CBO to collect revenue from both hunting and ecotourism (Kicheleri *et al.* 2018; Sulle and Banka 2017). This is because under reformed regulations all investors would be required to sign a contract with the CBO of the six villages under a JWMA. The TAWA and Wildlife Division would need to ensure that the contracts are transparently enforced by the CBO to guarantee that local communities would benefit equitably from trophy hunting and ecotourism in order to promote wildlife conservation in the area.

Insufficient revenue and other socio-economic benefits for current WMAs is the source of the lack of adequate wildlife monitoring of the hunting blocks and ecotourism schemes on village land. Although Village Game Scouts and TAWA are available for monitoring, they are not well equipped to support wildlife monitoring through patrolling to enforce anti-poaching measures in areas adjacent to the core protected areas on village land. Revising the *Wildlife Management Regulations of 2012* is necessary to introduce systematic monitoring of wildlife in the hunting blocks and WMAs, particularly those which occur on village land (WWF 2014; Booth 2017). Additionally, proper disbursement of conservation funding through training and capacity building would lead to proper implementation of wildlife monitoring techniques such as SMART in the trophy hunting concessions (Wilfred *et al.* 2019). The review of policies and institutions would also allow incorporating the use of local people with experience in wildlife monitoring in the proposed JWMA (Moyo *et al.* 2016).

The study also established that there are conflicting policies concerning access to and use of resources on land adjacent to protected areas (i.e. *Village Land Act 1999* and *Wildlife Conservation Act 2009*), creating the urgent need for a new cross-sectoral NRM policy and governance (WWF 2014). The cross-sectoral policy would promote the sustainable management of land and natural resources such as grazing land and address the problem of the lack of well-defined rights to land and natural resources especially when trophy hunting takes place on village land. It would also address the issue of disputes over natural resources and land-use in the proposed JWMA. This will then provide the legal environment for customary rights to access and use wildlife resources (Benjaminsen *et al.* 2013).

Furthermore, the JVVMA would provide partial grazing rights for the Maasai to graze livestock in the pastoral grassland especially during the dry season in an area inaccessible to them under the current option (URT 2012). Although this is stated in the current *Wildlife Policy of 1998*, a revised policy would need to state clearly how access to grazing resources would be regulated by pastoral communities. Therefore, the government needs to amend the policies to harmonise different sectoral issues, decisions, and actions (WWF 2014; Kicheleri *et al.* 2018). In short, an amendment of the *Wildlife Policy of 1998*, the *Wildlife Conservation Act 2009* and the associated regulations would need to include clauses that stipulated sufficient community participation, strengthened the institutional framework, and provided well-defined property rights and adequate equal benefits among stakeholders to ensure efficient wildlife management and sustainable livelihoods in the LGCA.

11.4 Limitations of the Study

The study has some limitations. First, the geographical location of the study villages and the nature of the conflicts made the study time-consuming and expensive to undertake. Although the researcher was able to reach the communities in the six villages, one of which was about 50 km from Wasso, it was difficult to access and obtain primary data from the tourist campsites, particularly Thomson Safaris and the OBC at Soitsambu and Ololosokwan villages, because it was the high season for both hunting and ecotourism. Furthermore, due to the conflicts in the area, there were extra security measures to avoid any threats to tourists. Although some information was available from secondary sources and stakeholders who attended the workshop, the researcher wanted to obtain first-hand information from the campsites, but was unsuccessful, despite having a research permit from the authorities in the study area.

Second, structuring the MCA problem and building the model was a time-consuming activity as this study comprised the systematic process of engaging stakeholders through FGD workshops and a community survey. Stakeholder engagement was important as it helped to elicit their ideas, perceptions and interests and incorporate them in the MCA process for sound decision-making. The process of decision-making also required the involvement of experts and non-experts from a wide range of disciplines with a lot of experience, which was done successfully. However, the study did not include stakeholders dealing with wildlife

management from the Ministry of Natural Resources and Tourism in Dodoma due to limited funding.

Third, the proportion of women participated in the survey (35%) was relatively smaller than that of men (65%). However, the gender disparity reflects the demographic characteristics of the Maasai communities.

11.5 Recommendations for Future Research

Further research in the following areas would be beneficial in supporting wildlife management in areas adjacent to protected areas, particularly in the LGCA. There is a need to undertake further research on non-financial benefits and a mechanism for the sharing of benefits by stakeholders in a CBNRM. This is because scholars on the CBNRM programme involving trophy hunting and ecotourism are inquiring about more equitable sharing of financial benefits from tourism schemes among stakeholders, especially the members of the local community (Ashley and Roe 2002; Long 2002; Mbaiwa 2004; Manyara and Jones 2007; Mitchel and Ashley 2010; Lamers *et al.* 2014; Nthiga *et al.* 2015; Mbaiwa 2011; Torres *et al.* 2011; Snyman 2012; Mbaiwa 2017). However, less attention has also been paid to how those benefits should be analysed and shared equitably. Studies have mostly focused on financial benefits, particularly revenue generated from a CBNRM. The results of this study indicate that in LGCA, ecological and socio-cultural benefits are also preferred by communities, but a mechanism for sharing these non-financial benefits is lacking. Further research is therefore needed in these areas.

Furthermore, this study focused on the application of MCA in the evaluation of wildlife management options by exploring the impacts of different options for the LGCA. However, it should be noted that there are other natural resources such as forests and minerals in the study area. Further research could be done by applying participatory MCA methods to evaluate management options and the sharing of benefits from other natural resources in a JVWMA.

Further research could also apply GIS in the MCA framework to evaluate NRM under multiple land-use models in the LGCA. The current study applied FGDs in an MCA framework and a community survey to elicit information from the stakeholders and local communities. These methods were appropriate to build the MCA model by incorporating information in the

decision-making process. Nonetheless, the application of GIS in the MCA framework was limited by time, skills, and resources. Based on these limitations, it is suggested for future MCA studies in the LGCA to apply GIS to evaluate the wildlife management options. Integrating GIS in the MCA framework can be appropriate to optimise the use of spatio-temporal land-use data and visualise the results of large-scale data analysis.

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Appendices

Appendix 1. A Community Survey Questionnaire

Research Topic: Exploration and Evaluation of Wildlife Management Options for the Loliondo Game Controlled Area Tanzania: Multi-criteria Analysis

Name of Researcher: GileardMinja

Registration Number: a1717271

Village.....

Sub-Village.....

SECTION A. TOURISM, WILDLIFE MANAGEMENT AND LAND-USE

1. Which of the following is a primary tourism land-use activity available in your village?

- 1. Photographic tourism () 2. Cultural tourism ()
- 3. Hunting tourism () 4. Don't Know ()

2. Are you involved in any of the above-mentioned tourism activities in your area?

- 1. Yes () 2. No () 3. Don't Know ()

3. If yes, what is the most implication of expanding land for eco-tourism and hunting in Loliondo?

- 1. Enhanced biodiversity () 2. Increased land-use conflicts () 3. Increased revenue ()

4. Are you involved in planning, management and decision-making of ecotourism and trophy hunting in your village?

- 1. Yes () 2. No () 3. Refused to answer ()

5. What is the status of the ownership in the current ecotourism and hunting concessions in Loliondo?

- 1. Village Government () 2. Investors ()
- 3. Central Government () 4. Refused to answer ()

6. Do you agree that eco-tourism and hunting have conservation value than socio-economic benefits?

- 1. Yes () 2. No ()
- 3. Refused to answer ()

7. If yes, which of the following socio-economic service is mostly supported with eco-tourism and hunting revenues?

- 1. Health () 2. Education ()
- 3. Water () 4. Energy ()
- 5. Infrastructure () 6. Don't Know ()

8. Please indicate your level of agreement or disagreement with the following statements on the challenges associated with hunting tourism at LGCA?

Agreement	1. Strongly Disagree	2. Disagree	3. Somewhat disagree	4. Neutral	5. Somewhat Agree	6. Agree	7. Strongly Agree	8. Don't know
a. No specified duration of ownership								
b. Lack of property rights for hunting								
c. Incompetent professional hunters								
d. Disregarding hunting laws								
e. Disrespect of government officials								
f. Uncontrolled wounded animals								
g. Corruption among officials								
h. Poor community involvement in decision making								
i. Community benefits from hunting fees								
j. Lack of financial accountability and transparency in the contracts								
l. Lack of policy reform in wildlife management								

SECTION B. LAND-USE TENURE, PROPERTY RIGHTS AND WILDLIFE MANAGEMENT

1. What is the current type of land tenure at Loliondo Game Controlled Area?

1. Customary Right of Occupancy ()
2. Granted Right of Occupancy ()
3. Don't Know ()

2. Which of the following category of land ownership does your village land belong?

1. General land ()
2. Village land ()
3. Reserved land ()
4. Both reserved land and village land ()
5. Don't know ()

3. Where do you graze your cattle?

1. At my private land ()
2. Dry grazing area ()
3. Wet grazing area ()
4. General reserved Area ()
5. Away from Loliondo ()

4. What is the current status of accessing the areas which are not suitable for tourism activities?

1. Accessible ()
2. Not Accessible ()
3. Partially accessible ()
4. Highly Accessible ()
5. Refused to answer ()

5. Do you own a piece of land?

1. Yes ()
2. No ()
3. Refused to answer ()

6. If yes, what type of property rights does your land possess?

1. State ()
2. Private ()
3. Common ()
4. Open Access ()

7. Please indicate your level of priority with the following characteristics of property rights in tourism at Loliondo Game Controlled Area (LGCA)

Priority	1.Not a priority	2.Low priority	3.Neutral	4.Moderate priority	5.High priority	6.Dont Know
a. Comprehensiveness						
b. Transferability						
c. Duration						
d. Benefit conferred						
e. Exclusiveness						

8. Which of the following institution is responsible to offer land for investment in your village?

1. State Authority ()
2. Village Government Authority ()
3. Tanzania Investment Centre (TIC) ()
4. TIC and Village Government ()
5. Don't Know ()

9. Do you have a certificate of customary right of occupancy?

1. Yes () 2. No ()
3. Don't Know ()

10. If yes, when did you obtain the certificate?

1. 5 years ago () 2. 15 years ago ()
3. 25 years ago ()

11. Do you have title deed of the land ownership?

1. Yes () 2. No ()
3. Refused to answer ()

12. If yes, when did you obtain the title deed?

1. 5 years ago () 2. 15 years ago ()
3. 25 years ago ()

13. Have you experienced any resettlement since you have settled in Loliondo?

1. Yes ()
2. No ()
3. Refused to answer ()

13. The current status of land-use at LGCA allows conservation to co-exist with livelihood activities. Assume that you will be required to move with or without compensation to promote wildlife management and biodiversity conservation at LGCA. Please indicate your level of agreement or disagreement with the following statements on the challenges of resettlement for conservation to your livelihoods at LGCA?

	1. Strongly Disagree	2. Disagree	3. Somewhat Disagree	4. Neutral	5. Somewhat Agree	6. Agree	7. Strongly Agree	8. Don't Know
a. Resettlement contribute to the erosion of informal safety nets								
b. Eroded social networks are caused by poor resettlement programme								
c. People became land-less in resettlement schemes								
d. Resettlement for conservation contribute to increased food insecurity								
e. Family breakdown increased after resettlement								
f. Impoverishment levels increased when there is resettlement								

SECTION C. WILDLIFE MANAGEMENT OPTIONS

OPTION1. CURRENT OPTION: LOLIONDO GAME CONTROLLED AREA (LGCA)

1. According to *the Wildlife Conservation Act 1974*, there is no restriction for communities to live in Game Controlled Areas. Also according to *Land Act No. 5, 1999* and *Village Land Act 1999* LGCA which is an area of 4,000 km² is classified as village land and the village land is registered under *Local Government Act 1982*, however, the whole area 4,000 km² was leased to Otterlo Business Corporation (OBC) by the government for trophy hunting. As a result, there are overlapping land-uses. Implementation of *Wildlife Regulation Act 2009*, which restricts human activities in GCA will have impacts to land rights and resources user rights at Loliondo. Please indicate your level of agreement or disagreement with the following statements on current option

Agreement	1. Strongly Disagree	2. Disagree	3. Somewhat Disagree	4. Neutral	5. Somewhat Agree	6. Agree	7. Strongly Agree	8. Don't Know
a. Allow wildlife to co-exist with livestock grazing in LGCA								
b. Accept that LGCA is a village land and you have a certificate								
c. Accept that livestock production is the main form of land-use which competes with wildlife conservation								
d. Allow the government to revoke OBC tourism lease and accept to lose \$819,000 per year from hunting								
e. Accept to participate in wildlife conservation by regulating grazing								

OPTION 2. GAME RESERVE AREA (GRA)

According to the new provision of *Wildlife Conservation Act 2009*, assume that there is a ban on livestock grazing and agriculture inside GRA to support wildlife management. *Wildlife Policy of 1998 and Wildlife Conservation Act 2009* allows the establishment of GRAs. This alternative may allow the ban of agriculture and livestock grazing but encourages wildlife conservation in 4,000 km². This hypothetical alternative may require relocation with compensation. A game reserve may allow hunting with a special permit and it is managed by Wildlife Division and Wildlife Authority departments under Ministry of Natural Resources and Tourism dealing with wildlife conservation. Assume that this hypothetical alternative is to be implemented at LGCA, how willing or unwilling are you to agree on each of the following statements in the table below?

Agreement	1. Strongly Disagree	2. Disagree	3. Somewhat Disagree	4. Neutral	5. Somewhat Agree	6. Agree	7. Strongly Agree	8. Don't Know
a. Accept that pure wildlife conservation as a major form of land-use								
b. Accept to move in a new area with compensation paid before relocation								
c. Allow revoke customary rights of occupancy								
d. Allow GRA tenure to replace village land tenure								

OPTION 3. VILLAGE-BASED INDEPENDENT WILDLIFE MANAGEMENT AREAS (VBIWMA)

According to the *Wildlife Policy of 1998*, there is an emphasis on community participation in wildlife management. Both LGCA and GRA do not involve community directly in wildlife management and there is no direct mandate for the management. Introduction of *Wildlife Management Act 2009* and *Wildlife Management Areas Regulation 2012* allows the establishment of Community Based Wildlife Management Areas (CBWMA). If VBIWMA alternative is accepted, it will be established in a designated area of 1,500 km² on the individual village lands and it will be managed by village assemblies. Human activities will be allowed in VBIWMA under land-use zoning. The rest area of 2,500 km² will be used for human activities under zoning. Assume this hypothetical alternative is implemented at LGCA how willing or unwilling are you to agree on each of the following statements in the table below?

Agreement	1. Strongly Disagree	2. Disagree	3. Somewhat Disagree	4. Neutral	5. Somewhat Agree	6. Agree	7. Strongly Agree	8. Don't Know
a. Accept part of your village land set aside for wildlife management								
b. Accept limited user rights to wildlife for hunting and photographic tourism in the VBIWMA								
c. Allow no changes on the village land tenure and customary rights of occupancy								
d. Accept contracts with photographic tourism to exist in the VBIWMA								
e. Allow new hunting contracts at the VBIWMA								

OPTION 4. JOINT VENTURE WILDLIFE MANAGEMENT AREAS (JVWMA)

According to *the Wildlife Policy of 1998*, there is an emphasis on community participation in wildlife management. Both LGCA and GRA do not involve community directly in wildlife management and there is no access to resources. Introduction of *Wildlife Management Act 2009* and *Wildlife Management Areas Regulation 2012* allows the establishment of Community Based Wildlife Management Areas (CBWMA) under the joint venture model. If JVWMA alternative is accepted, it will be established in a designated area of 1,500 km² on a joint village land-use plan managed by communities without land-use zoning. The rest of the 2,500 km² will be used for human activities. This alternative policy option will allow partial user rights for hunting and photographic tourism. Partial user rights will also be granted for livestock grazing during the dry season in designated areas of the JVWMA. Assume this hypothetical alternative is implemented at LGCA, how willing or unwilling are you to agree on each of the following statements in the table below?

Agreement	1. Strongly Disagree	2. Disagree	3. Somewhat Disagree	4. Neutral	5. Somewhat Agree	6. Agree	7. Strongly Agree	8. Don't Know
Accept setting aside an area of 1500 km ² for wildlife management								
Accept limited user rights to wildlife for hunting and photographic tourism								
Accept partial access to grazing and water during the dry season in the area								
Accept retaining the contract with photographic tourism in the JVWMA								
Allow not OBC to invest in the JVWMA								
Accept donors and government support to establish JVWMA								
Allow a fair distribution of benefits and costs of conservation								

SECTION D. SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

1. Sex of the respondent 1. Male () 2. Female ()
2. What is your ethnicity? 1. Chagga () 2. Sonjo () 3. Iraq () 4. Maasai ()
5. Refused to answer ()
3. What is your age (in years)?
1. 20 – 30 () 2. 31 – 40 () 3. 41–50 () 4. 51–60 () 5. 60+ ()
4. What is your marital status?
1. Single () 2. Married () 3. Divorced () 4. Separated ()
5. Widowed () 6. Others () 7. Refused to answer ()
5. Are you the head of your household?
1. Yes () 2. No () 3. Refused to answer ()
6. What is your highest level of education?
1. No formal education () 2. Primary education ()
3. Secondary Education () 4. Tertiary education ()
5. Refused to answer ()
7. For how many years have you been living in this village?
1. Since birth () 2. Between 1-12 years () 3. Between 1-12 years ()
8. What are your main reasons for settling in this village?
1. Employment () 2. Marriage ()
3. Search for business opportunity ()
4. Search for grazing pasture ()
5. Hunting and gathering ()
6. Others (specify)..... ()
9. What is your main economic activity?
1. Eco-tourism () 2. Farming () 3. Hunting tourism () 4. Livestock Grazing ()
5. Cultural tourism () 6. Beekeeping () 7. Employed () 8. Casual worker ()
9. Small business enterprise () 10. Others (specify)..... ()

Appendix 2. Focus Group Discussion Questions

Research Topic: Exploration and Evaluation of Wildlife Management Options for the Loliondo Game Controlled Area Tanzania: Multi-criteria Analysis

Name of Researcher: Gileard Minja

Location of the Workshop: Loliondo Village Community Hall

1. What is the current status of land-use at Loliondo Game Controlled Area?
2. What are the social, economic, cultural, environmental, and ecological changes you have experienced at Loliondo Game Controlled Area for the past 25 years?
3. How do social, economic, cultural, environmental and ecological factors influence wildlife management and land-uses at Loliondo Game Controlled Area?
4. What do you think about the possible wildlife management options which may promote wildlife management, livelihoods, ecosystem services and biodiversity conservation?
5. How can you differentiate between current option and the options?
6. What are the similarities and differences among options in terms of property rights?
7. What do you think about the objectives of promoting alternative land-uses?
8. How does each objective enhance social-economic and cultural values of the local communities?
9. How does each objective enhance wildlife management, biodiversity conservation and ecosystem services?
10. What are the criteria which can be used to determine the sustainability of each land-use alternatives?
11. What are the sub-criteria of each main criterion mentioned above?
13. Which criteria do you think have similar characteristics?
14. How many criteria are mutually exclusive?
15. What are the best criteria from the list of mutually exclusive criteria?
16. Can you please score alternatives against each criterion on the following effect table?
17. How many criteria possess the same score to all options?
18. What is the best alternative option according to the scoring and aggregation results?
19. Why do you agree or not agree with the results of the ranked options?
20. What are the benefits of the best-ranked options if implemented at LGCA?

Appendix 3. MCA Weighting Questionnaire

CRITERIA	RATING SCALE									
		1	2	3	4	5	6	7	8	9
ECONOMIC	a. Financial returns									
	b. Jobs									
	c. Gross regional product									
ECOLOGICAL	a. Endangered species									
	b. Ground water supply									
	c. Food (agriculture production)									
SOCIAL	a. Natural resource conflicts									
	b. Poverty level									
	c. Social equity									
CULTURAL	a. Rituals and ceremonies									
	b. Grazing culture									
	c. Cultural and historical sites									


Appendix 4. Multi-criteria Evaluation Matrix

EVALUATION MATRIX (EFFECT TABLE)

CRITERIA	Measurement Units	WILDLIFE MANAGEMENT OPTION			
		1. Loliondo Game Controlled Area (current option)	2. Game Reserve Area	3. Village-Based Independent Wildlife Management Area	4. Joint Venture Wildlife Management Area
1. Ecological					
a. Endangered Species	Number of Species				
b. Ground water supply	\$1000/Km2 /Year				
c. Food (agriculture production)	US \$1000 /km ² per year				
2. Economic					
d. Financial returns	US \$1000 per year				
e. Jobs	Number of employee/year				
f. Gross Regional Product	US\$1000 million /year				
3. Social					
g. Natural resource conflicts	+, ++, +++ -, --, ---				
h. Poverty level	+, ++, +++ -, --, ---				
i. Social Equity	+, ++, +++ -, --, ---				
4. Cultural					
j. Rituals and Ceremonies	+, ++, +++ -, --, ---				
k. Grazing Culture	+, ++, +++ -, --, ---				
l. Cultural and Historical sites	+, ++, +++ -, --, ---				

Key- -, --, --- Low, Moderate, Very Low+, ++, +++High, Moderate, Very High

Appendix 5. Human Research Ethics Approval

Our reference 32989	 <p>THE UNIVERSITY of ADELAIDE</p> <p>RESEARCH SERVICES OFFICE OF RESEARCH ETHICS, COMPLIANCE AND INTEGRITY THE UNIVERSITY OF ADELAIDE</p> <p>LEVEL 4, RUNDLE MALL PLAZA 50 RUNDLE MALL ADELAIDE SA 5000 AUSTRALIA</p> <p>TELEPHONE +61 8 8313 5137 FACSIMILE +61 8 8313 3700 EMAIL hrec@adelaide.edu.au</p> <p>CRICOS Provider Number 00123M</p>
29 May 2018	
Dr Jungho Suh School of Social Sciences	
Dear Dr Suh	
<p>ETHICS APPROVAL No: H-2018-109 PROJECT TITLE: Wildlife management and land-use options in Loliondo game controlled area Tanzania: a multi-criteria analysis</p>	
<p>The ethics application for the above project has been reviewed by the Low Risk Human Research Ethics Review Group (Faculty of Arts and Faculty of the Professions) and is deemed to meet the requirements of the <i>National Statement on Ethical Conduct in Human Research (2007)</i> involving no more than low risk for research participants.</p>	
<p>You are authorised to commence your research on: 29/05/2018 The ethics expiry date for this project is: 31/05/2021</p>	
NAMED INVESTIGATORS:	
<p>Chief Investigator: Dr Jungho Suh Student - Postgraduate Mr Gileard Sifueli Minja Doctorate by Research (PhD): Associate Investigator: Associate Professor Yan Tan</p>	
<p>CONDITIONS OF APPROVAL: Thank you for your responses dated 25.05.2018 and 29.05.2018 to the matters raised. The revised application provided 25.05.2018 has been approved.</p>	
<p>Ethics approval is granted for three years and is subject to satisfactory annual reporting. The form titled Annual Report on Project Status is to be used when reporting annual progress and project completion and can be downloaded at http://www.adelaide.edu.au/research-services/oreci/human/reporting/. Prior to expiry, ethics approval may be extended for a further period.</p>	
<p>Participants in the study are to be given a copy of the information sheet and the signed consent form to retain. It is also a condition of approval that you immediately report anything which might warrant review of ethical approval including:</p>	
<ul style="list-style-type: none">• serious or unexpected adverse effects on participants,• previously unforeseen events which might affect continued ethical acceptability of the project,• proposed changes to the protocol or project investigators; and• the project is discontinued before the expected date of completion.	
<p>Yours sincerely,</p>	
<p>Dr Anna Olijnyk Convenor</p>	
<p>The University of Adelaide</p>	

Appendix 6. Research permit from Arusha Regional Administrative Secretary

UNITED REPUBLIC OF TANZANIA
PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

Telegrams: "REGCOM"
Telephone: 2545608 / 2545820 / 2545872
Fax No. 2545239 / 2544386
E-Mail: rasarusaha@yahoo.com
E-Mail: rasarusaha@gmail.com
In reply please quote:
Ref. No. FA.195/232/01'K'/143



REGIONAL COMMISSIONER'S OFFICE,
P.O. Box 3050,
ARUSHA.

23 July, 2018

District Administrative Secretary,
Ngorongoro District,
P. O. Box 10,
LOLIONDO.

RE: RESEARCH PERMIT

Reference is hereby made to the letter dated 7th June, 2018 from Head of School, Social Sciences, The University of Adelaide concerning the above underlined subject.

I hereby taking this opportunity to introduce to you **Mr. Gileard Sifueli Minja** from University of Adelaide at the moment conducting a research titled "*Wildlife Management and Land Use Options in Loliondo Game Controlled Area, Tanzania: A Multi –criterial Analysisi.*"

Has been granted permission to conduct his research in **Ngorongoro District** from **July, 2018 to December, 2018.**

Due to this, you are requested to render any necessary Administrative assistance to enable him to accomplish the intended objective of his research.

Thank you for your cooperation.

A.J. Musthushu
For: **REGIONAL ADMINISTRATIVE SECRETARY**
ARUSHA

Copy to:
Mr. Gileard Sifueli Minja,
Researcher,
Student of UA- MOSHI