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# Conservation Outside Protected Areas:

The Perspectives of Local Community

Leaders in Southern Ngorongoro

Conservation Area, Karatu District Tanzania

**Joseph Gwandu Gambay**

Natural Resources Management

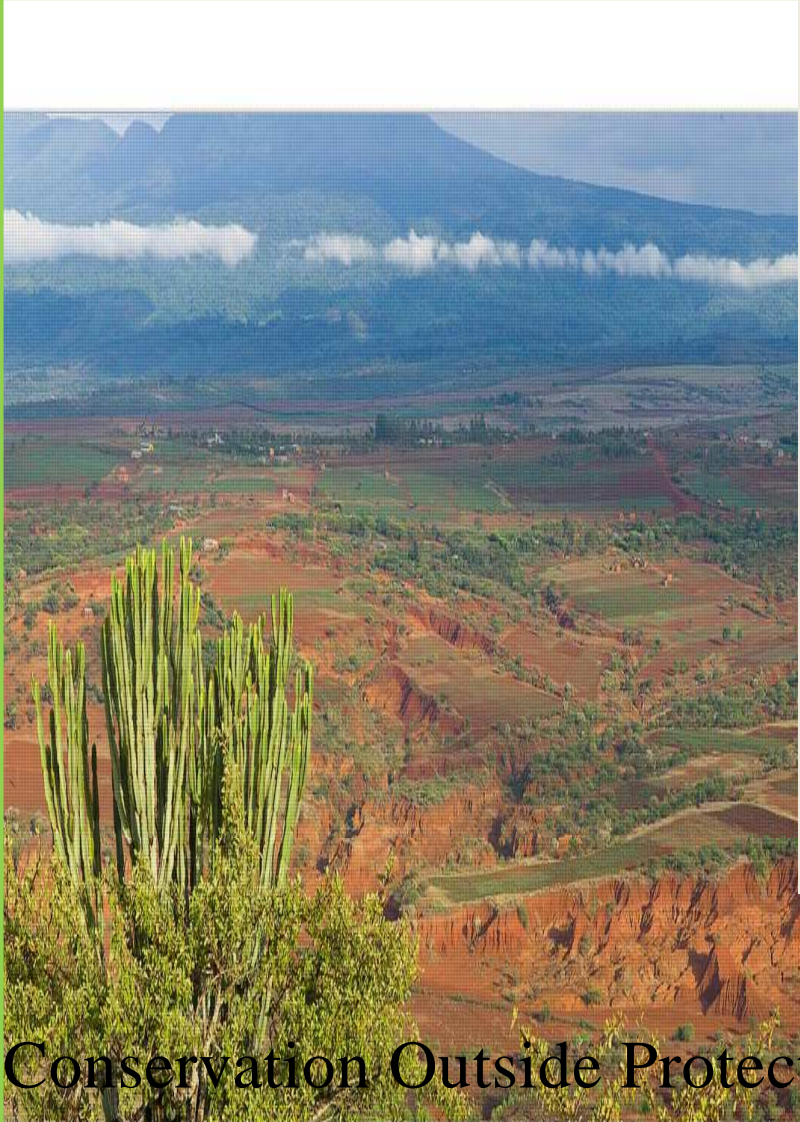
Submission date: June 2014

Supervisor: Eivin Røskaft, IBI

Norwegian University of Science and Technology  
Department of Biology



*Below: Section of Karatu Ngorongoro View*



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*Master's Thesis in Natural Resources Management: Biology Department, June 2014*

## **Abstract**

20 villages were the case study areas in Karatu district located between two protected areas of Ngorongoro Conservation Area (NCA) and Lake Manyara National Park (LMNP). The district has potential areas that could be used to develop wildlife management areas (WMA) and adopt conservation agriculture (CA) partly to address the issues of land clearing and soil erosion causing siltation and disappearance of the surrounding wetlands. Using face to face interviews, structured questionnaires were administered to a total of 133 respondents of local leaders at the village government levels. For purpose of this study, a local leader was defined as any person who holds any official position in the village government. The choice of local leaders was based on the assumption that they represent broad perspective about biodiversity conservation in relation to the grassroots members of the local communities and other conservation actors. The study was conducted on the broad objective to evaluate the attitudes of local leaders towards the conservation of village areas. The findings indicated that the attitudes of local leaders towards the conservation of village areas were positive, with 87% of respondents describing charcoal making activities as detrimental and insignificant to the developments of their villages. Majority rated village environmental conservation bylaws and committees as ineffective in dealing with the current state of rapidly environmental deterioration in the village lands. Among other variables, the position of leader was important predictor. Those with higher positions were less positive towards conservation in village lands. The implication of the results could be linked to conservation initiatives outside protected areas and understanding the attitudes and securing the support of local leaders. The overarching goal is to enhance biodiversity conservation both outside and within protected areas.

## **Acknowledgement**

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### List of Abbreviation

CA	Conservation Agriculture
CBC	Community-Based Conservation
CBD	Convention on Biological Diversity
COP	Conference Of the Parties
DED	District Executive Director
KDA	Karatu Development Association
MBK	Mazingira Bora Karatu
LMNP	Lake Manyara National Park
NBSAP	The National Biodiversity Strategy and Action Plan
NCA	Ngorongoro Conservation Area
PA	Protected Area
RIDEP	Regional Integrated Development Program
SENAPA	Serengeti National Park
TANAPA	Tanzania National Parks
TZS	Tanzania Shillings
VEO	Village Executive Officer
WDC	Ward Development Committee
WEO	Ward Executive Officer
WMA	Wildlife Management Area

# **1 INTRODUCTION**

## **1.1 Background**

Since its inception, nature conservation field has continued to accumulate more volumes of information about biodiversity and the ways to use its components sustainably. While it is generally agreed that protected areas are essential for biodiversity conservation, many issues remain contentious and complex in term of their effectiveness and specific policy initiatives. Their establishment, management and restoration of degraded habitats are some of the areas where varying viewpoints about conservation strategies and policies exist between the conservationists with varied background (Karanth et al. 2008). Further researches are being conducted in an effort to address the challenges of biodiversity conservation with the main focus on detrimental human activities that accelerate environmental degradation and biodiversity loss. However, much of the information learned through various researches not only tends to mismatch but also lack implementation linkages to conservation needs on the ground (Linklater 2003, Knight et al. 2008). Besides, many of these researches conducted in various disciplines such as ecology and wildlife management lack cross-disciplinary consideration of the nature of conservation challenges (Fazey et al. 2005).

Convention on Biological Diversity (CBD) during “Conference Of the Parties” (COP) at its tenth meeting developed a strategic plan for biodiversity 2011-2020 with five strategic goals including twenty Aichi biodiversity targets. Of the five goals, goal number one in order of priority seeks to mainstream biodiversity across government and society. This would be achieved through provision of education and information about everyday values and benefits of biodiversity components and the roles of conservation stakeholders in implementation of conservation actions. The plan emphasizes conservation of biodiversity outside protected areas and increases protected areas to 17% of earth surface by 2020 as well as restores at least 15% of degraded areas through conservation and restoration activities (COP 2010). Increasing the numbers and area of protected areas is a coherent move towards their main purpose of biodiversity protection. However, it is necessary to be caution in articulating the goals and methods because the decline of habitat and biodiversity are evident even in the present protected areas. This is largely attributed to the human activities in the unprotected areas surrounding protected areas which

block wild animal corridors making protected areas isolated and their effective size reduced (Radeloff et al. 2010). Subsequently, the entire ecosystem diversity has gone down rapidly in the past 50 years with projection of continued decline in the future which might rearrange the course of evolution on this planet (MEA 2005).

Creating protected areas is essential but, it is short-sighted to depend totally on protected areas for biodiversity conservation. Such dependency creates paradoxical scenarios where species inside protected areas receive much efforts and attentions for their preservation while the same species outside protected areas are somehow allowed to be damaged. More than 80% of earth surface is unprotected areas. These areas provide habitats for many endangered species and contain unique ecosystems that complement the roles of protected areas (Primack 2010). Degradation of areas outside protected areas causes the decline of biodiversity within the protected areas. Some studies have indicated that improvement of biodiversity conservation on even 25% of the existing unprotected areas could represent significant additional biodiversity gains (Cox and Underwood 2011). These grounds provide the rational to review the efforts directed to unprotected areas in the course of biodiversity conservation and protection. These areas not only contain substantial biodiversity but also hugely influence surrounding protected areas through the problems associated with edge effect. In this way, long-term biodiversity conservation at the scale needed requires exceptional cooperation of all stakeholders both inside and outside of traditional protected areas (Danby and Slocumbe 2005, Pérez-García et al. 2011). Potential unprotected areas include lands under agriculture, human settlements, grazing areas, industrial and urban areas, mining areas and logged forests. Concisely, biodiversity conservation in these areas could potentially address the concern that stems from estimates suggesting that up to 50% of all species on the planet will disappear within the next 50 years (Pimm and Raven , Koh et al. 2004, Thomas et al. 2004).

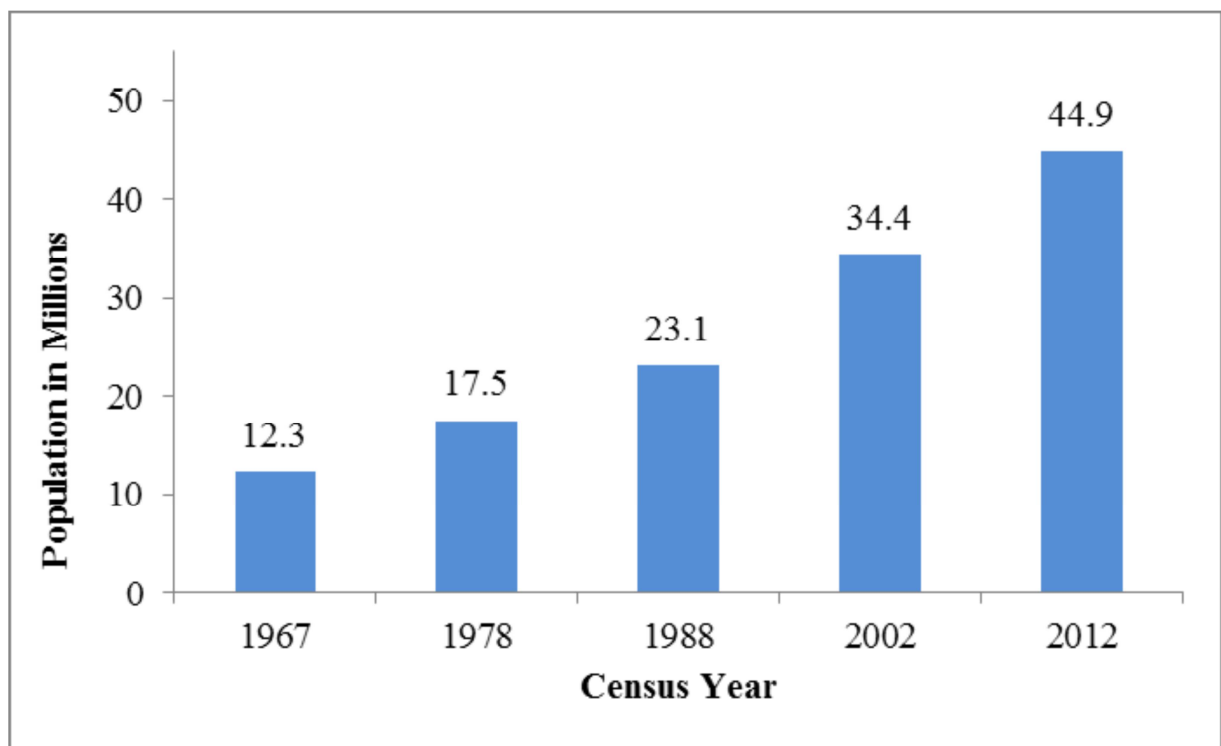
Conservation strategies down the years range from coercive conservation through to community based conservation (CBC), which sought to rectify the human costs linked to coercive conservation. CBC desired to return the ownership of natural resources to local communities by empowering and decentralizing management through bottom up participatory approaches. CBC has shown several shortcomings to be able to achieve the two main objectives of improving biodiversity conservation and socio-economic benefits of local communities. Despite some

notable successes but more or less it has been labelled as ineffective due to inadequate resources, incapacity of the local institutions, uneven implementation, promising too much than can deliver lack of collaborative design, bad governance and political corruptions (Songorwa 1999, Stephen R. Kellert 2000, Mwakaje et al. 2013). But above all, central governments and its agencies has not really decentralised resources management to the local people. This was more evident in developing countries where the effect of governance on conservation seemed more pronounced (Smith et al. 2003). The implication was theoretical transfer of decision-making power but practically conservation initiatives continued to follow the top-down approach (Goldman 2003).

The rational for CBC approach is connected to the reason why it was established. The main one includes failure of fences-and-fines approach in delivering conservation goals. The approach disregarded the interests of local inhabitants and excluded them from the management and use of natural resources located in their areas. The exclusion and other factors such as wildlife induced damages to crops, livestock and humans as well as evictions of people without compensation during establishment of protected areas altogether converged and promoted human-conservation conflicts which derailed trust between various conservation stakeholders. This thwarted supports of local people for conservation programs in village lands and the surrounding protected areas. The failures in achieving conservation objectives, lack of support of local people for conservation initiatives and the growing hostilities between local people and management of protected areas necessitated the development of CBC with the main purpose of reversing the situations above. In doing so, CBC approach intended to change local peoples' attitudes and practices and use them as means to reach the desired conservation outcomes. This considered the fact that when local people felt deceived they tend to sabotage conservation efforts as for instance in burning the forests and facilitating the poachers. Therefore, the future success of CBC requires collaborative planning that take into account CBC in a multi-scale and multi-actors approach (Hill et al. 2010).

As in many other parts of the world, in Tanzania the main purpose of biodiversity conservation is attached to protected areas while little or no attention is given to areas outside protected areas. These areas provide corridors which are crucial for the movement of wild animals between various habitats. However, human activities in unprotected areas continue to block these corridors which indicate the likely collapse of protected areas in a long term due to the negative

effects of the isolation and habitat fragmentations (Newmark 2008, Caro et al. 2009). The country has set aside 27% of its land as protected areas with 17.5% contribution to GDP (Mwakaje et al. 2013). These areas represent well the situation of where biodiversity is treasured excluding conservation programs in village and general public lands. But resources in areas outside protected areas are getting depleted faster than in protected areas because of unsustainable practices associated with socio-economic activities in these areas. Depleted resources in unprotected areas combined with rapidly increasing human population in Tanzania (Figure 1) which for the last ten years (2002-2012) has increased by 30% from 34.4 million to 44.9 million (URT 2012), exert huge pressure on the resources of the surrounding protected areas.



**Figure 1:** *Population Trends in Tanzania, 1967 – 2012 Censuses (NBS 2012)*

As combative measures, protected areas in Tanzania developed programs through CBC to share their revenues with local communities. The scheme is meant to improve attitudes of local people towards protected areas and as incentives to win their support in protected areas biodiversity conservation roles. According to TANAPA which is the highest category of nature conservation

in the country, between the years 2000 and 2007 had provided to local community development projects a total of around TZS 10.4 billion, about US \$6.3 million (TANAPA 2012). Despite this amount local people still generally tend to hold negative attitudes towards protected areas in Tanzania and other parts of the world (Newmark et al. 1993, Songorwa 1999, Durrant and Shumway 2004, Kideghesho et al. 2007). The major challenges that the benefits sharing programs face include failure to meet economic expectation of local communities and higher conservation induced costs than the generated benefits. Consequently, practices such as poaching and timber extraction activities by the local people continued in protected areas (Loibooki et al. 2002, Holmern et al. 2007, Mfunda and Røskaft 2010).

Although the evidence suggest existence of strong linkages between socio-economic practices outside protected areas and biodiversity conservation in protected areas, little or no efforts were devoted towards conservation outside protected areas. Given unsatisfactory performances of conservation approaches and strategies that always focused on protected areas, it's high time to review the priority assigned to, and expand research on the contribution of biodiversity conservation outside protected areas. This study was conducted with the broad objective of evaluating the attitudes of local leaders towards conservation in village areas. Apart from the nature of conflicts arising from wildlife induced damages, the study assessed interactions between local communities and protected areas in terms of the types of resources most wanted from protected areas that are scarce in village lands. This was conducted with the aim to understand the nature of resources needed from the protected areas and opening up the possibilities of developing them in areas outside protected areas. The overarching view is to enhance biodiversity conservation both in Karatu district areas and the surrounding protected areas of NCA and LMNP through reduction and elimination of conflicts arising from access to resources.

## **1.2 Problem Statement**

Despite some conservation successes achieved, especially in integrating government and society in living sustainably, biodiversity continues to decline (Rands et al. 2010). The National Biodiversity Strategy and Action Plan (NBSAP) for Tanzania to CBD 2010 targets identify inadequate awareness of the public and poverty as the main challenges to improving biodiversity conservation in the country. Other areas of concern include insufficient finances allocated to

conservation activities resulting in incapacity to information dissemination. As a way of improving biodiversity conservation, the plan proposed provision of biodiversity education and information to related sectors outside protected areas. However, there exist gaps between biodiversity conservation strategies and the practices of sectors such as agriculture, thus, the need to be aligned to policies of natural resources managements that consider sustainable healthy ecosystems in the country (Hatibu et al. 2002).

Biodiversity conservation outside protected areas entails presence of local authorities which form the basic units of community organizations at the grassroots levels. For these local units to realize sustainable conservation certain issues need to be addressed at the outset. These include capacity of financial and technical requirements, incentives through income and other benefits and commitments of local communities through participation which demand thorough analysis as it is often economically motivated (Larson 2002). The participation meant democracy for local people to make their own decisions on how to manage their destiny. However, what had not been part of the process was how the subject people could be lobbied by the interested groups. Special interest groups could always penetrate their interests to decisions made by local people on the grounds of facilitation. Due to the lack of information and the extreme poverty of the rural people where most natural resources are located, most decisions reached are not necessarily beneficial to them, whether on a short term or a long term basis.

The major economic activities in Karatu district are crop farming and livestock keeping which lack sustainable practices and continue to create soil degradation (Owenya et al. 2011). The rapidly increasing population and the rate at which natural resources are being degraded, not only negatively affect livelihoods but extend conservation problems to the surrounding protected areas such as in siltation of Lake Manyara, part of LMNP that provide crucial biological habitats (Birch-Thomsen et al. 2001, Jones 2002, Yanda and Madulu 2005). Overgrazing and encroachment of water sources that are not located inside protected areas as is the case of Mang'ola River source in Karatu, are adding to clearance of village and general public lands for expansion of agriculture and charcoal production activities which greatly contribute to resource depletion in the country (Luoga et al. 2000).

The dependency of human beings on biodiversity for their survival goes without question. Consequently, this requires more efforts to face the challenges of protecting biodiversity in

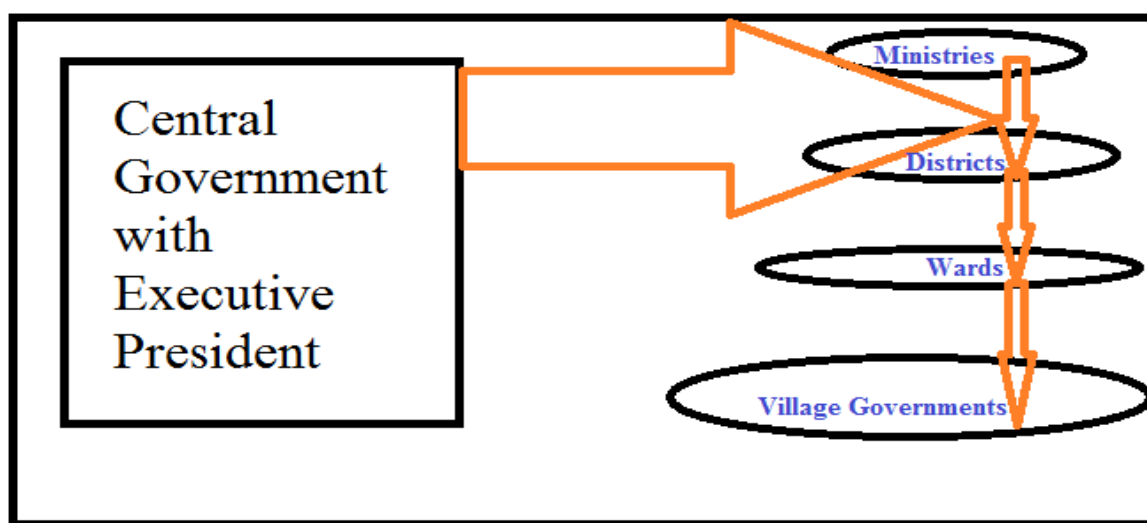
developing countries which are associated with poverty, political corruptions and lack of information. Considering the declining trends of biodiversity status despite continued increase in numbers and areas of protected areas globally, studies that explore strategies of conservation outside protected areas provide paramount meaning. This study was designed to understand the perspectives of local community leaders towards conservation activities in village areas. Information from local leaders is expected to contribute in filling the gaps in designing effective conservation programs in unprotected areas. Tanzania being one of the developing countries is not out of bad governance which forms the basis for vast problems facing biodiversity conservation. Unfortunately this has been intentionally overlooked by most local researchers in Tanzania as well as some from the west. The contribution of governance to biodiversity conservation is indispensable (Hecht 2012, Kaswamila and Malipula 2013).

### **1.3 Local Government in Tanzania**

The government structure in Tanzania is based on a central and many local governments (Figure 2). Local governments are both rural and urban. Rural governments consist of district councils made up of several divisions which also are composed of several wards. The wards are constituted of several villages. The former consist of the ward development committee (WDC) made up of all chairpersons of village governments and all village executive officers (VEO) in the ward. The councillor of the ward chairs the WDC and the ward executive officer (WEO) is the secretary. The WDC is just a committee responsible for coordinating development activities and planning in the ward and linking with the district level. There are two major organs of governance at the village level, village assembly and village council. The village assembly is composed of all adult residents in the village. The village assembly elects village councils of not less than 15 and not more than 25 members headed by an elected chairperson. All chairpersons of the sub-villages are members of the village council (REPOA 2008). The village assembly is theoretically the supreme body at the village level but in practice its only major function is to elect the council every five years. The reason is that neither in the law nor in practice does village assembly have ultimate legislative and executive powers, which are vested in the village council. The village government is the lowest level in representing the command chain from the executive president through district executive director (DED) who is an accounting officer for a particular district council to VEO. Theoretically local governments are assumed to be autonomous but in reality, things are different in Tanzania. Consequently, the structures and



arrangements are there to facilitate the agendas of central government and other actors (Amon Chaligha et al. 2007, Kaswamila and Malipula 2013).



**Figure 2:** *Simplified organizational structure of Tanzania Government*

Leaders at the village level are a very good medium of communication between the local people and other levels including the central government. They are used to ascertain opinions and feelings of the local community, especially when the higher levels plan to impose unpopular policies in local areas. In the same way, they are also used to influence and manipulate the people at the grassroots to accept whatever the higher levels wanted in terms of natural resources, such as, land and minerals. Village Land Act of 1999 gives power to local authority over their land but that has never been the case in Tanzania (Lange 2008). So the choice of local leaders in this study is based on that assumption of being able to represent broad perspective about biodiversity conservation in relation local people, higher authorities and other actors in their areas.

#### 1.4 Significance of the Study

Some interventions in Karatu that have potential to contribute to biodiversity conservation include Regional Integrated Development Program (RIDEP), a national agricultural project in 1980s aimed at improving agricultural productivity through soil and water conservation, World Wide Fund for Nature (WWF) for 2001-2003 sponsored an Non-Governmental Organization (NGO), Mazingira Bora Karatu (MBK) to facilitate agroforestry and conservation of soil and water sources. Karatu Development Association (KDA) is the oldest NGO in Karatu district since 1991 working towards improving environmental management through facilitation of conservation education extensions to local communities. Karatu district is strategically located to endeavor development goals from conservation related benefits. From sharing direct boundaries with two protected areas of NCA and LMNP to being an important stopover for most tourists heading for Serengeti National Parks (SENAPA), a popular tourists destination for the great migration of wildebeests. On the other hand the location threat wildlife corridors between NCA and LMNP which are rapidly disappearing due to increased socio-economic activities in Karatu district areas.

With more than 200,000ha uncultivated areas consisting of woodlands and bushlands, Karatu district has potential to reserve open wildlife areas, reinstate wildlife migratory corridors and develop sustainable practices in conservation agriculture, livestock grazing and charcoal production activities (Owenya et al. 2011). These initiatives could provide opportunities to tackle poverty which is one of the challenges to biodiversity conservation in developing countries. The district has a poverty rate of 44% in a total of 34,000 households and where about 1,200 children from poor households are working in coffee plantation (Nchahaga 2002, EDI 2005). However, while local communities are confronted with such abject poverty, the adjacent protected area of NCA collected a total of TZS 35 billion (about US \$23 million) for 2007/2008. As an indicator of bad governance 80% of these figures were used to cover operation costs without transparency (UNESCO 2008).

Therefore, the study documented the attitudes, perceptions and perspectives of local leaders towards conservation issues in village areas and surrounding protected areas. Understanding the findings could contribute not only in designing effective conservation programs outside protected areas but also in reduction and possible elimination of resource based conflicts

involving local communities and protected areas. Conservation programs outside protected areas are likely to enhance biodiversity gains both inside and outside protected areas.

## **1.5 General Objective**

The main objective of the thesis is to examine the attitudes, perceptions, knowledge and awareness of local community leaders towards conservation issues in Karatu villages and the neighboring NCA and LMNP

### **1.5.1 Specific Objectives**

1. To assess the knowledge and awareness of local leaders on issues related to conservation (water, wildlife presence, cultivation lands, livelihoods and soil erosion)
2. To determine attitudes of local community leaders towards conservation activities in village areas
3. To determine the attitudes of local community leaders towards the roles of protected areas in the development of surrounding villages
4. To identify wild animal species and their corridors in Karatu district areas
5. To describe the existing interactions between local leaders and external conservation actors

### **1.5.2 Hypotheses**

The location of Karatu district could significantly influence the attitudes and awareness of local leaders on conservation issues through four possible factors: wildlife corridors, villages bordering protected areas, buffer zone areas and socio-economic activities generating vast environmental degradation. However, only the village border factor was considered and the test of attitudes included other socio-demographic factors (gender, age, level of education and position of local leader in the village government). Consequently, the following two hypotheses were formulated and tested:

**H1:** Local leaders bordering protected areas will be more positive towards conservation in village areas as they are more informed on the importance of conservation due to higher interactions and participations with protected areas through benefits-based conservation programs.

**H2:** Local leaders bordering protected areas will be less positive towards protected areas because the closer the protected area the higher the conservation-induced costs experienced and the more negative attitudes expressed.

## **2 METHOD**

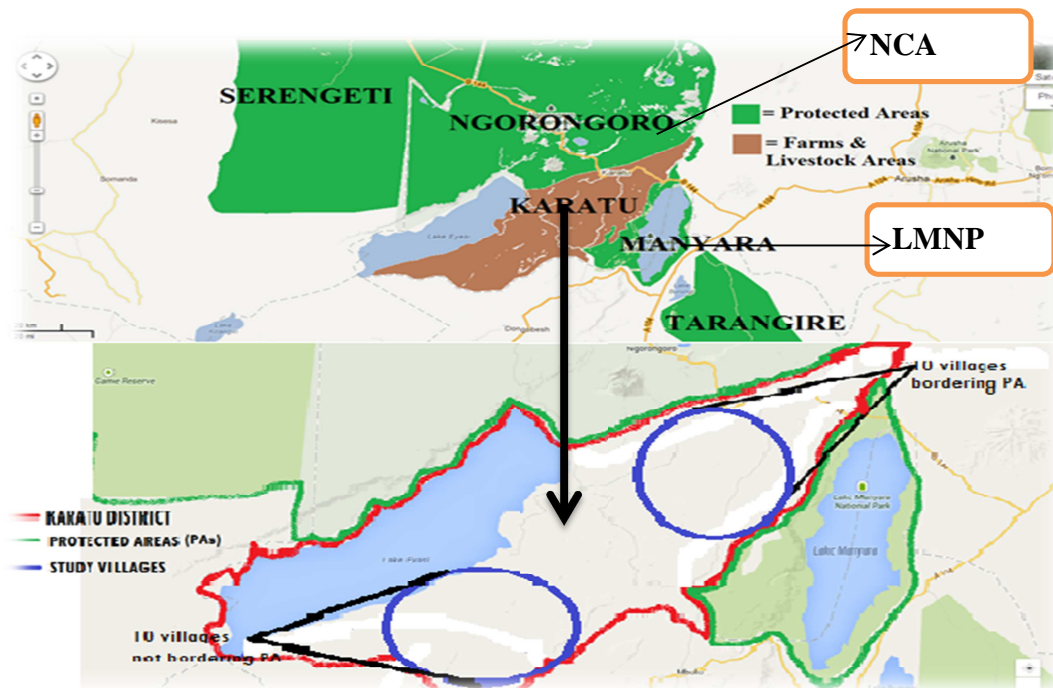
### **2.1 Study Area**

Karatu is one of the five districts in Arusha Region located in the northern part of Tanzania (Figure 3) between latitudes 3°10'– 4°00'S and longitude 34°47'–35°56'E. Karatu borders Mbulu district to the south, NCA to the north, LMNP to the east and Meatu district to the west. It is the traditional home to the Iraqw tribe who are agro-pastoralists, Barbaig tribe who are pastoralists, and the Hadzabe tribe, noted mainly as hunters and gatherers. The district has total land area of 3,300 km<sup>2</sup> and roughly divided into three zones; uplands, midlands and lowlands with altitude ranging from 1,000m to 1,900m. Rainfall in the district is bimodal and range 300–1200mm/year. The uplands consist mainly of agriculture while lowlands are woodlands used for grazing, charcoal production and wildlife. The district has 15 administrative wards and more than 45 registered villages with total population of 230,166 people growing at an annual rate of 3.2 % and aggregated into 34,000 households (NBS 2012). Locations of twenty study villages are indicated in figure 3. The average population density is 7–10 person/km<sup>2</sup> and most people live in the uplands (URT 2004) mainly around Ngorongoro Northern Highland Forest Reserve of Karatu.

The district is rich in natural resources. The community carries out forest enrichment tree planting activities in areas such as water sources, hilltops and abandoned lands. However, tree planting and growth are threatened by uncontrolled grazing (Owenya et al. 2012) and charcoal production which contributes to the resource depletion in Tanzania (Luoga et al. 2000). There are also deliberate efforts going on to reserve open wildlife areas to attract hunting and tourism opportunities, and more importantly to reinstate wildlife migratory corridors (COPEC 2003). Practically, all non-cropped areas have forest and grazing resources that are used for forestry, pastoralism and wildlife. Intercropping and agroforestry has been promoted in the district for improving production (Shetto and Owenya 2007) but also as way to assist biodiversity conservation in human dominated ecosystem (Noble and Dirzo 1997).



**Figure 3a:** Map showing location of Karatu district (in green) in northern Tanzania



**Figure 3b:** Sketch map showing locations of study villages (blue circles) in Karatu district with respect to NCA (north) and LMNP (south) in northern Tanzania

## **2.2 Types of data**

Both primary and secondary data were used. Primary data covered interviews and observation on conservation activities in village areas and surrounding protected areas of NCA and LMNP. Village government leaders in Karatu district were the main source of primary data obtained through questionnaire and focused group discussion that targeted their perspectives and attitudes on conservation issues. Secondary data were obtained from other research findings that focused on among other things; the attitudes of local people towards protected areas, coexistence of local people and wildlife and conservation activities outside protected areas. Internet and NTNU search engine ISI web of science provided source on the related topic.

## **2.3 Data Collection**

Collection techniques used for primary data included questionnaire, informal interviews, observation and focused group discussion. Sorting, narrowing down and reading of research findings on related topic made secondary data available for the study. For primary data questionnaire design included both closed and open ended questions. These were grouped into two parts. The first part focused on demographic variables that were obtained from either the village office or respondent. The second part focused on knowledge, awareness, attitudes, wild animal species and corridors and the interactions of conservation stakeholders at the village levels (see Appendix1). For the purpose of this study three main stakeholders were identified; the surrounding protected areas, NGOs and central government. In general respondents were asked to scale the provided statements on the basis of four response categories, 1=Strongly Disagree, 2=Disagree, 3=Agree and 4=Strongly Agree. Open ended questions inquired resources wanted from the surrounding protected areas.

## **2.4 Sample Villages Selection**

The sample study villages were selected by first grouping all villages in Karatu district into two categories on the basis of bordering and not bordering the surrounding protected areas. Then the list in each category was arranged alphabetically and correspondingly assigned numbers in ascending orders. Ten numbers were randomly picked from each category making a total of twenty study villages for the entire data collection activities (See Table 1 for details).

**Table 1:** Village names and location with respect to surrounding protected areas and the number of selected respondents in each village of the twenty study villages

Villages bordering PA	Number of respondents	Villages not bordering PA	Number of respondents
Ayalabe	8	Karatu Mjini	8
Tloma	8	Gekrum Arusha	8
Endamaghan	8	Barazani	8
Kambi ya Faru	5	Mikocheni	7
Rhotia Kati	6	Bassodawish	6
Bashay	6	Khusumay	7
Chemchem	6	Qaru	6
Kansay	7	Endabash	6
Endalah	6	Kilimatambo	5
Changarawe	5	Gekrum Lambo	7
<b>Total</b>	<b>65</b>		<b>68</b>
			<b>133</b>

## 2.5 Sample Respondents Selection

The random selection of respondents considered position and gender of the local leader. Position identification process was done through ward leaders and focus group discussion with key informants in Karatu district. Various positions were identified and for the purpose of this study two groups were formed. Group one (Chairpersons) included the village chairpersons, sub-village chairpersons and village executive officers. They run the day to day activities of the village government. Group two (Members) is made up of members of the village government council. They plan and set policies of the village government and play overall supervisory roles of group one. Village councils are constituted of between 15 and 25 people depending on village area and population sizes. For Karatu district the average was twenty people. Gender proportion considered local government regulations where women must account for at least 25 % of all the members of the council.

In all the selected villages the lists with names of all the local leaders were obtained and sorted into two position groups alphabetically followed by numbers in ascending order. In each selected village eight numbers were randomly picked. The two groups were systematically adjusted to enhance female gender representation. In total, one hundred sixty (N = 160) respondents were

selected. However, one hundred thirty three (N = 133) respondents were reached for interview (Table 1).

## **2.6 Questionnaire Administration**

Using face to face interviews, structured questionnaire were administered to the respondents with questions and statements that covered demographic information of the respondents and a broad range of conservation issues such as wild animals and their corridors, socio-economic activities and protected areas (See Appendix I)

## **2.7 Data Analysis**

Quantitative data were processed and analysed using Statistical Package of Social Science (SPSS) version 20. Descriptive statistic were used to generate mean, percentages which are important for comparison purposes, chi-square tests were used in understanding the significance differences of research results. Non parametric statistics were mostly used as the data were not normally distributed. Significance level was set at  $P < 0.05$ .



### 3 RESULTS

#### 3.1 General characteristics of the respondents

**Table 2:** *The characteristics of socio-demographic components of all the respondents in study areas*

Socio-demographic variable	Category Response	Frequency N=133	Valid Percent %
Gender	Female	32	24
	Male	101	76
Age (years)	29-39	39	29
	40-49	57	43
	50-On	37	28
Marital status	Single	8	06
	Married	125	94
Level of education	Primary	95	71
	Secondary	38	29
Village location	Border PA	65	49
	Not border PA	68	51
Position of leader	Chairperson	30	23
	Member	103	77

Socio-demographic characteristics of the respondents included gender, age in years, marital status, level of education, village location with respect to surrounding protected areas of NCA and LMNP and the position of local leader in the village government. Three of the factors were important in shaping the local leaders perspectives on conservation related issues. They were level of education, village border and position of leader. For the variable level of education many respondents had primary level education. Political party affiliation and the total number of human population in each study village were not presented because they indicated no particular pattern. The populations' numbers in the study villages were recorded as lowest village with 1,456 people and highest village with 19,766 people (see Table 2 for socio-demographic characteristics and other components).

### 3.2 Knowledge and awareness on conservation related issues

**Table 3:** *The impact of socio-demographic variables on knowledge of local leader regarding conservation and development matters*

Socio-demographic variable	Category	n	Question/Statement and category responses		$\chi^2$	df	P
			How do you describe in one word the availability of water supply in your village?				
			Normal	Difficult			
			Total	133			
Village location	Border PA	65	38.5%	61.5%	3.475	1	0.062
	Not border PA	68	23.5%	76.5%			
Position of leader	Chairperson	30	3.3%	96.7%	13.732	1	0.001
	Member	103	38.8%	61.2%			
			Are there wild animals currently in your village areas?				
			Yes	No			
Total			133	60.2%	39.8%		
Village location	Border PA	65	78.5%	21.5%	17.784	1	0.001
	Not border PA	68	42.6%	57.4%			

The issue of water supply was assessed in village areas. Respondents were asked to describe water availability as either normal or difficult. The variable factors that differed significantly are indicated in (Table 3). The linear regression analysis conducted between water availability assessment as dependent variable and village location and position of leader as predictors was statistically significant. The two significant variables explain 12.1% of the variation ( $r^2 = 0.121$ ,  $P < 0.001$ ). The most important variable in predicting variations is position of leader ( $t = -4.039$ ,  $P < 0.001$ ) followed by the village location ( $t = 2.173$ ,  $P = 0.032$ ).

The results for the presence of wild animals suggested that wild animal species exist in village areas. However, the assessment of wild animals varied statistically significantly between village locations. The majority of respondents in villages bordering protected areas indicated presences of wild animals in their village areas (Table 3).

**Table 4:** *The influence of socio-demographic variables on the knowledge and awareness of local leaders about various issues related to conservation*

Question/Statement and category responses									
Socio-demographic variable	Category	n	Shortage of cultivation land is due to increased human population in your village				$\chi^2$	df	P
			Strongly Disagree	Disagree	Agree	Strongly Agree			
		Total	133	1.5%	0.0%	6.8%	91.7%		
Gender	Female	32	6.2%	0.0%	0.0%	93.8%	9.183	2	0.01
	Male	101	0.0%	0.0%	8.9%	91.1%			
Level of education	Primary	95	0.0%	0.0%	3.2%	96.8%	12.348	2	0.002
	Secondary	38	5.3%	0.0%	15.8%	78.9%			
Position of leader	Chairperson	30	3.3%	0.0%	23.3%	73.3%	18.002	2	0.001
	Member	103	1.0%	0.0%	1.9%	97.1%			
			There is relationship between conservation programs and better livelihoods for local communities						
	Total	133	4.5%	28.6%	27.8%	39.1%			
Level of education	Primary	95	5.3%	29.5%	33.7%	31.6%	9.430	3	0.024
	Secondary	38	2.6%	26.3%	13.2%	57.9%			
Position of leader	Chairperson	30	0.0%	0.0%	3.3%	96.7%	54.001	3	0.001
	Member	103	5.8%	36.9%	35.0%	22.3%			
			Soil erosion due to poor agricultural practices in your village cause siltation of Lakes Manyara and Eyasi						
	Total	133	30.8%	4.5%	21.1%	43.6%			
Level of education	Primary	95	23.2%	4.2%	25.3%	47.4%	10.288	3	0.02
	Secondary	38	50.0%	5.3%	10.5%	34.2%			
Position of leader	Chairperson	30	100.0%	0.0%	0.0%	0.0%	86.924	3	0.001
	Member	103	10.7%	5.8%	27.2%	56.3%			
			The main source of water used in your village is located in the nearby protected area						
	Total	133	3.8%	3.8%	3.8%	88.7%			
Village location	Border PA	65	1.5%	0.0%	0.0%	98.5%	12.586	3	0.006
	Not border PA	68	5.9%	7.4%	7.4%	79.4%			

Four issues presented to respondents were shortages of cultivation lands, relationship between conservation and livelihoods, soil erosion and water source location. Statistically significantly

results are shown in Table 4. The linear regression analysis of the four issues as dependent variables and gender, level of education, position of leader and village location as independent predictors gave the following results; For shortages of cultivation lands, the level of education and position of leader were statistically significant explaining 10.3% of the variation ( $r^2 = 0.103$ ,  $P < 0.001$ ). The most important variable in predicting the variation was level of education ( $t = -2.558$ ,  $P = 0.012$ ) followed by the position of leader ( $t = 2.183$ ,  $P = 0.031$ ). Gender was not statistically significant ( $t = 0.588$ ,  $P = 0.557$ ).

For the relationship between conservation and livelihoods, only the position of leader was a significant predictor and explained 29.7 % of the variation ( $r^2 = 0.297$ ,  $P < 0.001$ ,  $t = -7.245$ ,  $P < 0.001$ ). The level of education ( $t = -0.243$ ,  $P = 0.808$ ) was not statistically significant.

For soil erosion, position of leader explained 54.5% of the variations ( $r^2 = 0.545$ ,  $P < 0.001$ ,  $t = 11.977$ ,  $P < 0.001$ ) while level of education was not statistically significant ( $t = 0.206$ ,  $P = 0.837$ ). For the location of water sources, the village location differed significantly ( $r^2 = 0.058$ ,  $P = 0.003$ ,  $t = -3.011$ ,  $P = 0.003$ ).

### **3.3 The attitudes of local leaders towards conservation in village areas**

In determining attitudes towards conservation in village lands three key statements were used in obtaining the views of respondents in the study areas. These are charcoal production, village conservation by-laws and village environmental conservation committees. The results with statistical significance are displayed in Table 5.

**Table 5:** *The impact of socio-demographic variables on the attitudes of local leaders towards conservation activities in village areas*

Question/Statement and category responses									
Socio-demographic variable	Category	n	Charcoal making activities are important for village development				$\chi^2$	df	P
			Strongly Disagree	Disagree	Agree	Strongly Agree			
	Total	133	81.2%	6.0%	3.8%	9.0%			
Age (years)	29-39	39	92.3%	7.7%	0.0%	0.0%	16.423	6	0.012
	40-49	57	78.9%	8.8%	5.3%	7.0%			
	50-On	37	73.0%	0.0%	5.4%	21.6%			
Village location	Border PA	65	84.6%	6.2%	7.7%	1.5%	13.309	3	0.004
	Not border PA	68	77.9%	5.9%	0.0%	16.2%			
Position of leader	Chairperson	30	50.0%	6.7%	13.3%	30.0%	33.010	3	0.001
	Member	103	90.3%	5.8%	1.0%	2.9%			
			Village conservation bylaws have inadequate penalties for offenders						
	Total	133	17.3%	36.8%	16.5%	29.3%			
Level of education	Primary	95	17.9%	45.3%	14.7%	22.1%	13.032	3	0.005
	Secondary	38	15.8%	15.8%	21.1%	47.4%			
Position of leader	Chairperson	30	20.0%	0.0%	0.0%	80.0%	54.770	3	0.001
	Member	103	16.5%	47.6%	21.4%	14.6%			
			Village environmental conservation committee performance is good						
	Total	133	39.1%	42.9%	7.5%	10.5%			
Village location	Border PA	65	47.7%	33.8%	10.8%	7.7%	7.567	3	0.056
	Not border PA	68	30.9%	51.5%	4.4%	13.2%			
Position of leader	Chairperson	30	30.0%	26.7%	20.0%	23.3%	17.252	3	0.001
	Member	103	41.7%	47.6%	3.9%	6.8%			

The linear regression analyses of three activities as dependent variables with age, level of education, village location and position of leader were all statistically significant. For charcoal activities, position of leader, age of respondent and village location were all statistically significant explaining 28.4% of existing variations ( $r^2 = 0.284$ ,  $P < 0.001$ ). The most important variable in explaining the variation was position of leader ( $t = -6.230$ ,  $P < 0.001$ ), the second

most important was age of respondent ( $t = 2.617$ ,  $P = 0.010$ ) and the last one is village location ( $t = 1.977$ ,  $P = 0.050$ ).

For village conservation bylaws, position of leader was significant ( $t = -4.360$ ,  $P < 0.001$ ) while level of education was not ( $t = 1.449$ ,  $P = 0.150$ ). 16.8% of variation was explained by this relationship ( $r^2 = 0.168$ ,  $P < 0.001$ ). For village environmental committee, again the position of leader was the most significant ( $t = -3.323$ ,  $P < 0.001$ ) while the village location was not significant ( $t = 1.534$ ,  $P = 0.128$ ). The variation explained was 7.70% ( $r^2 = 0.077$ ,  $P = 0.002$ ).

### 3.4 The attitudes of local leaders towards the roles of surrounding protected areas

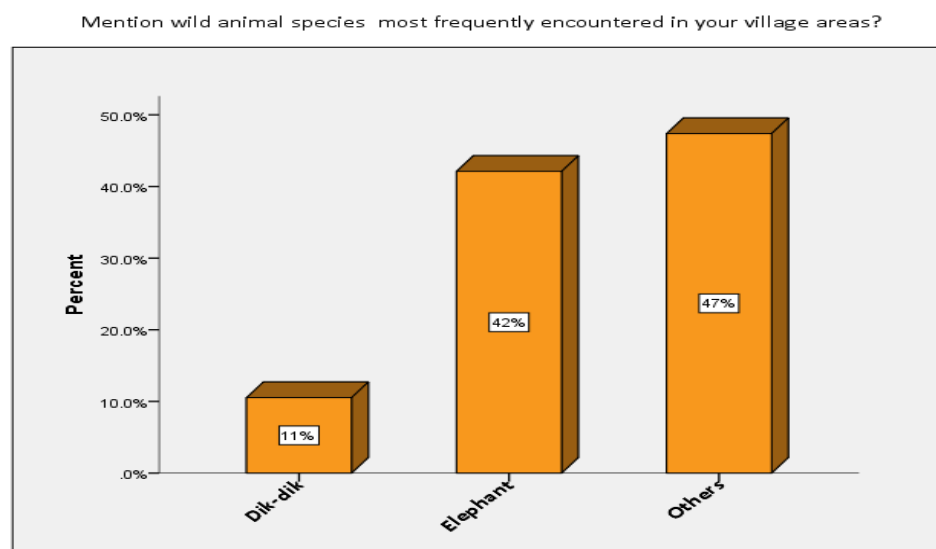
**Table 6:** *The influence of socio-demographic variables on local leaders' attitudes towards the roles and performance of surrounding protected areas in contributing to village development projects*

Socio-demographic variable	Question/Statement and category responses								
	Category	n	Protected areas considerably contributed to the development of your village				$\chi^2$	df	P
			Strongly Disagree	Disagree	Agree	Strongly Agree			
			Total respondents	133	47.4%	29.3%			
Village location	Border PA	65	56.9%	24.6%	16.9%	1.5%	10.678	3	0.014
	Not border PA	68	38.2%	33.8%	13.2%	14.7%			
Position of leader	Chairperson	30	20.0%	23.3%	50.0%	6.7%	38.209	3	0.001
	Member	103	55.3%	31.1%	4.9%	8.7%			
			Protected areas are not doing enough to support social services in villages						
	Total	133	2.3%	7.5%	6.8%	83.5%			
Level of education	Primary	95	1.1%	9.5%	4.2%	85.3%	7.164	3	0.067
	Secondary	38	5.3%	2.6%	13.2%	78.9%			
Village location	Border PA	65	0.0%	7.7%	1.5%	90.8%	8.823	3	0.032
	Not border PA	68	4.4%	7.4%	11.8%	76.5%			
Position of leader	Chairperson	30	3.3%	10.0%	16.7%	70.0%	6.968	3	0.073
	Member	103	1.9%	6.8%	3.9%	87.4%			

Two issues were used to assess the attitudes of local leaders towards protected areas. These are “the roles of protected areas contributed to village developments” and the “performance in supporting social services projects at the village level”. The linear regression of the roles and performance as dependent variables and level of education, position of leader and village location as independent predictors was conducted as based on Table 6. For the case of roles of protected areas to village developments both village location and position of leader were statistically significant in explaining the variation by 15% ( $r^2 = 0.150$ ,  $P < 0.001$ ). Of the two predictors, position of leader was most important ( $t = -4.256$ ,  $P < 0.001$ ) while the village location also contributed significantly ( $t = 2.872$ ,  $P = 0.005$ ). In the case of performance of protected areas supports to village social service projects only the village location was statistically significant ( $t = -1.975$ ,  $P < 0.001$ ) explaining 2.6% of the variation, though this is not statistically significant ( $r^2 = 0.026$ ,  $P = 0.093$ ). Both level of education and position of leader were not significant ( $t = -0.047$ ,  $P = 0.963$  and  $t = 1.603$ ,  $P = 0.111$ ) respectively.

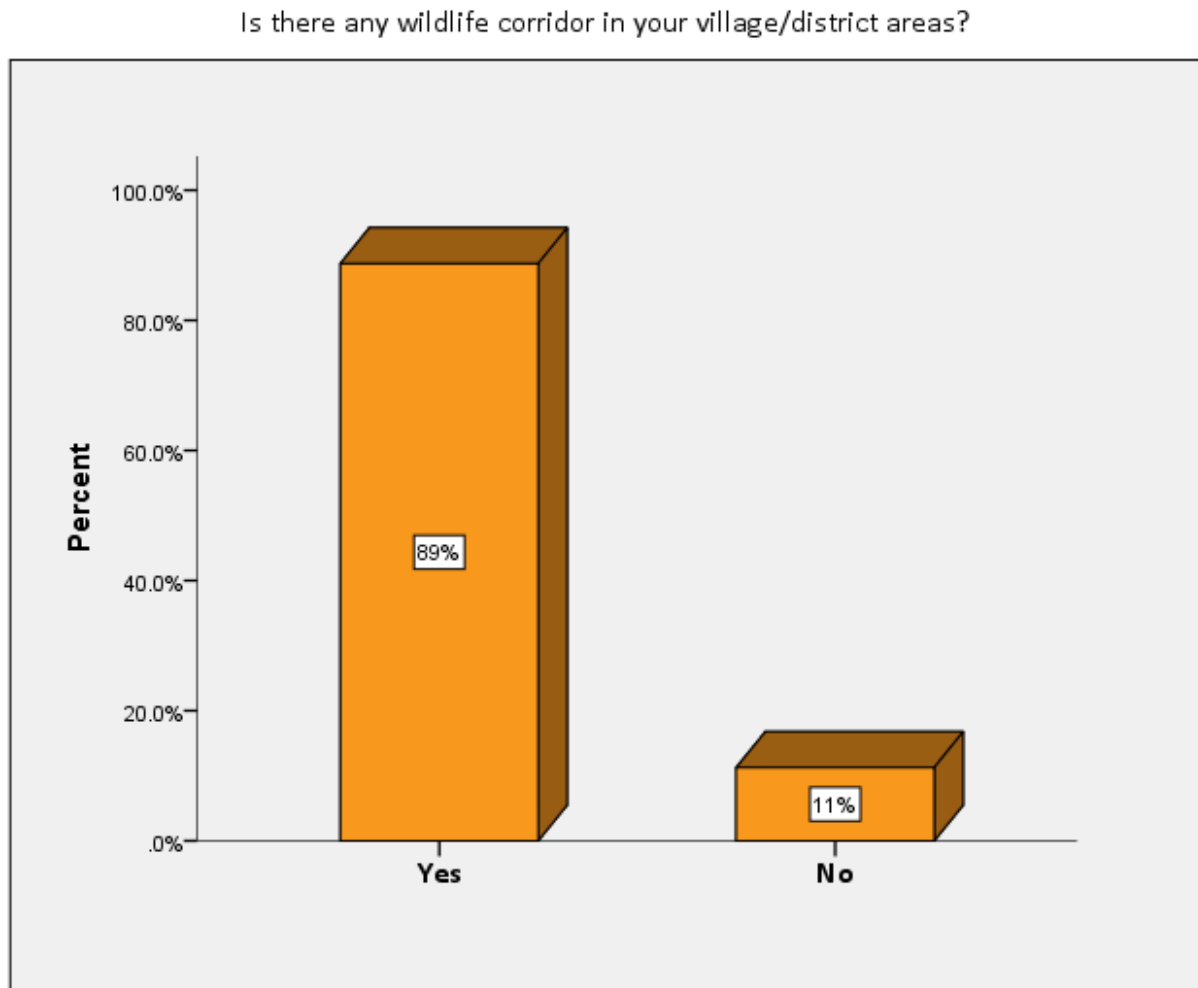
### 3.5 Wild animal species and their corridors in village areas

Many wild animal species were identified as present in village areas. The African elephant (*Loxodonta africana*) happen to be the most frequently encountered species (Figure 5).



**Figure 4:** The most common species identified by local leaders in the villages in Karatu district

In all the study villages the respondents managed to identify and named a wildlife corridor in their village areas (Figure 6 and Table 7).



**Figure 5:** *The responses of local leaders (yes, no) in identifying wild animal corridors in village areas in Karatu district*

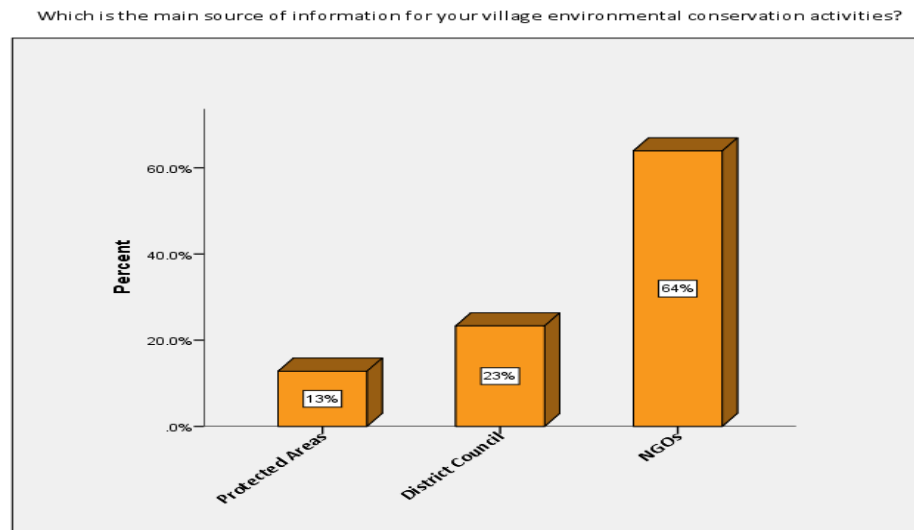


**Table 7:** *Wildlife corridor names in the study villages in Karatu district*

Corridor Name	Village Name(s)
Dari	Kansay
Durgeda	Khusumay, Qaru, Endabash
Endoro	Karatu Mjini, Gekrum Arusha
Ghaloji	Mikocheni, Endamaghan
Manusay	Chemchem, Endalah
Marera	Ayalabe, Rhotia Kati
Mlima Nyoka	Bassodawish, Gekrum Lambo
Mtowatembo	Kilimatembo
Murus	Barazani, Changarawe
Paratima	Tloma
Pario	Kambi ya Faru
Shangrila	Bashay

### 3.6 Conservation stakeholders at the village levels

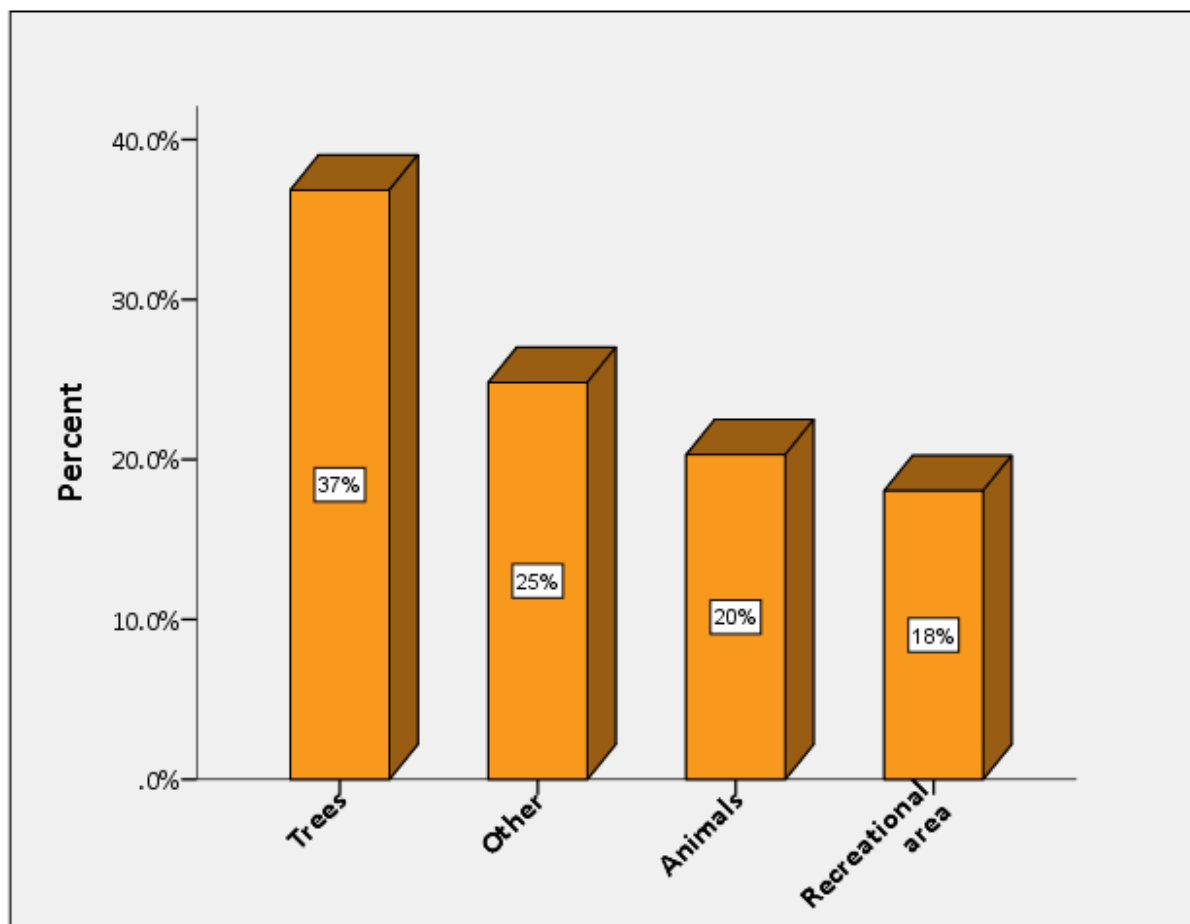
In assessing the interactions between villages and conservation actors, the following stakeholders were considered; protected areas, district council, NGOs and central government. The findings indicated more presence and interactions of NGOs at the village levels (Figure 7).



**Figure 6:** *The responses of local leaders to sources of information for conservation activities in village areas*

The surrounding protected areas were least mentioned which indicated least interactions with villages in Karatu district. This is to say they are less involved in facilitation of conservation issues in village areas despite the huge potential threats that local people from these villages could bring in terms of high demands for the access to resources in these protected areas. The result also indicated trees as the most currently needed resource from the surrounding protected areas. Wild animals were indicated second as the most needed resource from the protected areas (Figure 8).

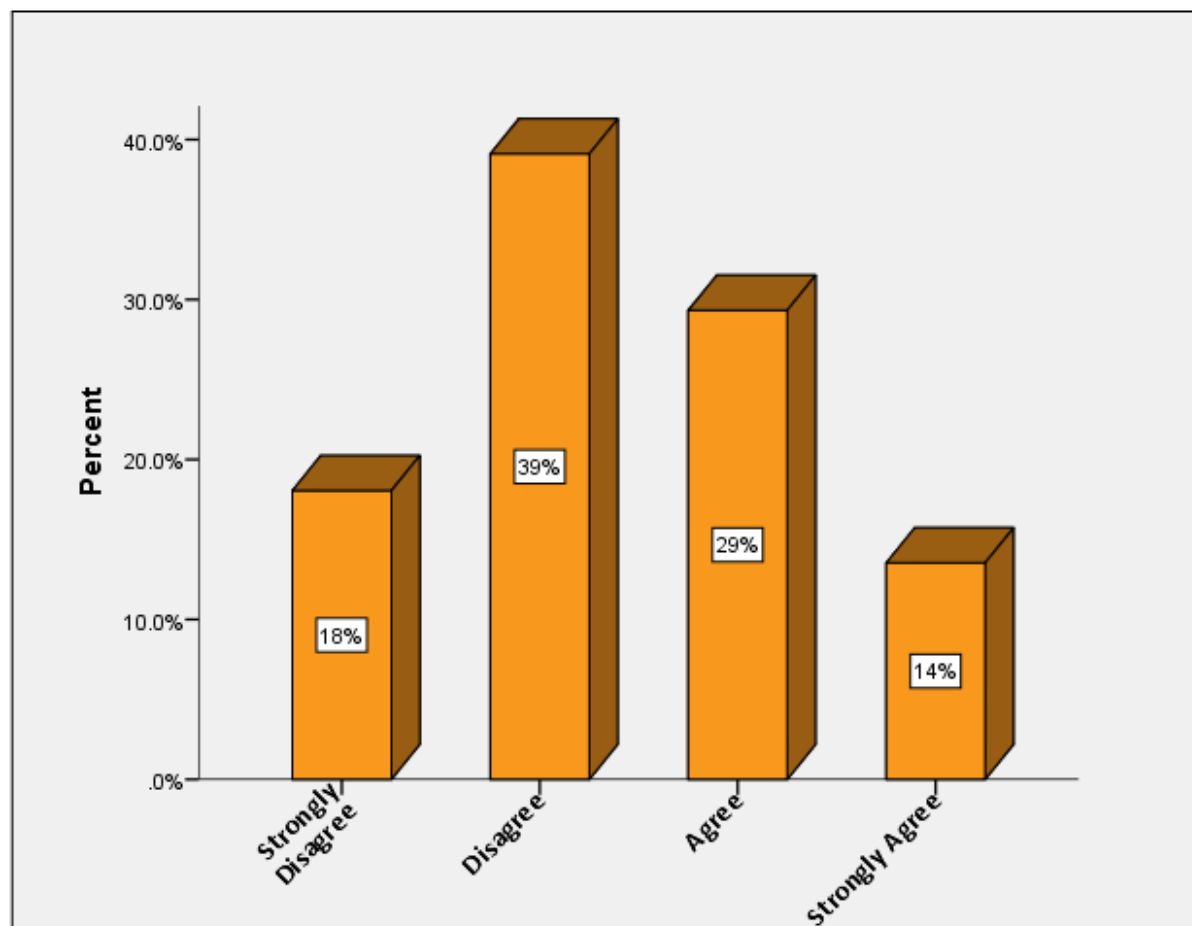
Mention one thing found in protected areas that you wish to be available in your village



**Figure 7:** *The responses of local leaders to the most needed resource from the protected areas surrounding Karatu district*

Regarding the support of central government for conservation activities in village areas, the views of local leaders were roughly divided between the agreed and not agreed. However, many indicated that the central government provides support for conservation activities in village areas (Figure 9).

The central government does not support for conservation activities in your village



**Figure 8:** *The responses of local leaders rating central government support to villages' conservation activities in Karatu district*

## **4 DISCUSSION**

### **4.1 General characteristics of the respondents**

Village government councils in Tanzania are made up of about twenty people elected by the village general assembly. The issue of gender balance is addressed through local government regulations which demand that women must constitute at least 25% of all the members of the village council. In all study villages the council members were largely constituted of male members. Given the challenges of female representation in village governments, this paper managed to obtain female respondents and they constituted 24% of all the respondents. The choice of local community leaders as respondents focused on their functions of bridging and linking the grassroots communities to the external conservation and development actors. In conducting their functions they tend to influence the decision making processes at the local levels. Basically their influences cut across many areas which include conservation activities in village lands and adjacent protected areas. From the findings three socio-demographic variables (level of education, village location and position of leader) were statistically significant in shaping the views of local leaders towards conservation issues. Both level of education and village location are known to influence conservation attitudes of local people. This is more obvious for village location in terms of whether close and bordering or far and not bordering protected areas. Local communities close and bordering protected areas are more affected by the community conservation programs and conservation-induced costs than those located farther away. Community conservation programs facilitate interactions between local people and neighboring protected areas. However, the level of interactions varies with location of local people. Those located closer and in animal corridors tend to have more interactions for various reasons including removing mistrusts and enhancing good relationships between the people and the protected areas. In a related study in Tanzania, the frequency of interactions between the management of protected areas and the local people were found to have significantly affected the conservational attitudes of local people towards the protected areas. The more frequent contacts enhance positive attitudes which also could be affected by the management strategies such as use of force and intimidation to local people (Newmark et al. 1993).

## 4.2 Knowledge and awareness on conservation related issues

Five factors related to conservation issues were used to evaluate the knowledge and awareness. These are water availability, presence of wild animals in village areas, shortage of cultivation land, local community livelihoods and soil erosion. The responses on the description of water availability showed that the majority (Table 3) of the leaders were aware of the current status of water availability in Karatu district areas. They described the availability as difficult. For leaders from villages bordering protected areas they were more likely to indicate the availability as normal. The difference could be explained by the short distances to water sources located in the nearby protected area. The other reason could be the impact of community conservation programs by the adjacent protected areas that support social service projects which include water supply to local communities (Newmark and Hough 2000). The descriptions of leaders reflected varied water availability among the villages with different locations. This corresponds to the location of water sources for the villages where majority of respondents indicated to be located in the surrounding protected areas. The closer the village to protected area the more likely the indication that the water source is located in the adjacent protected area (Table 4). The position of leader significantly influenced the response patterns. The chairperson group was more likely to indicate difficult availability than the member group. This could be connected to their bigger responsibilities and roles which allow them more participation and information. Generally, the views were that protected areas are currently the main source of water for many villages in Karatu district. The availability status was described as becoming insufficient due to climate variability characterized with long-term droughts, degradation of the forests and increasing number of human population (Malley et al. 2009).

Majority of leaders pointed out the presence of wild animals in the village areas and the crosstab with village location as predictor was significantly important. Leaders from villages bordering protected area were more likely to admit presence of wild animals in their village areas than those from villages not bordering protected areas (Table 3). This was expected considering the nature of human-wildlife interactions which use to happen between local people and the surrounding wildlife species. The movements of wildlife into human settlements might indicate possible declining resources in the nearby wildlife areas. Some wild animal species such as elephant tend to have wide ranging habitats and migrate between these habitats. The increased socio-economic activities of local people cause the encroachments of wildlife areas. If these

trends are allowed to continue then more wildlife species would continue to be seen in villages areas and this in turn would heighten the human-wildlife conflicts (Madden 2004). The shortage of cultivation lands were highly attributed to increased human population in the village areas by the majority of local leaders. The variables level of education and position of leader were significant predictors (Table 4). The leaders with higher level of education and chairperson positions were less likely to attribute shortages of cultivation lands to increased human population in village lands. This was expected given the other reasons that could cause shortages of land resources. Higher level of education could be associated to be of more informed about the other causes. Based on their functions, the leaders in the chairperson category happen to be more involved in the course of addressing development challenges in their respective villages. In this way, they might have encountered related information on other possible reasons for shortages. These could include intensification and inadequate agricultural practices which lead to underutilization of the existing cultivated lands depicted in persistent food insecurity (Pretty et al. 2003). Local leaders were aware of the challenges of rapidly growing human population in relation to land resource scarcity and conservation issues. Their views concurred with the facts that the availability of arable land resource competes with number of human population. Also, some studies found that during the 20<sup>th</sup> century, the cropland base diminished greatly (from ~ 0.75ha/person in 1900 to ~0.35ha/person in 1990) due to increase in human population (Ramankutty et al. 2002). The villages in Karatu district being part of the larger country are experiencing the pressure of rapidly increasing human population in Tanzania. According to national bureau of statistics the trend call attention for the need to address population issue in sustainable development programs (URT 2012). Local leaders perceived conservation programs improve the livelihoods of local communities. The chairperson category was more likely to suggest that conservation programs improve livelihoods than the member category (Table 4). Again, given their functions these leaders play the frontlines roles in all development initiatives in the villages. This provided more opportunities for them to participate in various conservation programs. Through participation and involvement they were likely to be more informed on the connections between conservation programs and better community livelihoods. (Infield and Namara 2001, Mariki 2013). Lack of significant relationship was not expected between the villages with different locations. This is because NCA and TANAPA community conservation service policies with local community development projects focused on the neighboring villages

that share direct boundary with them. Consequently, leaders from villages bordering protected areas had more interactions in terms of contacts and participations in these community conservation projects which received substantial amount of money from the respective protected area (TANAPA 2012). Soil erosion from the villages causes siltation of Lakes Manyara and Eyasi. Chairperson category totally opposed the statement compared to member category which supported that soil erosion generated from their areas cause siltation and possible disappearance of the surrounding lakes. No obvious reason that could explain this emerged pattern contrary to the existing situations. Lake Manyara in particular had been continuously subjected to massive degradation as a result of socio-economic activities in the surrounding areas (Rohde and Hilhorst 2001, AWF 2003, Yanda and Madulu 2005). Soil materials deposited into the lake basin make it shallow and susceptible to high evaporation. The volume of water gets reduced and if the current trend is not reversed there are possibilities of converting the lake into a seasonal one and completely disappearing in the long term. Though there was no evidence gathered that shows local leaders were involved in soil erosion initiatives by adjacent protected areas but there was evidence that conservation agriculture projects were being conducted in Karatu district (Owenya et al. 2011). Among other issues, the approach critically addresses the problems of soil erosion. Concisely, the leaders were expected to be highly aware on challenges associated with the problems of soil erosion. However, they showed basic understandings and most of their descriptions were reflected during focused group discussion with key informants working in different departments at the Karatu district council.

### **4.3 The attitudes of local leaders towards conservation in village areas**

These were examined using three activities connected to environmental conservation goals in village areas. The activities were charcoal making, village environmental conservation bylaws and village environmental conservation committees. The attitudes of local leaders towards conservation activities in village areas were positive, with 87% of respondents indicating that charcoal making activities were destructive and the village environmental conservation bylaws and committees were not adequately addressing the current situation of rapidly deteriorating resources in the village lands. The results indicated that four independent variables, age, level of education, village location and position of leader were important predictors (Table 5). For the



charcoal issues the variation was explained by three variables of age, village location and position of leader. The activities were viewed less negatively by the older leaders than the younger ones. This could be linked to the level of education of the respondents. There were many younger leaders with higher level of education compared to the older group. As indicated previously higher level of education entails more understanding of the importance of conservation. Leaders from villages not bordering protected areas were less negative to charcoal activities than those from villages bordering protected areas. There could be two possible explanations for this variation. One, the activities are carried out in villages not bordering protected areas. The leaders from these villages were beneficiaries of the activities either as individuals or as institution of the village government. Two, impacts of community conservation programs on conservational attitudes of local people. Apart from benefits sharing, these programs facilitate training and participations of local leaders in conservation activities involving the adjacent villages that share direct boundaries with protected areas. These interactions between local people and protected area management not only improve the attitudes towards protected areas but also towards conservation issues generally. With the improved conservational attitudes they were more negative towards the charcoal activities which in most cases were conducted using unsustainable methods. This finding supports H1 that leaders from villages bordering protected areas will be more positive towards conservation in village areas. The disparity supports other findings which indicated enhanced conservational attitudes resulting from the interactions between local people and protected area managements (Newmark et al. 1993, Mehta and Heinen 2001, Holmes 2003, Kideghesho et al. 2007). In the case of village environmental conservation bylaws and committees, the level of education, village location and position of leader tested significance difference (Table 5). However, in a linear regression analysis level of education and village location disappeared. With position of leader as important predictor, the chairperson group was more likely to rate both bylaws and committees as more inefficient than the member group. The pattern could be associated with bigger responsibilities and roles of the chairperson group in running the village governments but also to higher level of education where the majority had secondary level of education. Higher level of education involves more understanding of the linkages of conservation issues (McClanahan et al. 2005, Kideghesho et al. 2007, Karanth et al. 2008). The desires of local leaders were to see more actions towards addressing the current challenges facing resources management in the village

areas. For instance, the penalty for defaulting one bylaw was set at TZS 5,000 (about US\$ 3) which according to the village leaders was far below the value of trees that were illegally harvested. In the case of committees underperformance the reasons indicated were financial constraints and some of the members collude with the defaulters through corruption practices. These suggestions explain the dissatisfaction of local leaders on the ongoing situations. Consequently, they need to promote sustainable practices that enhance the health of the environment in their village areas.

#### **4.4 The attitudes of local leaders towards surrounding protected areas**

Generally local leaders held negative attitudes towards surrounding protected areas in terms of the two issues used to assess them. These were roles played in the development of villages and performances in supporting social service projects at the village governments. Important predictors were level of education, village location and position of leader (Table 6). During linear regression analysis the effect of level of education did not appear. Those from villages bordering protected areas were more negative towards the protected areas than the other group from villages located not close to protected areas. This reflects H2 that local leaders from villages bordering protected areas will be more negative towards them given the higher conservation-induced costs experienced in these areas. Historically, the costs experienced tend to increase with decreasing distance from the protected areas. For the variable position of leader the category of chairperson group was less negative than the member group. There can be two possible explanations for the divergence in provided responses. One is the possible influence of level of education where majority in this group hold higher level of education. Two is based on their roles where they have more direct involvements and participations than the other group in community conservation initiatives. Apart from the impact of participations on their attitudes, benefits received could be another reason for more positivity. They form the first contact group for any community conservation programs in village areas. In the process of involvements and participations they are likely to have received more benefits from extra assignments resulting from the conservation programs activities. Consequently, the information and benefits gained through the involvements explain their attitudes towards protected areas. The finding corroborates similar study conducted in western Serengeti where wildlife-related benefits or

rather conservation-related benefits had positive impact on local people's attitudes towards protected areas (Kideghesho et al. 2007).

#### **4.5 Wild animal species and their corridors in village areas**

Local leaders identified and named many wildlife species and their corridors in village areas. Majority of respondents mentioned elephants as the most frequently encountered wildlife species followed by dik-dik (*Madoqua*) in the village areas (Figure 5). The elephant result was expected in consideration to their need for wide ranging habitats with sufficient resources. The location of the study villages between two protected areas of NCA and LMNP was another determinant factor. Adding to this factor is their bigger body size which make easy to be seen and identified. This corroborate other studies findings that predicted distribution of elephants during dry and wet seasons to be associated with presence and distance of protected area (Mwalyosi 1991, Galanti et al. 2006, Caro et al. 2009, Pittiglio et al. 2012). The movements of elephants outside the protected areas are extensive. This could partly explain why they been easily poached for many years. The trend of being poached is even frightening that they could go extinct in few years if the present rate of poaching is not properly addressed (UNEP et al. 2013). On the other hand the result that the dik-dik was the most second frequently encountered species was a bit surprising in regard to their behavior that tend to be vigilance and avoidance (Lea et al. 2008). There is no obvious reason why this was the case but it is reasonable to suggest that they were being hunted by humans for food-protein purposes. As a result of these interactions they were frequently seen than the other species excluding elephant. The presence of wildlife corridors in village areas was assessed. Majority of local leaders were not only in agreement that the corridors are present but also identified and named the existing and remnants of them in almost all the study villages (Table 7). These corridors connect either village to village or village to protected area and apart from the fact that they provide habitats for few wildlife species they are also provide grazing areas for livestock. They were of different size areas and overexploited probably due to tragedy of the commons. Expanding cultivation lands were indicated to be the most priority of many local leaders. According to them the expansion would address the issue of food insecurity. These views suggest that the wildlife corridors in the form of village open lands would not continue to exist indefinitely. This can be reflected on the growing numbers of human

population and the continuing degradation of the current cultivated lands due to inadequate agricultural practices. One of the important wildlife corridors in Karatu district not located in the study village is Kitete-Selela corridor. The corridor connects Serengeti Tarangire ecosystems through NCA and LMNP. If all the open village lands were to be converted to cultivated lands then this would include Kitete-Selela corridor which other studies had already categorized as in critical condition (Caro et al. 2009).

#### **4.6 Conservation stakeholders at the village levels**

Two main issues were addressed regarding conservation activities in village areas. One was the source of information for environmental conservation and two the financial support either directly or indirectly aimed to promote conservation activities in village areas. With the two issues three main stakeholders were used to assess the interactions at the village levels. These were NGOs, central government and the surrounding protected areas. Majority of respondents mentioned NGOs as the main source of information for environmental conservation activities in their village areas followed by the district council and protected areas (Figure 7). More of the respondents in the category of chairperson had higher frequency of indicating NGOs than the member category. This could be linked to the nature of their work of running village affairs on day to day basis. In this way they cannot be bypassed during any visit to the villages by any particular stakeholder. Accordingly, their expressed views closely reflect the records in the village visitors' book. On the other hand the views of local leaders were divided on central government as participating in supporting conservation efforts in village areas (Figure 9). The support for this claim was stronger to leaders in the chairperson category than the member category. There was no evidence of what central government supported to have this pattern of responses. The interaction between the local communities and central government was expected from the current wildlife conservation act. Among other things, central government is mandated for all wild animals outside protected areas and to provide technical assistance to local governments in conservation and utilization of resources. The law is categorical that the ownership of wildlife resources are vested in central government (URT 2009). The responses of the leaders could be linked to political networks that run from the highest to the lowest level of political institutions. Some of these institutions in developing countries tend to facilitate political

corruptions. This is explained by the facts that governance has remained a big challenge to conservation projects particularly when managing natural resources with high financial value (Smith et al. 2003). The interactions with protected areas were examined using support to local community development projects. The most supported projects were educational oriented and water projects were the least though its availability was considered difficult by the majority of local leaders (Table 3). The supports of protected areas to adjacent local communities aim to secure their support for conservation activities. From the discussion with leaders the most pressing current problem was water supply and firewood. Therefore, proper identification of the priority areas is necessary for these support projects to achieve positive outcomes. This finding reflects other studies which have indicated little interactions between the protected areas and adjacent local communities despite the support provided for local initiative projects (Kaltenborn et al. 2008). Local leaders were asked to suggest the best way to benefit their villages from the surrounding protected areas. The issue of support for community development projects was on top of their priorities. However, of the interest was the suggestion that part of the land belonging to protected areas be surrendered to villages. Though their proportion was insignificant but in a long term this proportion is likely to grow if the concerns of the local people are not adequately addressed. The other notable finding was based on the current most wanted resource from the protected areas on the grounds that the resource was either scarce or absent in village areas. The most needed resource was trees for various uses (Figure 8). This corresponds to the extent of deforestation in the village areas and the indicated current challenge of firewood. The needs for trees were more intense to leaders from the villages bordering protected areas. According to study area, villages close to protected areas are under intensive cultivation due to high soil fertility and amount of precipitation. As a result, most of the lands are likely to have been completely cleared already compared to the marginal lands.

#### **4.7 Implication for Biodiversity Conservation**

The primary objective of protected area is protection of biodiversity and associated natural and cultural resources. The areas outside protected areas not only complement the roles of protected areas but also contain considerable biodiversity that worth conservation efforts (Primack 2010). Considering the impact of governance on biodiversity conservation (Smith et al. 2003), the roles of local leaders at the village governments stand to likely influence any conservation initiatives in their respective village areas. Strategies in designing their participation need to consider their

roles and position in community organizations. Those with higher position in authority are less positive towards conservation in village lands. Another factor that is crucial to bring on board is village location where leaders close to protected areas are more positive towards conservation of village areas. Given the indicated positive attitudes of local leaders towards conservation in village areas, conservation initiatives outside protected areas would likely receive the support of local leaders. Currently, one of the big threats facing existence of protected areas is huge demands of local communities that depend on natural resources for their daily survival. Among other factors the access to resources in protected areas has been central to conflicts between the local communities and the protected areas. Consequently, many local communities tend to hold negative attitudes towards protected areas (Newmark et al. 1994, Fiallo and Jacobson 1995, Badola 1998, Kideghesho et al. 2007, Bennett and Dearden 2014). The present study identified the resources that were scarce or not existing in village areas but highly needed by the local people. These include trees and land for cultivation. The increasing population and unsustainable practices of socio-economic activities in village areas hugely contribute to depletion of resources. Knowing the resources needed by the local people and exploring the possibilities of developing these resources in their areas would be vital for the surrounding protected areas of NCA and LMNP. In this case the study villages were located in rural areas with no electricity power. The major source of energy used is firewood which is now scarce. One of the possible projects that could address several goals is agroforestry. Establishing trees in these human dominated areas would relieve protected areas of the pressure resulting from the demand of local people for the resources. The conflicts arising from access to resources also would be tackled. Agroforestry projects have potential to contribute to biodiversity conservation in areas outside protected areas (Bhagwat et al. 2008). The conditions of unprotected areas significantly affect biodiversity within protected areas. If areas outside protected areas are degraded biodiversity within the protected areas decline (Danby and Slocombe 2005). Therefore, the initiative would not only improve biodiversity outside protected areas but also within the protected areas and continue their existence.

In Tanzania, many ecosystems health are in downward trends. There are various factors that have been attributed to this situation. But the one that receive less attention and finances, both nationally and internationally is dysfunctional institutions. The fact that conflicts exist between local people and the surrounding protected areas and that the local people hold negative

perceptions on them is a very straight and simple indicator that present institutions do not functions. With exception to wildlife induced damages most of the causes of conflicts are linked to access to basic resources such as pastures, bushmeat, cultivation lands and firewood. In a country that is faced with food insecurity challenges and the rapidly growing human population to expect a continued existence of protected areas would be inconsequential thinking. These challenges are not reflected on the abundance of potential resources that could be used to eradicate persistent famine. The likely reasons for the failures are connected to the institutions that are not working on issues such as political corruptions. For instance, in Tanzania the institutions that are involved in natural resources management include Ministry of Natural Resources and Tourism, TANAPA and Ngorongoro Conservation Area Authority. The importance of revenues generated from natural resources-based tourism goes without saying. Despite these revenues they have not been able to secure the management of just one wildlife species, the elephant, which are being poached that if no measures are introduced their population might disappear in next few years. These institutions are dysfunctional and as currently constituted cannot safeguard natural resources in the country. Therefore, they need radical reforms that integrate all levels including local people and their authorities. In this way, they will be able to tackle the problems of biodiversity conservation both inside and outside protected areas. Last but not least, further research is recommended on how conservation goals could be affected by the position, roles and attitudes of government leaders in different levels. This considers the fact that most of the decisions regarding conservation programs in the country results from government leaders in various capacities.

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## Appendix I

### Questionnaire survey for 20 villages in Karatu district, Tanzania: June-August 2013

#### I. Socio-demographic characteristic

##### a. The village office

1. Questionnaire No.....
2. Date .....
3. Village name.....
4. GPS reading: S.....E.....
5. Village population.....
6. Village boundary: Border PA ☐ Not border PA ☐
7. Village main economic activities.....

##### b. The Respondent

1. Name of Respondent.....
2. Position of leader: Chairperson ☐ Member ☐
3. Gender: Female ☐ Male ☐
4. Age of respondent: 20-29 ☐ 30-39 ☐ 40-49 ☐ 50-on ☐
5. Level of education: Primary ☐ Secondary ☐
6. Marital status: Single ☐ Married ☐

#### II. Knowledge and awareness on conservation related issues

1. How do you describe in one word water availability in your village?  
Normal ☐ Difficult ☐
2. Are there wild animals currently found in your village/district?  
Yes ☐ No ☐
3. Shortage of cultivation land is due to increase in human population  
1 ☐ 2 ☐ 3 ☐ 4 ☐
4. There is relationship between conservation and better livelihoods  
1 ☐ 2 ☐ 3 ☐ 4 ☐
5. Soil erosion from your village is cause siltation of Lakes Manyara and Eyasi  
1 ☐ 2 ☐ 3 ☐ 4 ☐

6. The water source for your village is located in the nearby protected area

1 ☐ 2 ☐ 3 ☐ 4 ☐

### **III. Attitudes towards of conservation village areas**

1. Charcoal making activities are important for your village development

1 ☐ 2 ☐ 3 ☐ 4 ☐

2. Village conservation bylaws have inadequate penalties for offenders

1 ☐ 2 ☐ 3 ☐ 4 ☐

3. The performance village environmental conservation committee is satisfactory

1 ☐ 2 ☐ 3 ☐ 4 ☐

### **IV. Attitudes towards the roles of surrounding protected areas**

1. Protected areas considerably contributed to the development of your village

1 ☐ 2 ☐ 3 ☐ 4 ☐

2. Protected areas are not doing enough to support social services in village

1 ☐ 2 ☐ 3 ☐ 4 ☐

### **V. Wild animal species and their corridors in village areas**

1. Mention wildlife species most frequently encountered in village areas.....

2. Is there any wildlife corridor in your village/district areas?

Yes ☐ No ☐

### **VI. Conservation stakeholders at the village levels**

1. Which is the main source of information for conservation activities in your areas?

PA ☐ District council ☐ Central government ☐ NGOs ☐

2. Mention one thing found in PA that you wish to be available in your village.....

3. The central government does not provide support for conservation in your village

1 ☐ 2 ☐ 3 ☐ 4 ☐

**Thank you for your time and participating to fill in this questionnaire**