

**THE ROLE OF LOCAL INSTITUTIONS IN THE MANAGEMENT OF AGRO-  
PASTORAL AND PASTORAL SYSTEMS: A CASE STUDY OF MKATA PLAINS,  
KILOSA DISTRICT AND NGORONGORO CONSERVATION AREA,  
NGORONGORO DISTRICT, TANZANIA**

**BY**

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**A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE  
DEGREE OF DOCTOR OF PHILOSOPHY OF THE SOKOINE UNIVERSITY OF  
AGRICULTURE**

**2007**

## ABSTRACT

The pastoral areas of Tanzania have been experiencing increasing land-use pressure and out-migration of pastoralists to other areas. In some areas the immigrant pastoralists have been involved in resource-use conflicts; raising concern at various levels of governance. However, the underlying causes of resource-use conflicts are yet to be established. This study was conducted in Mkata plains and Ngorongoro Conservation Area in order to determine the role of local institutions in the management of common grazing lands. Specifically the study aimed at determining trends in land-use and resource tenure; establish strength of local institutions; determine factors determining resource-use conflicts in the study areas. The study indicated that the pastoral system in the study areas was shifting to agro-pastoralism, leading to high grazing intensities and rangeland deterioration. Local institutions were strong and plays central role in the management of communal grazing lands. Factors which significantly ( $p < 0.05$ ) enhance local institutions include market integration, degradation of rangelands and local leadership. Livestock ownership and local autonomy are significant in Ngorongoro area; whereas, wealth differentiation significantly ( $p < 0.05$ ) undermine local institutions in the study areas. Resource-use conflict in Mkata plains is mainly over crop damages by livestock. Conflicts in Ngorongoro area involve conservation authorities and local communities over expansion of cultivation. Factors significantly ( $p < 0.05$ ) escalating conflicts are wealthy heterogeneity and restrictive policies in Ngorongoro; and increasing herd size and commercialization in Mkata plains. Strong local leadership significantly ( $p < 0.05$ ) minimise conflicts in study areas, while livestock ownership and range deterioration minimises conflicts in Ngorongoro area. Local mechanisms for resolving resource-use conflicts include “conflict resolution committees” in Mkata plains; and benefit sharing between the Ngorongoro Conservation Area Authority and local communities. The study proposes a cross-linkage institutional framework for

management of communal grazing lands. The main conclusion of this study is that local institutions have persisted and plays a central role in governance of common grazing lands. It is recommended to establish secure tenure ship of grazing lands for different pastoral groups and establishing of sustainable carrying capacities and grazing systems in study areas.

### **DECLARATION**

I, KISOZA, LWEKAZA JAMES ANDREA, do hereby declare to the Senate of the Sokoine University of Agriculture that this thesis is a result of my original work and has never been submitted for a degree award at any other University

Signature.....

Date.....



### **SUPERVISORS' CERTIFICATION**

I certify that I have read this thesis and that in my opinion it is adequate in scope and quality, as a thesis for the degree of Doctor of Philosophy.

Signed..... Date.....

**Professor G. C. Kajembe (Main Supervisor)**

Signed.....Date.....

**Professor G. C. Monela (Co- Supervisor)**

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## ACKNOWLEDGEMENT

In pursuit of this work a number of people, institutes and government departments were of great assistance in different capacities. It is not possible to mention each one by name, but I wish to express my sincere gratitude to them all. For special thanks however I must single out the following persons. My supervisors Professor G.C. Kajembe and Professor G.C. Monela deserve special gratitude first for accepting me as their student and for their intellectual stimulation, professional guidance, critical comments, encouragement and sincere interest in this study from its formulation to its completion. A special mention is due to Professor G. C. Kajembe the main supervisor, for introducing me to the subject of institutions, his devotion for this work, inspirations and financial support during preparation of research proposal and early stages of data collection is highly appreciated. Professor Elinor Ostrom of Indiana University, USA agreed to serve as an external supervisor; her contribution during the initial stage of this work is highly appreciated.

I wish to extend grateful acknowledgement to Professors R. C. Ishengoma, and G. C. Monela, who served as Faculty Deans during my study period, and Head of Department Professor G. C. Kajembe, for administrative support. All other staff members of the Department of Forest Mensuration and Management are acknowledged for their cooperation and moral support. A special mention is due to the staff of the Remote Sensing and GIS laboratory for their tireless assistance in processing the remote sensing imagery. Dr. B.P. Mbilinyi, is acknowledged for his advice on remote sensing analysis; Mr. Rudovic Kashaga assisted me in processing the satellite imageries. I would also like to gratefully acknowledge the staff of the Institute of Resource Assessment and the Department of Geography at the University of Dar - Es – Salaam who provided me with training on remote sensing and GIS.

Dr. Jean Nduwamungu read and critically commented on draft manuscripts of this thesis; his contribution immensely improved my work. Professors M. Shem, and Dr Mtengeti as well as the late Professor A, Oking'ati shared with me many ideas and their academic insights and constructive criticisms were very helpful. I am very grateful to them all.

During the field work a number of people and government departments provided me with logistical support. Various government offices at National level, Ngorongoro Conservation Area and Kilosa district facilitated data collection, all of them deserve special mention. The Permanent Secretary, Ministry of Natural Resources and Tourism provided me with a clearance to carry out a research in Ngorongoro area. My sincere appreciation is due to Mr. Chausi, E. the Chief Conservator, Ngorongoro Conservation Area for granting me a resident permit and permission to conduct research in the area. His logistic support and insights on pastoralists of Ngorongoro improved immensely my study. I am deeply grateful to Mr. Victor Runyoro, the Principal Ecologist at Ngorongoro Conservation Area and a fellow PhD student for his moral and logistic support during my stay in Ngorongoro area. We shared intense discussions and I benefited immensely from his rich knowledge of the socio-economic setting and ecology of Ngorongoro area.

I would like to extend my gratitude to my field assistants in Kilosa and Ngorongoro area who served as guides, enumerators and translators. Messers: Jokka, Gawe, Salamba in Kilosa: and Messers: Swedi, Matei and Tegemea in Ngorongoro area helped me to conduct interviews and range surveys - their help to me is sincerely acknowledged. A special mention is due to farmers, herders, local leaders and government agents who devoted their time to respond to continuous interviews and allowed me to pry into their privacy. Their cooperation shall always be remembered.

I remain deeply indebted to the Open University of Tanzania for sponsoring me and for granting me study leave to undertake the study programme. A special mention is due to Professor C. Mmari, Professor D. Komba, and Professor U. Minga for their empathy, encouragement and sincere interest in this study. Moral and practical support extended to me by the Open University staff is highly appreciated.

I would like to express my sincere acknowledgement to staff and administration of LITI – Morogoro for their moral and practical support. A special mention is due to the Principals of Livestock Training Institute (LITI), Morogoro: Mr. E. Kapinga and later Mrs N.N. Mtenga who generously provided me with accommodation and access to institute facilities and transport during the entire period of my study.

Finally I want to make a special note to my wife Praxeda and our wonderful children; Alinda, Wendy, Imani and Nuru, who had to tolerate my long absence from home for several years. Without their understanding, unfailing support, patience and above all their prayers and love, I could never have found courage and energy to complete this task.

To all these and organisations, I am deeply thankful. My sincere hope is that this work can be practically applicable in connection to improvement of pastoral and agro-pastoral resources in arid areas and minimize resource-use conflicts. The significance and generous contributions of all people mentioned above notwithstanding, the final responsibility for this work rests on me.

## **DEDICATION**

This work is dedicated to my wife Praxeda and our children, who beared the consequences but remained my unfaltering source of inspiration and encouragement. To Almighty God for his blessings; and for giving me mental, moral and physical strength to accomplish this important endeavour.

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### LIST OF ACRONYMS AND ABBREVIATIONS

|       |   |   |
|-------|---|---|
| AO    | : | Authorised Officer  |
| ARCO  | : | Arusha Regional Commissioner's Office                         |
| ASAL  | : | Arid and Semi Arid Lands                                      |
| CLIP  | : | Community Based Livestock Improvement Project.                |
| CPR   | : | Common Pool Resources   |
| DRMCC | : | District Range Management Coordinating Committee              |
| IUCN  | : | International Union for Conservation of Nature                |
| IFAD  | : | International Fund for Agriculture and Development            |
| IRETO | : | Maasai vernacular for pastoral livelihood improvement project |
| EIU   | : | Economic Intelligence Unit                                    |
| FAO   | : | Food and Agriculture Organisation                             |
| KDC   | : | Kilosa District Council                                       |
| LITI  | : | Livestock Training Institute                                  |
| NCA   | : | Ngorongoro Conservation Area                                  |
| NCAA  | : | Ngorongoro Conservation Area Authority                        |
| NAS   | : | National Academy of Science                                   |
| MLHUD | : | Ministry of Lands, Housing and Urban Development              |
| MLNRT | : | Ministry of Land, Natural Resources and Tourism               |
| MNRT  | : | Ministry of Natural Resources and Tourism                     |
| NRMC  | : | National rangelands management committee                      |
| PC    | : | Pastoralist Council   |
| PINGO | : | Pastoral Indigenous Non - governmental Organisations          |
| RRMA  | : | Reserve Range Management Area                                 |
| VRMA  | : | Village Range Management Area                                 |

WDC : Ward Development Committee  
WWF : World Wildlife Fund for Nature



## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Background

##### 1.1.1 Overview

Pastoral and agro-pastoral land-use systems in most of the developing countries are characterised by high dependence on communally owned land resources. These resources are inclusively referred to as “commons”. Ostrom (1996) refers to this category of land resources as “common pool resources” (CPR). In the literature there is a great deal of confusion between the concepts of “common pool resources” and “common property regimes”. The common pool resources are defined as those resources which are non-excludible but which are subtractive. Whereas, common property regimes are the property relations that define claims to the resources (Ostrom *et al.*, 2002). Examples of common-property regimes abound the rural areas across all continents and transcending all cultures (Netting, 1978; Ostrom, 1996).

In developing countries, common property regimes provide equitable and sustainable access to livelihood support systems at a minimum cost (Runge, 1981, 1986). Thus, the majority of the world's rural populations are directly dependent on local CPR like water, forests, grazing lands and fisheries for their livelihoods. Resources falling under this category are potentially renewable and capable of being sustained in perpetuity. However, whether or not this potential would be realised depends on numerous factors including; the institutional arrangements that people adopt concerning resource utilisation. Institutional arrangements which are hereby referred to as conventions that societies establish to define their members' relationship to resources and translates interests in resources into claims; and claims into property rights. Nonetheless, more often formal institutions created by the state may be

incongruent with informal institutions (rules and customs) governing the use of CPRs, which may lead to environmental degradation and resource conflicts. Bromley (1992) refers to this situation as institutional “dissonance”. In Africa, this condition is ubiquitous in most of communally owned grazing lands.

### **1.1.2 Pastoral, agro-pastoral systems and common grazing land institutions**

Pastoralism and agro-pastoralism remain the predominant land use systems in most of the arid and semi-arid areas of sub - Saharan Africa. These areas are characterised by low and highly variable rainfall, with mean annual rainfall ranging between 300 and 700 mm (Goodin and Northington, 1985) usually concentrated in one or two rainy seasons in a year separated by a relatively long dry spell. The physical environment in these areas is characterised by high variability of resources in space and time and is generally unsuitable for crop production. One of the limited ways this land can be made viable is through grazing animals adapted to dry conditions, because livestock are more suited to such risk prone environments owing to movement of animals to track the resources. This type of land use system also allows communities to adjust to climatic variability (Swift, 1996). The pastoral production systems have thus evolved and over centuries have accumulated traditional ecological knowledge to survive under harsh environmental conditions and exploit otherwise ephemeral resources in a sustainable manner. Swift (1996) defined pastoralism as production system in which 50% of gross household revenue comes from livestock or livestock related activities. Agro-pastoralism is defined as a production system in which more than 50% of gross household revenue comes from crop production and 10 to below 50% comes from livestock. Thus, livestock based economy is a mainstay for pastoral systems. However, to date pure pastoralism is quite rare, since most of pastoral communities have adopted farming or diversified to other livelihood systems, the most common systems being semi-pastoralism and agro-pastoralism. This led Baxter (1994) to

assert that pastoralism is an occupation, as well as a vocation and he extends the term to individuals within groups who adhere to the belief about the fundamental importance of livestock to their ways of life, but who have been forced by destitution or diversification to non-livestock livelihoods. For the purpose of this study the broad definition of the term pastoralism, advocated by Baxter, has been adopted.

The main feature of pastoralism is herding private herd on communal grazing lands, and typical pastoral strategies are based on herd mobility, maximization and herd diversification (Lane and Swift, 1989). The widespread communal resource management institutions together with pastoral strategies can be seen as risk aversion devices under unfavourable climatic conditions. These institutions then provide the major means of production and existence. However, the rationale of the pastoral strategies and the associated institutions has remained oblivious to most observers, as well as development planners. Most observers accept the notion that land degradation process is causally linked with pastoral culture and institutions, also that pastoralist behaviour is inherently self destructive over long term through its impacts on the range environment, the “Hardins (1962) tragedy of commons” axiom. Consequently pastoralism has been judged to be irrational, economically inefficient and environmentally destructive (Herlocker, 1999).

Recently the belief of pastoral systems irrationality, un-productivity and self-destruction has come under strong challenge (Lane and Swift, 1989). Results from a number of case studies have demonstrated that some individuals have jointly and wisely communally owned lands over long periods of time thus challenging the ‘tragedy of commons’ axiom (Herlocker, 1999). However, most of pastoral groups have been faced with profound modifications to their cultural environments. As a result their local institutions in some cases are unable to

quickly adapt to the new challenges, leading into degradation of communally owned resources including the range lands.

### **1.1.3 Pastoral sector of Tanzania**

In Tanzania, the traditional pastoral and agro-pastoral land-use systems are predominant in semi-arid areas in central, northern and northwest regions. The traditional livestock sector accounts for over 95% of the national herd, which is approximated at 16 million cattle and ranking the third largest herd in Africa (URT, 1998). The sector also contributes to about 18% of the National Gross Product and provides employment to approximately 3.8 million people (EIU, 1997). About 20- 25% of the national herd is kept under pure pastoral system mainly by the Maasai and Barbaig herders in Arusha and Manyara regions (Mpiri, 1995). The agro-pastoralists comprise of different ethnic groups including the Gogo (Dodoma), Nyaturu (Singida), Nyamwezi (Tabora), Sukuma (Shinyanga and Mwanza) and Kuria (Mara), and accounts for about 75 - 80% of the national herd (ibid). At present, pastoralism is practised by immigrant Maasai herders in more humid areas in Morogoro, Coast, Tanga, Mbeya and Rukwa regions. The agro-pastoralists have mainly migrated to Rukwa and Mbeya regions (Brockington, 2000).

The pastoral lands in Tanzania are mainly held by tribal or sub-tribal communities with a customary right of occupancy governed through local institutions (Mwenye, 1991). Traditionally, the pastoral societies have evolved different local institutions for regulating access and use of range resources as well as resolving resource use conflicts. However, interventions like nationalisation and privatisation by state government have undermined the traditional pastoral systems and the associated land tenure institutions, rendering these ineffective in managing communal grazing lands (Ndagala, 1998).

## **1.2 Problem Statement**

Land tenure in pastoral areas of Tanzania is under stress. The stress emanates mainly from changing natural and demographic environments. Other underlying causes are social, economic and political changes. In the past three to four decades both pastoral and agro-pastoral areas have been experiencing rapid population increase, with a national mean population growth rate estimated at 3% per annum (Kurian, 1992). This has increased demand for cultivation lands, forcing pastoralists to more marginal areas and triggering off environmental degradation process. These processes were paralleled by overall climatic changes, with increasing droughts. The combined effect of these processes has culminated into general decline of pastoral community's welfare and increased livelihood insecurity (Lane, 1998).

The decline also stems from both current and past governmental policies that viewed pastoralism as an unsustainable land use system which has to be transformed by sedentarisation. The Maasailand settlement scheme and Operation Barabaig development scheme are cases in point (Ndagala, 1998). The colonial land policies disrupted pastoral land tenure systems through alienation of customary lands to the state and settler farmers. This in turn eroded the legitimacy of traditional decision making structures, leading into the breakdown of these structures. Nationalisation and villagisation policies during the 1970s led to wide scale alienation of pastoral lands for example the Basuto Wheat Project complex (Lane and Moorehead, 1996). These policies caused land tenure insecurity and created conditions for open access. Pastoralists were forced into the remaining atrophied common grazing areas, with shrinking resource base (Igole and Brockington, 1999). These processes culminated into massive destitution in pastoral communities, forcing an increasingly large number of pastoralists to change to other means of livelihoods like cultivation in marginal lands, wage labour and out migration (Lane, 1998).

Similar policy externalities were generated in the main agro-pastoral areas in the Western Cotton Growing Areas of Tanzania. The government subsidy on cotton led into crop extensification which resulted into wide-scale deforestation, loss of soil fertility and overall environmental degradation. This in turn led to enormous loss of grazing lands and increased grazing intensities. The processes have been aggravated by high human and livestock population densities as well as unfavourable semi-arid environmental conditions. This situation forced the Sukuma herders to migrate to other regions of Tanzania (Brockington, 2000). The recent economic reforms and trade liberalisation have created some opportunities, but also have posed many new threats to pastoral systems. The national agriculture policy of 1982 (URT, 1982a) had promoted commercial agriculture production. This was followed by land tenure reforms like the Land Act No.4 of 1999 (URT, 1999a) and the Village Land Act No.5 of 1999 (URT, 1999b) which supports land market in the country. These policy changes in conjunction with other sectoral policies like the wildlife management Act of 1975 (URT, 1975b), have been followed by large scale privatisation of the remaining pastoral lands for commercial farming, hunting blocks, mining and land speculation. The severely affected are the pastoral areas in northern Tanzania, including the areas for this study. Currently, there are cases of large scale expropriation of pastoral lands by corrupt officials, marginalisation of pastoralists and in some areas there have been some forced evictions (Igole and Brockington, 1999).

Loss of grazing lands, environmental degradation and high grazing intensities in the main pastoral and agro-pastoral areas of Tanzania has led into massive migration of pastoralists and livestock. Currently, there is a steady movement of livestock from the north of the country to the south. The main target areas include Morogoro, Coast, Mbeya and Rukwa regions (Mpiri, 1995). This has brought different ethnic groups into the same ecological ranges, with increased potential for environmental degradation and resource-use conflicts.

The perceived social and environmental consequences are arousing concern at different levels of governance. In particular, the consequences on resource tenure are not well known. In some areas the immigrant pastoralists and indigenous ethnic groups, mainly agriculturists, have forged complementary co-existence for example in Usangu plains (Kajembe *et al.*, 2003a). Where as, in some areas the immigrant pastoralists have intensified the conflicting demands for natural resources for example in Ruvu basin (Ndagala, 1998). In some areas this led into violent clashes and loss of lives, for example in Kilosa district, Morogoro region (URT, 2001). Still, the underlying causes for these conflicts are yet to be fully established. The conflicts are, most probably, manifestations of the shortcomings in the local institutions governing land resource tenure and conflict management. Using a case study of pastoral communities in Kilosa and Ngorongoro districts in Tanzania, it is envisaged that this study will generate information on the capacity of local institutions with regard to management of common grazing lands. The results are expected to be used in recommending institutional innovations under similar socio – economic and environmental settings in Tanzania and elsewhere.

### **1.3 Justification of the Study**

Analyses from all over Africa show that development interventions in pastoral areas have failed to achieve the intended goals (Kirk, 1999). Indigenous pastoral land tenure systems have often been perceived as the obstacle to progress (Lane, 1998). But, this “old orthodox” (Lane and Swift, 1989) or “mainstream view” (Sandford, 1983) portraying communal land tenure to be inherently destructive has been challenged, for example by Lane and Moorehead (1996). Failure to promote the participation of producers has been singled out as one of the main factors that led into failures in pastoral development. Current emphasis is on the rediscovery of pastoral traditional institutions. This is mainly due to a new and more positive perception of pastoral societies on the part of decision-makers. Also,

the need to stabilise pastoral areas in the face of recurrent climatic crises, the redefinition of the concept of pastoral development and the search for better technical solutions and more sustainable programmes. Furthermore, the past developmental interventions in pastoral areas ignored the cultural attributes like community needs, goals, organisations and their local knowledge. Realisation is now growing that pastoralists are also experts in managing their marginal and risky environments. Therefore, priority should first be given to understanding of pastoral systems and associated customary institutions under which resources are managed.

There is now a significant shift in the approach in government policies for pastoral development. The main emphasis since mid 1980s has been empowerment of pastoral associations to organise public goods and services; and to take active roles in the management of local natural resources. Moreover, the emerging theory on range management (the dynamic ecosystem theory) suggests that administrative reforms in the field of pastoral land tenure should concentrate on restoring and supporting local control of resources and minimising state interventions. This entails adoption of appropriate land tenure rules and incentives that would provide a framework within which pastoral groups could negotiate the use of resources in different ecological zones according to variable local conditions. New tenure rules should combine the traditional system with the appropriate formal regulations (Lane and Moorehead, 1996). In this situation, the local institutions remain critical in pastoral systems, whereby the relationship between formal and informal systems is a key area for reforms that will enable local institutions to play increasing role in the management of local common pool resources.

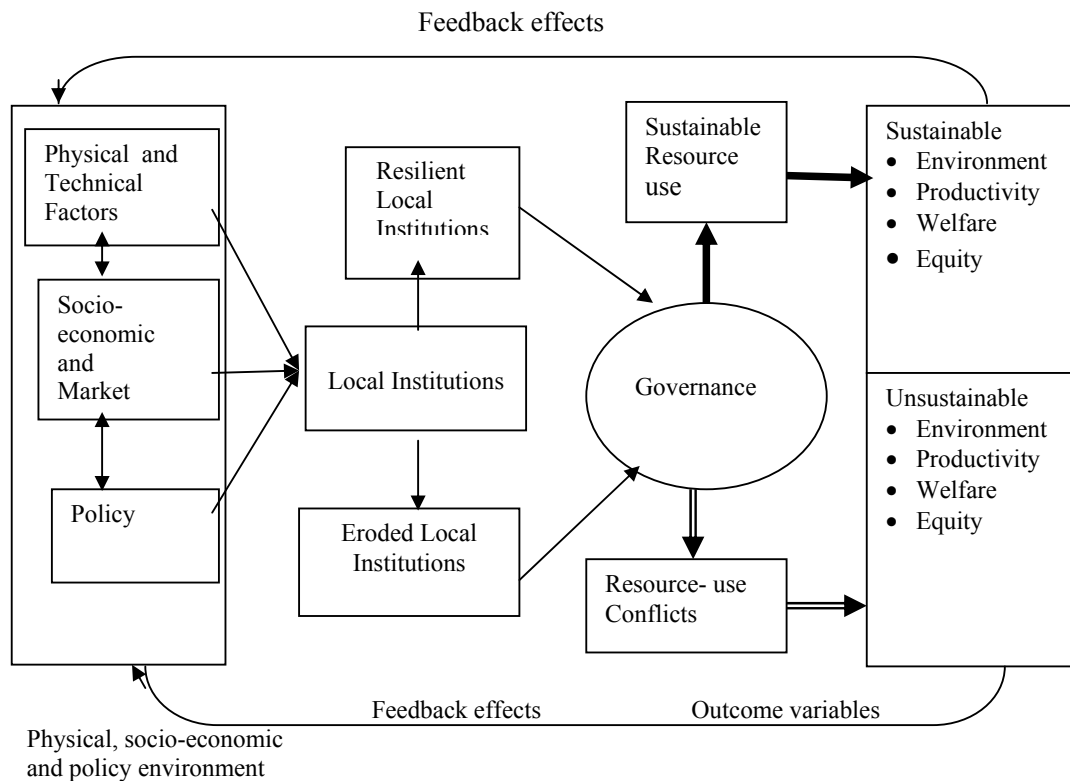
A new paradigm on pastoral development is now being advocated. This is paralleled by political and economic process underway in many African countries including state



divestiture, devolution of power and political liberalisation. In general, these reforms consider more than ever the resource interests of pastoralists. Particularly, devolution of decision making regarding resource tenure to lower levels to allow for more participation of resource users. Tenure reforms and local institutions have also, been included in the Rio protocols (GTZ, 1998). Past policy reforms in Tanzania adversely impacted on pastoral land tenure, as well as on local institutions regulating the use of common pool resources and conflict management. There is a growing need for capacity building and empowering of local institutions for local level management of natural resources. However, only scanty information does exist on the types and effectiveness of the contemporary local institutions for the management of common pool resources. This justifies a study to analyse the types and potential capacity of existing local institutions for regulating use of common pool resources.

#### **1.4 Conceptual Framework**

The conceptual framework underlying this study in Figure 1 is based on the theories of agriculture intensification, resource management, and institutional change (Binswanger and McIntire, 1987; Ostrom, 1990).



**Figure 1: Conceptual framework**

Key  
 → Positive effect  
 ⇒ Negative effect

It also derives from the two models (the demand led and supply led models) that have been used to explain changes in land use, property rights and institutional changes (Kamara, 1999; Anderson and Hill, 1975). The demand-led model is consistent with the theories of agriculture intensification, and emphasizes that the redefinition of property rights by communities follow a need to internalize externalities that arise as a result of population growth and increased market opportunities. These property rights evolve if benefits for changing existing property regimes exceed the costs. The demand-led model is largely accepted on the grounds that factor scarcities and market opportunities do change people's preferences for different property rights.

Hyami and Ruttan (1984) introduced the “induced institutional innovation” model, which emphasizes on factors affecting the supply of institutional innovation. North (1995) expanded on this by introducing the importance of individual and shared values in the process of institutional changes. Binswanger and McIntire (1987) postulates in their theories of agriculture intensification and induced institutional innovations, that factors such as population growth, market and technology will induce changes in resource management at local level as a result of changing factor scarcities and prices. Government policies also bear significant impact on natural resource management and local institutions. The impacts of policy changes will depend on the nature of institutions (social capital) endorsing changes, community characteristics and natural resource endowments.

The conceptual framework (Figure 1) shows that the physical, socio-economic and policy environment or the “conditioning factors” define the choice of possible strategies of resource use by stakeholders in the quest to attain socio-economic welfare. The outcomes of resource use are dependent on the facilitating local institutions endorsing the changes. The institutional arrangements determine governance of resource system, which in turn lead to different incentives and preferences for resource use.

The outcomes are measurable in terms of change in productivity, condition of resource base, human welfare and equity. Pender *et al.* (1996) referred to these as “outcome” variables. There is a feedback effect between the “outcome” and “conditioning” variables. Whenever the local institutions fail to create the appropriate governance resource-use, conflicts may erupt. Consequently, this may necessitate changes on the institutional arrangements in order to maintain sustainable resource base and community welfare.

## **1.5. Objectives of the Study**

### **1.5.1 Overall objective**

The overall objective of this study was to identify and analyse the role of local institutions in the management of pastoral communal resources and resource-use conflicts in a view of advising a rational institutional framework for sustainable and environmentally sound pastoral development interventions.

### **1.5.2 Specific objectives**

The specific objectives of this study were:

- i) To determine land cover/use changes and trends in resource tenure regimes in the study areas.
- ii) To analyse types, roles and strengths of existing local institutions in the management of common grazing lands in the study areas.
- iii) To analyse types and causes of resource-use conflicts and existing local mechanisms for conflict management in the study areas.
- iv) To assess institutional innovations in the study areas.
- v) To propose institutional framework for the management of pastoral communal resources and resolving resource use conflicts.

## **1.6. Hypotheses**

The study tested the following hypotheses:

### **1.6.1 Null Hypotheses (Ho)**

- i) Socio-economic, state policies and environmental factors have no influence on local institutions governing co-operation in collective management of communal grazing resources.

- ii) The perceived environmental degradation, crop-livestock integration, market integration, state policies and socio-economic factors have no effect on resource - use conflicts.

### **1.6.2 Alternative Hypotheses (Ha)**

- i) Socio-economic, state policies and environmental factors have influence on local institutions governing co-operation in collective management of common grazing lands.
- ii) The perceived environmental degradation, crop livestock integration, market integration and socio-economic factors have significant effects on resource-use conflicts.

### **1.7. Research questions**

In order to attain the study objectives, the following research questions were addressed:

- i) What is the trend in land-use and resource regimes in the study areas?
- ii) What are the types and efficiency of local institutions governing use of common grazing lands in the study areas?
- iii) Which types of resource-use conflicts occurring in the study areas?
- iv) What are local mechanisms employed in resolving resource use conflicts?
- v) Which institutional changes that have occurred in the study areas?

## **CHAPTER TWO**

### **2.0 LITERATURE REVIEW**

#### **2.1 Definitions and Concepts of Institutions and Organisations**

##### **2.1.1 Overview**

Institutions as well as organizations are part of our daily life; the two terms are in common usage and are regarded as synonymous. However, in analysing institutional arrangements in the context of this study, a clear understanding of the term “institution” and how it is related to the term “organization” is critically important. This is because different meanings have been given to the term “institution” depending on where, by whom and for what purpose it is used. Often, a preoccupation on organizational development tends to neglect the importance of laws and policies that are necessary for effective organizational performance (Bandaragoda, 2000).

##### **2.1.2 Definition and nature of institutions**

The term institution can be defined as “organized or established procedures” These procedures are presented as constituent rules of the society, or “rules of the game”. The notion that an institution is a social order or pattern that has attained a certain state or property implies that institutions serve the purpose of shaping and stabilizing human actions. Institutional economists adopt a similar interpretation in which “institutions” are defined basically as “the rules of the game” in a society, or more formally, the humanly devised constraints that shape human actions” (North, 1990). Institutions set the ground rules for resource use and establish the incentives, information, and compulsions that guide economic outcomes. Institutions can be both formal and informal. The formal rules include the written laws, regulations and procedures while the informally established procedures, norms, mores, myths, practices, and patterns of behaviours form the institutional framework (Kajembe *et al.*, 2000). With time informal practices also become rules in their own rights

when they are accepted by the society (Bandaragoda, 2000). Both formal and informal institutions define and fashion the behavioural roles of individuals and groups in a given context of human interaction, aiming at a specific set of objectives. The key characteristics of institutions are that they are patterns of norms and behaviour that persist because they are valued and useful (Merrey, 1993).

In many developing societies, informal rules have a tendency to override formal rules, rendering the enforcement of formal rules difficult and thereby affecting performance (Kajembe *et al.*, 2000). While the coexistence of formal and informal institutions is inevitable, situations where some informal rules tend to contradict formal rules are obviously dysfunctional. Furthermore, under certain settings where there is lack of enforcement or due to disregard of the written laws, the formal institutions become ineffective, and they are replaced by a set of practices that show divergence from the declared laws, rules and regulations. These practices can be referred to as “rules in use” (Kajembe *et al.*, 2004; Bandaragoda, 2000).

Based on the definitions above and the terminologies used in practice, institutions are a combination of (a) policies and objectives (b) laws, rules and regulations (c) organizational bylaws and core values; (d) operational plans and procedures; (e) incentive mechanisms; accountability mechanisms; and (f) norms, traditions, practices and customs.

All institutions share a set of defining characteristics. They are systems of rules, decision-making procedures, and programmes that give rise to social practices, assign roles to the participants in these practices, and guide interactions among the occupants of the relevant roles. Institutions arise in all areas of human endeavour. Where they arise to deal explicitly with matters related to human/environment relationships, they are referred to as

“environmental” or “resource” regimes (Young, 1999). For instance, both local arrangements dealing with common field agriculture in traditional societies and international arrangements pertaining to shared river basins are regimes that are rather focused in spatial and functional terms. As such, institutions vary along a number of significant dimensions, including types of members, size of membership, degree of differentiation, functional scope, geographical domain, extent of formalisation, mix of formal and informal elements, density of rules and programmes, structure of administrative organisations and links to other institutions (Young, 1999).

Furthermore, all institutions operate in larger settings characterised by material conditions like the nature of available technologies; the distribution of power in the material sense, and the cognitive conditions such as prevailing values, norms, and beliefs, that affect the consequences flowing from their operation (Young, 1999). A key analytical objective of institutional analysis is to establish how institutions influence or affect outcomes arising from interactions among actors in various social settings and why some institutions are more effective than others in the sense that they exert more influence over the course of human interactions (Levy *et al.*, 1995). Since institutions are not actors in their own right, they must influence the behaviour of those subject to their rules, decision-making procedures and programs - in order to be effective. In this sense, there is a distinction between direct and indirect effects. The direct effects arise from the operation of environmental or resource regime or, in other words, those institutions created to deal with human / environment relations. For example, the traditional systems of land tenure or water rights that have developed informally in small – scale agrarian societies belong to this category (Young, 1999). The indirect effects of human /environmental relations are the unintended and often unforeseen environmental side effects of institutional arrangements established to deal with problems arising in other issues (Runge, 1992).



### **2.1.3 Organisations defined**

Organisations are defined as networks of behavioural roles arranged into hierarchies to elicit desired individual behaviour and coordinated actions obeying a certain system of rules and procedures (Bromley and Cernea, 1989). Another definition describes organisations as “structures of recognized and accepted roles” (Merrey, 1993). These hierarchical arrangements are usually referred to as organizational structures. Organisations are groups of individuals with definite roles and bound by some common purpose and some rules and procedures to achieve set objectives. Like institutions, organisations also shape human actions.

### **2.1.4 Link between institutions and organisations**

In order to conduct an institutional analysis, an important conceptual consideration is the link between institutions and organizations. The link between institutions and organisations can be seen in two ways. One-way is the perception that organizations evolve and come into existence through the influence of the institutional frameworks. Thus, both institutions and organizations are intrinsically interlinked, and together, they provide a structure for human interactions. Once established, the organizations in turn influence how the institutional frameworks develop - depending on the changing social, economic, and more importantly, political situations and adjust the institutional frameworks to suit the emerging demands (Bandaragoda, 2000). The second perception is that established organizations represent a set of norms and behaviours that persist because they are valued and accepted as useful. In this way, they play a role of institutions. As such an *ad hoc* committee formed for a temporary task is not an institution; neither is an association of resource - user group formed by the government officials for limited purposes at a certain stage of the project. Whereas the users association persisting over time and continuing to fill a need that is valued and useful to its

members can be regarded as an “institutionalized organization” (Merrey, 1993). Either of these perceptions has an important consideration for this study, that is the need to consider the compatibility between existing laws, customs, policies and organizational arrangements. Values and usefulness of the existing institutional framework as accepted by the stakeholder community also need to be evaluated, because necessary changes for the institutional framework can be formulated only on that basis. Furthermore, according to both perceptions, some of established organizations can be seen as agents of institutional change. The support of such influential organizations can also be very useful, both in conducting an institutional analysis and in formulating recommendations for change. More significantly, the real value of these organizations became more apparent during implementation of identified institutional strategies.

#### **2.1.5 Functions of institution**

The definitions given above indicate that institutions are humanly devised constraints to shape human actions. However, institutions inherently have dual purposes to constrain and liberate individual and group actions (Bromley and Cernea, 1989). When elaborating on this, Bandaragoda (2000) cites the example of laws and court systems, which restrict some human actions, but also provide freedom for actions in some other instances. The institutional framework serves to reduce the uncertainty for human actions and thereby have a stabilising effect on a society. However, the stabilising effect of institutions does not mean that institutions are static. As society and its priorities change, institutions (conventions, codes of conduct, norms of behaviour, laws, contracts) tend to evolve and continually alter the choices available to individuals (Kajembe *et al.*, 2004).

There is apparently a cyclic phenomenon related to institutions, in which institutions are determined by human actions, which once established, in turn, determine the scope and character of subsequent human actions for desired objectives (Bandaragoda, 2000). This is an important aspect in analysing institutions for possible changes (Kajembe *et al.*, 2004), and also to establish how an external facilitator could be useful in identifying and introducing changes. This is particularly crucial in different settings under which pastoral and agro-pastoral systems operate in Tanzania. In these systems, the extent and character of observed gaps between declared rules and rules- in-use and their implications on the resources and resource use relationship is not well known.

#### **2.1.5.1 Institutions and management performance**

The linkage between institutions and performance is indisputable. But, in order to establish how institutions contribute to, or affect performance, it is important to assess the current levels of institutional performance. At the outset, it must be understood that institutions being rules or role structures, practices and norms, do not perform. On the basis of strength and validity of institutions, it is the management or actors in the organisation that actually affect the performance, thus the emphasis on institutions and management performance (Bandaragoda, 2000). North (1990) argues that from economist's viewpoint, institutions affect the performance of individuals, groups or organisations, a country or its economy through the effect of institutions on the cost of exchange and production. Together with technology, institutions determine the transaction and transformation (production) costs. Therefore, performance can be expected to be better in the institutional framework in which these transactional costs are low.

Similarly, members of an organisation have some defined objectives and they endeavour to achieve them by being within an institutional framework and by using a combination of

extra-institutional factors, such as, knowledge, skills, strategies, and co-ordination. The institutional framework serves as a necessary condition, but not a sufficient condition for management performance (North, 1995). Thus, a succinct definition by North (1995) is that an institution is the “framework within which human interaction takes place”.

#### **2.1.5.2 Effectiveness of institutions**

In the most general sense, effectiveness is a measure of the extent to which institutions matter or, the extent to which the outcomes of human/environment interactions differ from what would have occurred in the absence of these arrangements. To this, most analysts would add a particular concern for impacts that are positive in the sense that they contribute to serving, or at least to managing, the problems that lead to establishment of particular institutions. When construed in this way, effectiveness is a variable, and the institutions range from highly effective arrangements that have profound impacts on the course of human/environmental relations, to those with little or no impact in these relations (Young, 1999). However, it is important to note that, some of the institutions that prove to be highly effective under certain conditions may be ineffective under other circumstances and that the same institutions may become more or less effective over the course of time.

The other attributes of institutions are sustainability, efficiency, fairness and robustness. The institutional contribution to achievement of environmental sustainability is defined in ecological terms. Thus, an institution achieves a high score in terms of sustainability to the extent that it bolsters the capacity of relevant ecosystems to maintain themselves over time. Institutions are also rated in terms of production of outcomes that promote socio-economic objectives, including efficiency and fairness. Efficiency, in this context is a measure of the extent to which goals like sustainability are achieved with minimum expenditure of resources. Fairness refers to extent to which the outcomes conform to normative standards

of equitable distribution. Finally, institutional robustness is the extent to which institutions are durable or stable over time (Young, 1999).

### **2.1.5.3 Nested institutions and management performance**

Human actions are constrained by and protected by nested system of different layers of institutions. Basing on the foregoing discussion, and by considering both the core meaning of the term “institution” which emphasizes on the rules aspect and the associated common usage of the term that is associated with “organisations”; a much broader interpretation of institutions i.e. “institutional framework” tends to be adopted by most analysts.

The institutional framework for management of pastoral resources, for example, will consist of established rules, norms, practices and organisations that provide a structure to human actions related to range resource management. The established organisations are considered in this case as subset of institutions. Thus, the overall institutional framework related to management of pastoral and agro-pastoral resources can be considered in three broad categories: policies, laws and administration (Saleth and Dinar, 1999). Whereby; (i) Policies include - national policies, local government policies and organisational policies. (ii) Laws are formal laws, regulations and procedures, informal rules, norms and practices and internal rules of the organisation. (iii) Administration involves organisations at policy levels for resource management and organisations at implementation level for delivery management. A combination of the above institutional elements constitutes the nested institutions (Saleth and Dinar, 1999).

### **2.1.6 Institutional framework for management of natural resources**

Institutions figure prominently as determinants in the course of human/environment relations. As such, faulty institutional arrangements frequently cause large scale

environmental problems, such as; depletion of living resources resulting from unrestricted access to common pool resources or environmental pollution occurring as externalities of privately owned resources.

Conversely, institutional arrangements always play a role in solving environmental problems, as in cases featuring in the creation of limited – entry to avoid unsustainable harvest of biological resources, such as range lands (Young, 1999). or international regimes intended to prevent environmental problems In both cases, the fundamental premise is the same; institutions account for a sizeable proportion of the variance of human behaviour affecting bio-geophysical systems (Young, 1999).

#### **2.1.7 Local institutions**

Local institutions can be categorised into two main types: internally and externally sponsored institutions. Internally sponsored institutions are mainly traditional constructs and play major roles in the management of natural resources. Internally sponsored institutions therefore represent the established local system of authority and other features derived from the socio-cultural and historical process of a given society. They usually originate from the local culture, and are deep rooted in the past, reflecting knowledge and experience of the local communities. They include norms, rituals and customs that serve in organising people for the management of natural resources (Kayambazinthu *et al.*, 2003; Kajembe *et al.*, 2003b).

Local institutions can further be classified into indigenous and traditional institutions. Indigenous institutions are those, which originates within a particular community or in a specific locality. Communities have generated institutions over time so as to cope with particular agro-ecological and socio-economic environment (Appleton *et al.*, 2000).

Traditional institutions include set of rules and norms based on cultural principles and values of specific cultural group to regulate and control social behaviour and maintain cultural practices. They are long established and accepted orders, codes and practices that have the effect of an unwritten law, handed down through generations. They encompass not only indigenous but also scientific and other knowledge gained from outside i.e. externally sponsored knowledge systems (Appleton *et al.*, 2000). Tradition is used to distinguish between what today is considered to be local people established rules, from outside interventions that propose new rules and regulations for access to land resource to which people are unaccustomed.

Externally sponsored institutions include formally established institutions that are governed by state systems of either local or central governments. They include all rules governing the management and utilisations of natural resources. They also encompass support from donor agencies for sustainable management of natural resources in a given locality. Government administrative structures are moderated by externally sponsored institutions in that they are set and established by the government for administrative purposes. Externally sponsored institutions influence implementation of different natural resource management interventions and resolving resource use conflicts (Mayeta, 2004). Institutions falling under this category include national policies and regulations governing access and use of various resources by different users.

#### **2.1.8 Factors affecting local institutions governing common pool resources**

A number of factors have been identified to affect the functioning of local institutions governing common pool resources. Some of the factors have direct effects, while others have indirect ones.

### **2.1.8.1 Factors with direct effects**

The factors that directly affect local CPR institutions are demographic pressure, market integration, and technological changes.

#### **(i) Demographic pressure**

Demographic pressure is generated through variations in levels of population, whether as a result of local changes or through migration. Increasing population can significantly influence the ability of users to follow existing rules and norms for resource management. Agrawal and Yodama (1997) reviewed the relative importance of population pressure and the enforcement of institutions on resource conditions. Agrawal (2002) writing on the role of population in resource management argues that it has a long history, for example Malthus (1803); where scholars link population increase with degradation of resource and breakdown of local resource management regimes. Much recent scholarship tends to link environmental degradation in relatively straightforward fashion with population growth (Durning, 1998). However, the debate is highly polarized. Some scholars assert that population pressure has an enormous effect (Myers, 1991) and others suggest the impact to be far more limited (Agrawal, 1995; Leach and Mearns, 1996; Varughese and Ostrom, 1998).

#### **(ii) Market integration**

There is a wide agreement that increasing integration in markets has usually an adverse impact on local institutions for the management of common-pool resources, especially when roads begin to integrate distant resource systems and their users with other users and markets (Young, 1999). As local economies become more connected to larger markets and common property systems and confront cash exchanges, subsistence users are likely to



increase harvesting levels because they can now exploit resources for cash income as well (Colchester and Mahoney, 1994).

Market pressure may also undermine common property arrangements, in that market integration introduces new ways of resolving risks that common property institutions are often designed to address. Pooling of resources, which become possible under common property regimes, helps those who are subject to such regimes. It helps by allowing them to reduce risks they would face were they have to exploit the same resources individually. Furthermore, markets encourage individuals to specialize in different kinds of economic activities. By specializing in different occupations and exchanging surplus output, individual producers can alleviate the need for migration and storage of resources. In addition, markets form alternative arenas for the provision of credit and generation of prestige in ways that can undermine the importance of other local institutions (Agrawal, 2002).

### **(iii) Technological changes**

The emergence of new technologies may transform cost benefit ratios of harvesting from commons and this is likely to undermine the sustainability of local institutions. However, sufficient time may be needed before users adapt to new technologies. Furthermore, technological change is capable of disrupting existing mechanisms of coordination around mobility and exchange of resources among community members. It can also alter political and economic arrangement that defines common property regimes (Agrawal, 2002). Oates (1999) observes that, market integration and introduction of new technologies and changes that they might prompt in existing resource management regimes is not always a harmless process, as it may result in losers and winners.

Typically, new demand pressure originating from markets and technological changes are likely to create different incentives about the products to be harvested and rates of harvest. They are also likely to change local power relations as different subgroups within a community using common-pool resource gain different types of access and maneuver to ensure their gains (Peluso, 1993).

#### **2.1.8.2 Factors with indirect effects**

##### **(i) Resource user characteristics**

The importance of characteristics of a group that manage the commons was sparked in part by Olson's seminal work (Olson 1965 in Agrawal, 2002). According to enormous literature on the commons and collective action, smaller groups are more likely to engage in successful collective actions. The conclusion is supported by Baland and Platteau (1999, 1977). Nevertheless, other scholars have remarked on the ambiguities in this assertion and suggest that relationship between group size and collective action is not straight forward. For example, Marwell and Oliver (1993) posit that, a significant body of empirical research established that the size of a group is positively correlated to its level of collective action.

But, according to Ostrom (1997) the impact of group size on collective action is usually mediated by a number of variables. These include the production technology, the degree of excludability, jointness of supply and the level of heterogeneity in the group, whereby the nature of heterogeneities within groups can have multiple and contradictory effects (Hardin, 1982). Baland and Platteau (1997) hypothesized that heterogeneities of endowments have a positive effect on resource management, whereas heterogeneities of identity and interest may create obstacle to collective action. For example, heterogeneities of interests may lead to different types of economic specialization and different levels of endowments, which could in turn lead to mutually beneficial exchange. It is also possible, in groups with high

levels of heterogeneities of interests, to attain collective action if some subgroups can enforce resource management rules (Varughese and Ostrom, 1998).

## **(ii) State policies**

As the ultimate guarantor of property rights arrangements, the role of the state and overarching structures of administration have been decisive under many historical circumstances in governing common-pool resources. Whereas, most communities and local user groups have rights to craft and implement new institutional arrangements, but unspecified rights and settlement of major conflicts can only be addressed through state interventions (Rangan, 1997). The recent decentralization of control of various natural resources to local user groups has brought into question the differences in authority across levels of governance. The local community –government relationships in resource management is normally very complex and the outcomes are very varied. Moreover, the relationship is influenced by a number of reasons, which underlie the government decisions. That is whether the main focus is to decentralise resource management regimes or in response to resource related laws or national policies. Agrawal (2001) concludes that there is no generalised understanding of effect of governments' policies on the CPR management regime, whereby various national policies indirectly affect natural resource management systems.

## **2.1.9 Theories and concepts of collective action in the management of common pool resources**

### **2.1.9.1 Overview**

Under what conditions does an individual voluntarily cooperate to pursue a common goal, such as sharing resources with other users so as to allow the system to function? Indeed, the viability of the commons paradigm depends among other things to a large extent on people's

willingness to cooperate. However, as theory and research show, people's cooperation (i.e. their voluntary participation to the provision and maintenance of a collective good) cannot be taken for granted. Collective action theory shows that people's willingness to cooperate depends on a number of factors that need to be taken into account in the development of any resource management system whose viability is contingent upon cooperation. Cooperation as a social phenomenon stands at the centre of lively academic debates, whereby a clear distinction ought to be made between "cooperation optimists" and "cooperation pessimists" (Dietz *et al*, 2002).

#### **2.1.9.2 Collective action optimists and pessimists**

Cooperation theorists may be divided in so-called "collective action optimists" and "collective action pessimists". Collective action optimists refer to those social scientists who assume that wherever cooperation is required for the mutual benefit of a group of people, it will naturally occur. Participation optimism originates from orthodox group theories prevailing in political science in the 1950s. These believed that the existence of a collective interest constitutes a sufficient motive for joint action, and that, if given a chance, people would try to influence decisions that affect their lives. Failures to live up to these expectations were considered abnormalities (Nagel, 1979).

However, low participation in elections, voluntary organisations, and collective action in general, led political scientists to question the validity of these assumptions in the early 1960s. The costs of participation were recognised as a factor that may induce individuals to take a "free ride" on other people's efforts instead of sharing the costs or burden of cooperation. This has led in the late 1960s to an increased pessimism in economics, political science and other disciplines about people's inclination towards voluntary cooperation. Three distinct paradigms have been particularly influential in

supporting theories about the limited opportunities for people to further their common interests: the "logic of collective action", "prisoner's dilemma" and "the tragedy of the commons". Although these three paradigms share some fundamental views about the inherent conflict between individual interests and group interests, each of them has had powerful influence in academic and political circles (Nagel, 1979; Olson, 1965, Melucci, 1995).

#### **2.1.9.3 The logic of collective action**

"The logic of collective action" is a theory advanced by Olson in 1965 (Olson, 1965). The theory is often used to demonstrate that rational individuals are unlikely to participate in a group endeavour to pursue a common goal. By "collective action", Olson refers to group efforts to further common interests. The logic here therefore encompasses almost all acts of cooperation aimed at goals shared by a group of people. These goals may relate to a tangible goods, or to immaterial benefits, but they all have a point in common that if the goal is achieved, everybody benefits from it, regardless of whether he or she contributed to its provision. Economists refer to these sorts of group goals characterized by jointness of supply and impossibility of exclusion as "public goods". The theory recognised the link between collective action and public goods and that all group goals and group interests are subject to the same dilemma.

Contrary to Hardin's "Tragedy of the Commons" (Hardin, 1968) and to the "Prisoners Dilemma" (Ostrom *et al.*, 2002), Olson theory recognize the possibility of rational individuals pursuing a public interest. The factors determining an individual's attitude towards cooperation were identified as, group size and other group characteristics and coercion. Olson referred to coercion as one instance of a broader group of phenomena he calls "selective incentive", which are material or social rewards specifically oriented

towards those who contribute to a collective action. Marwell and Oliver (1993) argue that there are many factors that may explain collective action other than those discussed by Olson.

First of all, as pointed out by Melucci (1995), it is necessary to overcome “the Olsonian individualism” and a negative assumption that collective phenomena are simply empirical aggregations of people acting together needs to be discarded.

Secondly, by considering non-material rewards as acceptable selective incentives, and by recognising that also “extra-rational motivations” (such as moral motivations and self-realisation) may determine individuals' participation to collective action, it is possible to recognise many more situations under which it may occur.

#### **2.1.9.4 Prisoners' dilemma**

The “Prisoners’ Dilemma” originates from mathematical game theory, which was one of the dominant frameworks for analysing social interactions in the fifties and sixties. The Prisoner's Dilemma shares with Olson's theory of collective action in its generality and its apparent power in providing a solid basis for a profoundly disturbing conclusion “that rational people cannot achieve rational collective outcomes” (Ostrom, 1990). The Prisoners' Dilemma suggests in a clear manner that it is impossible for rational people to cooperate, a conclusion that bears directly on fundamental issues in ethics and political philosophy. In effect the paradox that individually, rational strategies lead to collectively irrational outcomes seems to challenge a fundamental faith that rational human beings can achieve rational results (Ostrom, 1990). Like Olson's logic of collective action, the Prisoners’ Dilemma has been applied to a broad spectrum of situations. Several theorists have relied on this argument to provide the essentials of a theory of state, which would be needed above

all to enforce contracts and punish deviants, so that social order can be maintained. It was also frequently used to explain the depletion of common pool resources and the failure of groups to provide or maintain public goods. However, its application to real life situations has been strongly criticised by many scholars.

Runge (1992), for example, calls attention to the fact that the game represents a special case of joint action that can only be understood if one recognises the structure of the game as a function of the institutional environment in which it is embedded. Those who see in the Prisoner's Dilemma an inevitable human tendency tend to confuse cause and effect, and that the result of the game is just an artifact of the way in which it is set up. Thus, as argued by Bromley (1992) it is essential to understand that the institutional structure of any game (or life situation) reflects the prior social purpose to be served by the human interaction under consideration. The existing institutional structure reflects, among other things, prevailing cultural and social norms regarding individualism and its relation to collective notions. In that sense, we can say that people behaviour (or choices) is moulded by operating institutional contexts.

#### **2.1.9.5 The Tragedy of the Commons**

The still widely used metaphor “tragedy of the commons” owes its origins to an article by Garrett Hardin which appeared in *Science* in 1968. Hardin (1968) was not exclusively concerned with common pool resources, but with what he names “no technical solution problems” in general. These include a broad array of problems such as population explosion, air pollution, deforestation, industrial waste control, and so on. The powerful impact of this article may partly be explained by the time and socio-cultural context in which it was published. It was in those years that the western world became suddenly aware

of the dramatic consequences of an unconcerned use of natural resources that was rapidly leading to their depletion and to an irreversible loss of biodiversity.

However, in subsequent publications Hardin has already modified his position in which he argues that the “tragedy of commons” is inevitable only in a situation characterised by absence of management. He also distinguishes between unmanaged and managed common resources (Hardin, 1994; Monela, 1995). Common property regime is used to refer to property rights arrangement in which a group of resource users share rights and duties towards a resource (McKean and Ostrom, 1995).

## **2.2 Property and Property Rights**

### **2.2.1 Property rights and regimes**

Natural resource use and management are governed by people's perception of the property rights applying to the resource in question. Natural resource management systems of sub-Saharan Africa operate under a variety of property right arrangements or regimes (Bruce, 1990). The nature of property and the specification of property rights are determined by members of a society in question. Property rights are defined as a set of rights and obligations governing access of individuals or groups to the stream of benefits, which can be derived from a resource (IFAD, 1995). A resource regime is a structure of rights and duties characterising the relationship of individuals to one another with respect to a particular resource (Bromley and Cernea, 1989).

The literature on property generally recognizes four categories of regimes: the state property (*res publica*) where claim - at least nominally - rest with the government; private property - where claim rest with an individual; common property or communal property regimes (*res communes*), where claim rest with a group; and open access or non property situations (*res*



*nullis*), where there is no secure claim (Gibbs and Bromley, 1990; Swallow, 1990). These categories are usually distinguished on the basis of the ease with which potential users can be excluded from access to the good ('excludability'), and whether using a portion of the good shrinks the supply that remains ('sub-tractability'). 'Public' goods which are non-excludable and non-sub-tractable (e.g. street lights and clean air) contrast with private goods, which are both excludable and sub-tractable. Common property goods lie somewhere in between the two, and share some of the characteristics of each; exclusion is difficult, and they are sub-tractable (Ostrom, 1990).

Thus, private property and common property can be seen not as mutually exclusive, but as two types of property with a good deal in common (Bruce and Mearns, 2002). As access to use of common property is confined to members of a defined user group, which excludes other potential beneficiaries, the common property therefore has some of the attributes of shared private property. On the other hand, common property regime is a way of privatising the rights to use a resource without having to divide the resource into individual holdings (McKean, 1995).

### **2.2.2 Common property versus open access regimes**

The term 'common property' has been largely misunderstood and falsely interpreted (Bromley and Cernea, 1989). Over the years, 'common property' has all too often been used to refer both to land or resources available to all and consequently not owned or managed by anyone, and also to situations where access is limited to a specific group that holds rights in common. The confusion between the two has been aggravated by the way a 1968 article by Garrett Hardin on the 'tragedy of the commons' (Hardin, 1968) has been interpreted and understood. Though this is not explicit in the article, the situation that Hardin was describing was in practice one that is more accurately termed 'unregulated open access' use

(Ostrom, 2000). However, it was widely interpreted as applying to any situation involving resource used in common by several or many users. Failure to recognize 'common property' as a regulated form of resource tenure and use, managed by a group of users with exclusive rights to do so, and the consequent presumption that such a use is destined inevitably to lead to degradation of the resource, has had a profound impact on thinking, policy and practice related to control and management of rangelands and other natural resources (Ostrom, 1992). In particular, it has contributed to the pursuit of land distribution policies that favour individual private landholdings, and has helped to justify state control of natural resources, like forests, ostensibly to ensure protection and productive use (Bruce, 1986).

There is also confusion because 'common property' is used to refer to a resource or to the collective system for managing the resource, or to both (Ostrom, 1992). In this study, therefore, the term 'common pool resource' (CPR) has been used to characterize the resource, and the term 'common property' (or 'common property regime') is reserved for situations in which the resource is managed as common property (McKean and Ostrom, 1995).

### **2.2.3 Roles of institutions in the management of common pool resources**

In order to regulate the use and management of a common pool resource, there must be institutions that authorize and secure use by a particular group of users (to the exclusion of others), and institutions that set rules to govern this use and monitor and enforce those rules. Thus, common property systems can function only if the group is organized, or can organize itself, to set and implement such rules, provide individual members with inputs and services that are more effective when organized collectively, and provide a mechanism for negotiation and liaison with the state and other external entities (Ostrom, 2000).

It is also necessary to ensure that the user group is empowered to exercise the exclusive use rights that it claims. Much misunderstanding and confusion has arisen in this respect because of failure to distinguish between the rights to use a resource and the rights related to the resource itself. Rights may exist or be established that enable persons, or groups of persons, other than the owner to use the resource or some specified output of that resource. This becomes particularly important in understanding uses where much of the resource is owned by the state, but most usage is by individuals, collective or industrial entities, frequently with multiple users exercising rights to different products or to use at different times of the year (Ostrom, 1992,). Equally, systems based on communal ownership or control of the land may contain tenurial niches in which individual and family property also exists. Common property should therefore not be confused with 'communal tenure' (Bruce and Mearns, 2002).

The distinction between stock and flow (output) is another aspect of resource management that is often overlooked or misunderstood. The institutional arrangements for producing and using flow units are quite likely to be different from those controlling and managing the stock units. Problems and issues can arise separately in each, and the governance arrangements needed to handle both successfully are frequently complex (McKean and Ostrom, 1995). Perhaps the most important area of misunderstanding relates to the relative merits of private and common property. The preference for private property that underlies so much of the transfer out of common property rests on the argument that well-defined property rights are needed in order to ensure that the holder will use the resource efficiently and responsibly, and that only private property rights provide this security. However, much of the debate about privatisation assumes that private property is synonymous with individual ownership. This overlooks the fact that the definition of private property actually has to do with rights, not who holds them, and that much private property is held by

business partnerships and shareholder-owned industrial corporations, and other collective entities (Bruce, 1990). It is therefore argued that, "like individual parcellation, common property gives resource owners the incentive to husband their resources, to make investments in resource quality and to manage them sustainably and thus efficiently over long term" (McKean, 1995).

#### **2.2.4 Circumstances favouring common property regimes**

The principal argument in support of privatisation to individuals or expropriation by the state is based on the assumption that the cohesion and discipline necessary for effective collective management cannot be achieved, resulting in unregulated open access overuse with a 'tragedy of the commons' conclusion. Implicit in this argument is the assumption that circumstances no longer permit effective collective control or, more fundamentally, that the changing environment within which individuals must operate fosters behaviour patterns inimical to collective cooperation (Dietz *et al.*, 2002). However, these arguments fail to take into account those factors, which encourage collective action, and the self-regulating capabilities of groups of users (Runge, 1986). These arguments also overlook the reasons why the alternatives to common property management may themselves not be sustainable. The same reasons that make it difficult to secure exclusion from a CPR may make it even more difficult to achieve the degree of separation, exclusion and protection necessary to privatise it. Individual private use can also lead to overuse and degradation, particularly on the low-productivity sites characteristic of many common pool resource areas. Equally, the state may not be able to control, manage or prevent degradation to a resource it has expropriated (Berkes *et al.*, 1989).

Furthermore, privatisation is unlikely to improve the efficiency of meeting the needs of those who used the resource as common property. In fact, by transferring control of the

resource to a limited number of individuals who thereby acquire the social and legal sanction to exclude others, privatisation is likely to exacerbate the problems of those without access to private property (Bromley and Cernea, 1989). The thrust toward expropriation or privatisation also tends to ignore the fact that breakdowns in common property systems may reflect deficiencies in policy or policy implementation, rather than their appropriateness for managing a resource. For example, common property seldom has the same degree of support in law, or elicits the same response from the authorities when threatened, as private property (Bruce and Mearns, 2002). The central question that needs to be addressed is, under what circumstances does common property provide the best match between the resource and the economic, social and institutional context within which it is located? As long as resources are abundant, and pressures on them are low, the need for regulation and rules is unlikely to arise, and open access use is likely to be as appropriate as any other regime (McKean, 1995).

### **2.2.5 Advantages of common property regimes**

Dietz *et al.* (2002) and McKean (1995) observe that, in many situations more than one of following conditions apply, particularly where people are interested in making good use of a resource system capable of generating multiple products:

#### **(i) Indivisibility**

The resource may have physical traits that preclude parcelling. The production system may not be amenable to division or demarcation. It may not be possible to establish boundaries around the resource system, or resources may be mobile over large territory.

**(ii) Uncertainty in location of productive zones**

In fragile environments nature may impose great uncertainty on the productivity of any particular section of a resource system, and the location of the unproductive sections cannot easily be predicted from year to year, but the 'average' or 'total' productivity of the entire area may be fairly steady over the years. In this situation, the resource system is stationary and may even have fairly obvious boundaries, but its productive portions are not stationary. In such systems resource users may well prefer to share the entire area and decide together where to concentrate the use at a particular time, rather than parcelling the area into individual tracts and thereby imposing the risk of total disaster on those users whose parcels turn out to be unproductive in a given time.

**(iii) Productive efficiency through internalizing externalities**

In many resource systems, uses in one zone immediately affect uses and productivity in another. If these externalities are substantial, creating a common property regime to make resource management decisions jointly can provide a mechanism for acknowledging and internalizing the multiple negative externalities that are implicit in resource use in this setting (McKean, 1995).

**(iv) Administrative efficiency**

Even if resources are readily divisible into parcels, and where intensive independent use of adjacent parcels does not produce negative externalities, the administrative support to enforce property rights to individual parcels may not be available (Runge, 1990). The society may be too poor to support a large court system to enforce individual land titles, and even low-cost fencing would be expensive by the society's standards. Creating a common property regime in this case can be a way of substituting collective management rules, which function as imaginary fences and informal courts internal to the user group, for what

is missing. It is less expensive in these circumstances, and it is within the power of a group of resource users to create a common property regime (McKean, 1995).

Historically, common property regimes evolved where the demand on a resource was becoming too great to tolerate open access use any longer, so that property rights in the resource had to be created, and where other factors make it impossible or undesirable to allocate the resource to individuals (McKean, 1995). A common property regime can also emerge as a way to secure control over a territory or a resource, to exclude outsiders or to regulate the individual use by members of the community (Bruce and Mearns, 2002). Common property, like any other property or governance regime, is likely to be maintained only as long as it is appropriate to the changing situation in which it is found. For instance it is a main stay production system in most of pastoral land use systems prevalent in African rangelands.

#### **2.2.6 Collective action in the management of common pool resources**

Sustainable management of common pool resources is dependent, to a large extent, on the collective action of a group of resource users. According to Olson (1965) success in collective action is firstly dependent on the nature of the group such as: its size, age and purpose. Secondly, it is dependent to the extent to which group characteristics are shared among group members such as homogeneity in origin and in goals. It also depends on the role of incentives in the realisation of collective action and overcoming of free-rider problems (Dietz *et al.*, 2002). Such incentives may take the form of positive “joint product” benefits to members who participate in group activities or of “penalties” imposed on those who fail to contribute to the collective action. Other factors include the political will and psychological attitudes such as relative deprivation among group members (Hardin, 1982).

### **2.2.7 Why care about common pool resources?**

Development agencies and policy makers concerned with rural development in Africa should care about the future of CPRs for three related sets of reasons. First, CPRs are the integral part of the natural environment. Secondly, CPRs are central to rural income and welfare. This is especially important for the poor. Thirdly, many CPR regimes in Africa are now disintegrating in the face of socio-economic and environmental pressures. Modern economic forces have often favoured privatisation of previously common - pool resources, narrowing access to a smaller fraction of the population. From the other direction, new states have often nationalised rural resources. Legally, at least, this has destroyed common property institutions. In practice, however, these institutions may continue to function in some form typically weakened by no longer having recognised authority (Ostrom, 1990).

Common property resource regimes remain the appropriate management strategy in three types of circumstances. First, where a group venture is the only practicable way of securing and controlling the resource. Second, where resource productivity per unit area is not high enough to guarantee individual and public returns needed to sustain private property regimes. Third, more contentious case is where new technologies could support privatization by a minority with access to them, but at the expenses of the poorer majority. In such cases, expropriation of communal resources has led to resource-use conflicts. This remains true in most rangelands and forests (IFAD, 1995).

### **2.3 Natural Resources Tenure as a Social Institution**

Natural resource tenure refers to the terms and conditions on which natural resources are held and used. According to Bruce (1986) if land is the natural resource under focus, land tenure refers to the terms and conditions on which land is held and used. Tenure is not a matter of man's relationship to natural resource such as land but is rather a social institution.



It is a matter of relationships between individuals and groups of individuals in which rights and obligations with respect to control and use of land, for instance, are defined. In traditional agrarian societies natural resource tenure is a profoundly important social institution (Birgegard, 1993).

Access to and use of natural resources, and notably land, has been and still is the key means for survival for a majority of the people in Sub - Saharan Africa (SSA). The control and use of land and other natural resources has been the way to sustain the family or the household, to maintain the clan and to enrich the tribe (Mkangi, 1983). Access to and control of natural resources is also a prime source of social position and power. Therefore, land and natural resource tenure is a profoundly political issue. One can argue that land has significance in all dimensions of rural life (Birgegard, 1993). Therefore land tenure, becomes an all embracing social institution. Consequently, forced changes in tenure rules have ramifications to the entire social fabric of rural societies (Okoth – Ogendo, 1991; Mkangi, 1983). This fact is too often overlooked. The analysis of tenure issues is in most cases reduced to a matter of land use, agriculture production efficiency, access to credit, fragmentation of holdings, mechanisms for conflict resolution, or the like, failing to recognize the wider implications of tenure. The weakness of such an analysis becomes most apparent when it is used as a basis for tenure reform proposals (Birgegard, 1993).

### **2.3.1 The multiplicity of indigenous tenure systems in Sub-Saharan Africa**

Tenure systems in SSA show a bewildering wide diversity. Different ethnic origins, histories of conquest and subordination, densities of settlement, social structures, natural resource endowment, agriculture production systems, technology, religious beliefs and a host of other location and group specific factors have resulted in a wide range of natural

resource tenure systems. This multiplicity of tenure systems has evolved over time and is presently in an accelerated process of dynamic change (Birgegard, 1993).

Typically, in most indigenous systems, each individual has a number of tenure rights or bundles of rights with respect to different natural resources. Yet, rights often differ between individuals and categories of individuals. Under certain settings, several individuals may claim rights to one and the same resource (Feder and Feeny, 1991). This is a typical case for common property regimes governing the use of say forests and grazing lands (Norohna, 1989).

### **2.3.2 Dynamism in indigenous natural resources tenure systems in Sub –Saharan**

#### **Africa**

The indigenous natural resources tenure systems in Sub-Saharan Africa are not static. A range of factors can lead to change in natural resources tenure systems. Some are dramatic such as conquest or subordination in war, including colonization. Natural calamities, such as extended drought and famine may also generate change. Other factors occur more gradually such as increase in population, innovations in production technology, commercialisation of production, domestic migration, and re-orientation of religious beliefs such as the spread of Islam and the introduction of western type land laws (Birgegard, 1993).

One, clearly discernible, change in indigenous tenure systems has been observed under increased population pressure and the influence of commercialisation of natural resource use where tenure systems tend to become increasingly individualized. This trend is particularly clear for arable land (Bruce, 1986). Individualization of tenure also means

that secondary right holders such as women see their rights diminishing. Some see these changes as social disintegration (Shipton, 1988).

### **2.3.3 Tenure reforms in Sub-Saharan African context**

In the Sub-Saharan African context, tenure reform is generally not considered to imply a redistribution of land or other natural resources. Rather, tenure reform refers to changes in the terms and conditions on which natural resources are held and used. Reform implies an attempt to influence a change through interventions (Bruce, 1986). Post-independent SSA has seen numerous government interventions for changing natural resource tenure.

Sweeping reforms in most countries declared the state as the owner of all the land. Previous freehold titles were transformed to leasehold titles. In countries choosing a socialist path to development like Tanzania, tenure reforms started a process of collectivization of production on cooperative and state farms (Tenga, 1987). Few countries such as Ghana, Nigeria and Botswana, attempted to integrate indigenous tenure systems with government-controlled land administration systems. Few other countries have pushed on individualization of tenure through nationwide programmes. The most systematic compulsory tenure reform programme is that of Kenya (Okoth-Ogendo, 1991). In spite of many attempts to reform tenure systems in Tanzania, the most common result is that the state stands as the formal owner of land and other natural resources but indigenous tenure systems rule the way these resources are controlled and used (Shivji, 1998).

The current debate on tenure reforms in Sub-Saharan Africa focuses on the possibility that such reforms may accelerate economic development. In this debate the analysis is often reduced to the economic efficiency aspects of tenure. More recently, sustainability in resource use has been added. This focus overlooks the profound significance of tenure in

the formation and functioning of the entire social fabric of a society. Tenure reforms should be seen in such a broad perspective but seldom is. An ill-conceived tenure reform is not only likely to fail in its development objectives, but it is also a powerful source of social disruption (Birgegard, 1993). The question is then what type of tenure reform, if any, can increase efficiency in resource use and also contribute to sustainable resource-use.

### **2.3.4 Tenure and common pool resources**

Common pool resources (CPR) are simply resources used in common. CPR are a sub-category of public goods. A specific characteristic of CPR is that their use is sub-tractable (Ostrom, 2000). Increased ecological concerns have brought new life to an old and controversial debate on tenure and CPR. The arguments against communal management arrangements in favour of private management systems have come out with even stronger force for agricultural land. At the same time research findings on communal management systems and experiences from pilot development activities have questioned the privatization argument and suggested that there might be alternatives (Birgegard, 1993).

## **2.4 Land Tenure in Tanzania**

### **2.4.1 Evolution of land tenure**

Land tenure in Tanzania, as in most developing countries, has been characterized by a dualism of both statutory and customary land regimes (Shivji, 1998). This heterogeneity is reminiscent of the political history of the country, particularly the colonial past. The most important political events are the establishment in 1885 of German administration. This was followed by British administration (1918 – 1961) as a “Mandated Territory” (later a Trust Territory) under the auspicious of the League of Nations (later the United Nations Organisation) (URT, 1994). The colonial era was followed by the independence under a government committed to the philosophy of socialism (during 1960s to late 1970s) and the

subsequent economic liberalization and structural adjustments of 1980s (Shivji, 1995). Each of these historical landmarks had significant impacts on the land tenure system in the country. As such, the evolution of land tenure in the country can be examined under three main eras: the pre-colonial, colonial and post- independence periods ( Shivji, 1998).

#### **2.4.2 Land tenure during pre-colonial period**

Prior to colonial period, land holding in Tanzania was based on customary laws of different tribes. Land allocation was controlled by the recognised authorities including - chiefs, elders and headmen – who allocated land to individual members, on behalf of the tribe (MLHUD, 1995). In many areas there was communal land for grazing and forest lands for gathering fuel-wood, and shifting agriculture was practised extensively. Such cultivation was practicable and viable under conditions of low population densities, abundance of land and subsistence agriculture. Under this system each member of the family and heir, had a definite share in land hold under clan tenure, but none had a right to dispose the land (Tenga, 1992, 2001).

#### **2.4.3 Land tenure under colonial administration**

The colonial administration - the Germany (1885 – 1916) and the British (1918 – 1961)- introduced a property regime that invested ownership of all land resources in the state, creating state property regime. In effect this alienated local communities' customary ownership of land resources to the state and foreigners (URT, 1994). The institutional mechanism used to effect this was through introduction of legal instruments: laws, decrees and regulations (Shivji, 1998). The Germany decree “regarding creation, acquisition and conveyance of crown lands” of 1895 and the British land Ordinance No.3 of 1923, vested a radical title (i.e. ultimate ownership and control) in the state under the discretion of the Governor. Colonial authorities assumed that the indigenous occupants had no ownership

rights over the land (URT, 1994), leading to bloody “Majimaji” rebellion of 1886 – 1893 (URT, 1994). According to Shivji (1998), this property regime was aimed at facilitating the exploitation of resources in the colony and asserts conquest powers.

This was indeed, the beginning of the breakdown of the customary institutions for governing land resources. For instance the British administration, applying the indirect rule approach, established the Native Authorities, which usurped land-allocating functions of traditional land allocating authorities. The Native Authorities were gradually replaced by Local Government Authorities created under the Local Government Ordinance CAP 333 of 1953. The Local Authority was an elected government; this is apposed to appointment by basing on hereditary rights which applied to the Native Authority (Tenga, 1987). By 1963 the Native Authorities and African chiefs were phased out by the Native Authorities (Repeal) Act of 1963.

#### **2.4.4 Land tenure during post-independence period**

The independent state adopted virtually the same colonial land ordinance. For example, the Tanganyika Land Ordinance of 1963 and subsequent land laws retained the radical title where all lands in the country were public lands vested on the President (Tenga, 1987), who holds lands in trust of all people of Tanzania (URT, 1994). For the past 40 years until 1995, there has been no comprehensive land tenure policy, except some land tenure conversions (Okoth – Ogendo, 1991). For example - the Freehold Titles (Conversion) and Government Lease Act, No. 24 (Cap. 523) of 1963; Customary Leaseholds (Enfranchisement) Act, No. 47 of 1966; Rural Farmlands (Acquisition and Regrant) Act, No. 8 of 1966 – are among the legal instruments that facilitated land tenure conversions (URT, 1994). Shivji (1998) observes that none of these measures amounted to land reform or land redistribution.

Other supplementary statutes like – the Land (Law of Property and Conveyance) Ordinance, Cap. 114; the Land Registration Ordinance, Cap 334; the Town and Country Planning Ordinance, Cap. 378; the Land Acquisition Act of 1967; and the Limitation Act of 1971, all gave primary emphasis to the Granted Right of Occupancy (Shivji, 1994). But very little protection was deemed for customary tenure system under which about 95% of the land in the country is governed. Nonetheless, substantial changes in land tenure came about through other policies. More importantly the late colonial land reforms and modernisation ideology continued to influence and direct post-independence policies with varying, mostly, adverse effects on customary lands (Shivji, 1998). Modernising the traditional systems meant removing them from their traditional surroundings and their institutions and integrating them into the capitalist market institutions. These policies were implemented through a number of programs: settlement schemes and group ranch projects, nationalisation, “villagisation” operation, village titling and legislation; and economic liberalisation (Kihondo, 1999).

#### **2.4.5 Modernisation policies**

The modernization policies of early 1960s emphasised on land individualization, titling and registration (World Bank, 1961). The Village Settlements Act, No. 27 of 1965, provided for establishment of the village settlement schemes. Whereby the rural settlement commission would be granted a right of occupancy to lands and the individual farmers would hold the lands under specified derivative rights (Jacobs, 1980). The rangelands development projects (Range Development and Management Act, No. 57, of 1964) aimed at establishing of group ranches in the main pastoral areas (Jacobs, 1980). But both programmes failed largely because there was no participation whatsoever of peasants and pastoralists - in the planning, management and use of land. The perception of the people on land tenure embedded in their customary systems and their land rights deriving thereof were

disregarded (URT, 1994; Coulson, 1982). These policy measures had in effect initiated the process of open access regimes.

#### **2.4.6 Nationalisation and “villagisation” policies**

Substantial changes in land tenure generally and customary tenure in particular was brought about by “nationalisation” and “villagization” policies of late 1960s and 1970s Tanzania, then committed herself to socialist production system (Coulson, 1982). The implementation of socialism policies was followed by nationalisation of private enterprises, whereby assets were taken over by parastatals including land, which was held under rights of occupancy. Land held under customary systems in the villages was also alienated to parastatals through government allocations, creating potentials for land disputes (Shivji, 1998; Lane and Moorehead, 1996). The “villagisation” operation was conducted during mid 1970s in implementation of socialism policies. It involved reallocation of existing villages and resettlements, peasants and pastoralists in new or old villages (Tenga, 1987) centred on communal production (Nyerere, 1968). However, according to Shivji (1998) “villagisation” was carried out without any accompanying authority in law. The result was confusion in tenure and the undermining of security for customary land holders. Tenga (1987) argues that, “villagisation” increased the possibilities of alienating village land on unprecedented scale.

The legal instruments used to legalise land expropriation under villagisation include: the Rural Lands (Planning and Utilisation) Act, No. 14, of 1973. According to Shivji (1998), the Act was laden by a number of shortcomings, in particular the deemed rights of occupancy by customary holders was never addressed by it. Another instrument is the Village and Ujamaa Village (Demarcation and Registration) Act of 1975 (URT, 1975a),



provided for the granting of “right of occupancy” to the village council. This Act was intended to provide villages and village lands greater security.

In practice, however, village titling turned out to be yet another source of insecurity for customary holders. As the Act provided the village council, and therefore other government institutions, which control it, unfettered powers over village land. There was no checks and balances in place to prevent corrupt tendencies by council members to granting land to outsiders against the interest of villagers (Shivji, 1998). At local levels, titling has given rise to boundary conflicts. Shivji (1998) cite cases of villages obtaining certificates under suspicious circumstances, for example the boundary conflicts between Sonjo and Maasai villages in Ngorongoro District in Arusha region. The fact that the Maasai hold the land title had never prevented the Sonjo claim that the former had encroached on their land (URT, 1994).

The institutional provisions of the two Acts (Village Land Act, 1967, and District Authorities Act of 1963) were repealed and merged in the Local Government (District Authorities) Act No. 1 of 1982. However, the legal framework for village land remained unclear and a potential source of conflicts (Shivji, 1987). In effect villagization destroyed what little was left of the security of deemed rights of occupancy deriving from the 1923 Land Ordinance. This in effect was largely as a result of institutional clash, because a number of administrative structures that had mandate to allocate land were put in place without formally repealing the precedent authorities. The case in point is best exemplified by the Local Government system which was superseded by Development Councils (DCs), created by the Decentralisation of Government Administration (Interim Provisions) Act of 1972 (Shivji, 1998). The DCs took over the land allocation functions and control of usage, but there were no formal repeal of the Local Government Ordinance. The Village and

“Ujamaa” village (Registration, Designation and Administration) Act, No. 21 of 1975, (URT, 1975a) allowed registration of villages and vested into the “Village Council” powers to oversee usage and transfer of village lands (Tenga, 1998). Under the Act, the District Development Council had to allocate land for village use to village council, but it was not clear whether the DDC had any land reserve for allocation to the villages (Shivji, 1998). The Act set up the “Village Assembly” (a meeting of all adults in the village), the elected village council of 25 persons, and a sub-committee consisting of five members, which deals with land matters. But under the law, the Village Assembly has very little power, while the Village Council was subject to powers of District Councils, and other government agencies at higher levels (URT, 1994). This had created a total confusion over the tenure regime with jurisdiction over the village lands. Consequently, most villagers in Tanzania have ever since been haunted by the apprehension about their lands (URT, 1994).

The Village Act of 1975 was replaced by the Local Government (District Authorities) Act, No. 7 of 1982 (URT, 1982b). This Act repeals also the Local Government Ordinance, and incorporated the system of villages under its structures (Tenga, 1998). But this did not improve the security of tenure of customary title holders. The government attempted to normalise the situation by introducing the Regulation of Land Tenure (Establishment of Villages) Act, No. 22 of 1992 (Shivji, 1998). The Act sought to extinguish pre – villagisation customary rights in villages established during villagisation process, but the Act had since been declared unconstitutional by the High Court (Shivji, 1994). Thus, village titling has potential for devastating consequences for the land rights of the rural poor, and in practice it is not feasible. The National Land Policy of 1995 has abandoned village titling (MLHUD, 1995).

#### **2.4.7 Economic liberalisation policies**

During mid 1980s the government adopted policies for liberalisation of the economy (Campbell and Stein, 1991). These aimed at creating enabling environment for a free market and to encourage foreign investors. However, the measure contributed to land alienation and expropriation, particularly for lands held by customary owners in villages. The legal instrument which provides for economic liberalisation is the National Investment (Promotion and Protection) Act No. 10, of 1990 (Shivji, 1998) which was repealed by the Tanzania Investment Act No. 26 of 1997 (URT, 1997a). The main aim of the legislature is to attract foreign investors, at the expense of customary landholders.

### **2.5 Pastoral Resource Tenure**

#### **2.5.1 Overview**

The pastoral systems operate within localised informal as well as formal institutions. The informal or customary institutions are the habitual ways – not established in written law – a pastoral society manages its everyday affairs. These include customary land tenure, inheritance, trade, rules and conventions about marriage and conflict resolution over access to resources. The formal institutions relevant to pastoral development include national constitutions and legislatures dealing with land ownership and use, property rights in animals or trade (Swift, 1996). The pastoral communities in dry land areas have developed a large array of tenure arrangements and institutions for access and use of resources, which are risk sharing devices. This demands high flexibility in institutions and tenure arrangements (Ngaido, 1999). Thus, equity remains the major concern among pastoralists who tend to regard their scarce resources (land, water and forage) as better managed for the general good under communal control (Child *et al.*, 1984). The in-built equitable resource access guarantees satisfaction among members, who in turn abide to the rules (Ngaido, 1999).

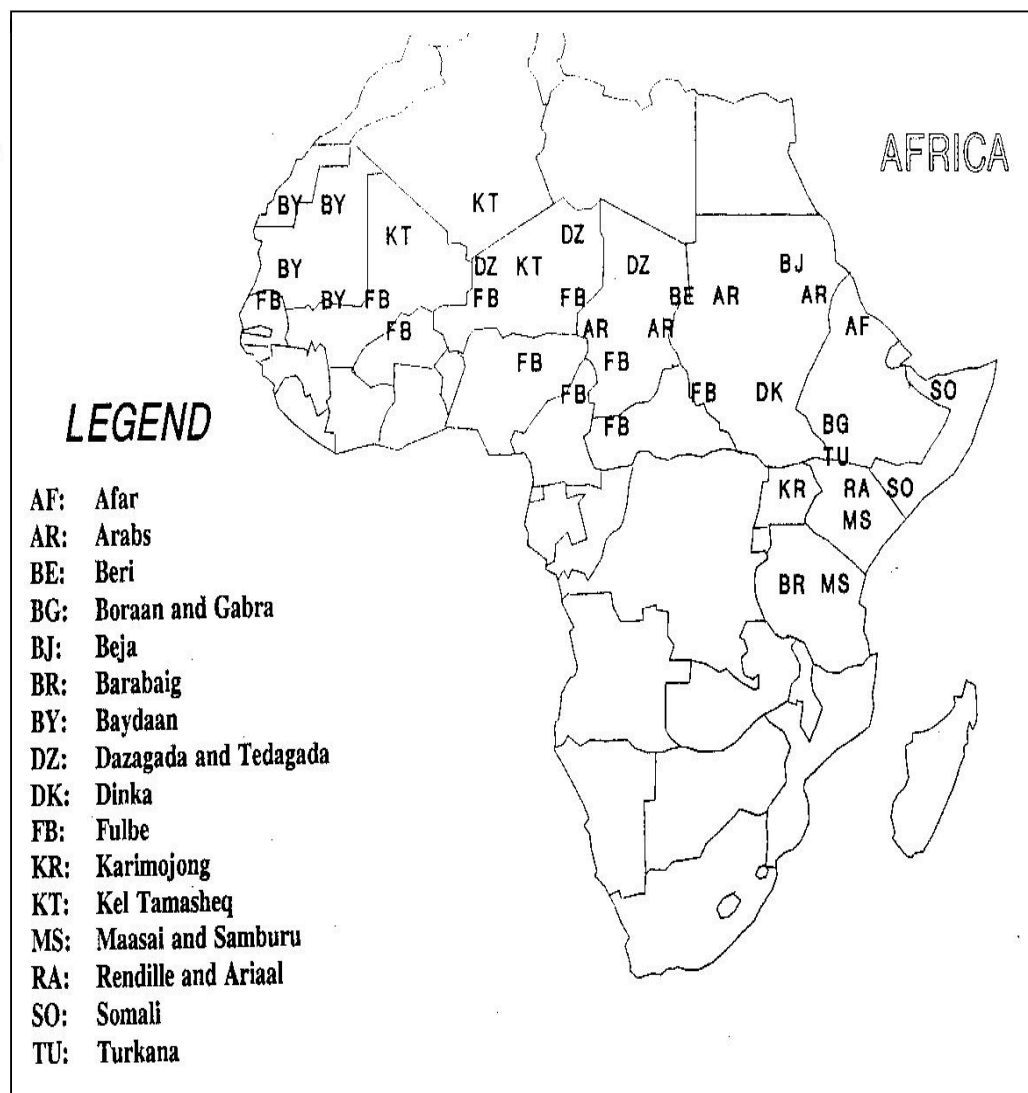
### **2.5.2 Pastoral production systems**

Pastoralism evolved as a response to two factors; medium human population densities and the presence of extensive rangelands, usually marginal lands unsuitable for rain-fed crop production. Pastoralism way of life entails continuous movement of animals in search of pasture and water. Though pastoralism faces harsh and unpredictable conditions and environment, it has been relatively stable over long-term in terms of providing livelihoods. Due to their need for widespread mobility, pastoral communities often come into contact with sedentary agricultural communities, who on their part, due to their increasing populations, increasingly encroach on the marginal pastoral land that could be converted to agricultural production (Shem, 2004).

In East Africa and much of Sub-Saharan Africa, pastoral communities are generally found in dry lands, often referred to arid and semi-arid areas (ASALs). Dry lands are those areas that cannot support sustained and reliable crop agriculture. Sustained and reliable cropping has been defined as 75% probability of harvesting the most drought tolerant traditional crop, usually millet in East Africa. The areas exhibit a high diversity in climate, landforms soil types and vegetation. Key ecological features include harsh climatic conditions that are characterized by low yearly rainfall (about 250-600mm), which show high variability, both in space, and time, coupled with year-round high temperatures (35-40°C). These climatic conditions result in short growing seasons often randomly scattered in space and time, low pasture production, and often prevalence of ephemeral and annual species (Bekure *et al.*, 1991).

Livestock keeping is the major occupation and also the main mode of production, referred to as *pastoralism*. Today, pastoralism represents a key and widespread human land-use system, occupying over 25% of the earth's land surface. In Eastern Africa, pastoral lands

stretch from southern Sudan down to Mozambique. Examples of pastoral communities within this territory include the Nuer of Sudan, Afir and Beni Amir of Eritrea, Maasai, Pokot, Samburu, Turkana, Rendille and Somali of Kenya, Jie and Karamojong of Uganda, and the Maasai and Barabaig of Tanzania (Figure 2).



**Figure 2: Distribution of the main pastoral groups in Africa**

Source: Bonfiglioli, 1992

These are only very few examples. These heterogeneous communities differ, even if only slightly, in objectives, strategies, needs, management styles, and the degree of movement in search of pasture and water for their livestock (Shem, 2004). In Tanzania, the pastoral population is estimated at about 250,000 people. The main pastoral groups are: the Maasai-speaking groups, such as the Maasai in the North and Ilparakuyo (Baraguyu, Wakwavi or Kwavi), in the East; and the Barabaig in the North-West. There are also a growing number of agro-pastoralists, including the Kuria, Sukuma, Gogo and Nyamwezi. Pastoralists, by their very nature, are flexible and opportunistic and can rapidly switch management systems and adopt other land-use systems in overall extensive livestock production system. For example, cattle herders could practice regular systems of transhumance for a long period, building up relationships with crop cultivators on their routes.

However, in the event of extreme drought they switch to highly ‘nomadic’ patterns moving to new areas in search for pasture and water for animals, thus breaking the relationships established with the farmers. When the crisis passes or eases out, they may revert to their former pattern or adopt a total new mode of management. Based on mobility level, pastoralism can broadly be defined in three ways. Firstly as *nomadic (pure) pastoralism*, this essentially revolves around livestock keeping and the utilization of natural pastures. Nomadic pastoralists are forced to constantly move out in search of pasture and water in order to maintain their subsistence, namely livestock. The routes followed depend on environmental conditions, the state of available resources, and the livestock species being managed. Nomadic pastoralism is characterized by the absence of cultivation, even for supplementary income. In Tanzania, both the Barabaig and the Maasai have for a long time been known to be pure pastoralists.

Secondly, there is *transhumance* pastoralism, which involves regular seasonal migrations. These migrations may take place between dry and wet season grazing fields or between highland and lowland pastures or between pastures and salt licks. The main difference between transhumance and the nomadic pastoralism is that under normal circumstances migration patterns of the *transhumants* are usually predetermined. These patterns do not, however, imply rigidity, but are often subject to substantial deviation as need arises. There is strong association with higher-rainfall zones; if the rainfall is such that the presence of pasture is not a constraint, then herders can afford to develop permanent relations with particular sites, for example building permanent houses. This type of pastoralism is usually associated with diversification to other economic ventures such as crop production and fishing.

Thirdly, is *agro-pastoralism*, which is a highly diverse form of pastoralism. Agro-pastoralists can be described as settled pastoralists who cultivate sufficient areas to feed their families from their own crop production. Therefore, cultivation forms the main subsistence activity, but livestock rearing remains an integral part of the production system. By engaging in both livestock and crop production, agro-pastoralists minimize the risk of falling below critical threshold of disaster, and therefore maximize the probability of survival. Agropastoralists generally occupy zones whose rainfall can support dryland crop cultivation, i.e. the semi arid areas. More recently, a new category, *urban pastoralists* have sprung up. This term has been used to refer to pastoralists whose true pastoral lifestyle and mode of production is no longer in operation, and as a result they have either been made sedentary around some basic facilities provided by relief missions, government and others, or have voluntarily moved to urban, or trading centres in search of alternative livelihoods (Shemu, 2004).

### **2.5.3 Some key features of pastoralism**

It is important to point out some key features of pastoralism, which involves risk minimization mechanisms and pastoral traditional knowledge.

#### **2.5.3.1 Risk minimization mechanisms**

During their long experience and interaction with environmental uncertainty, African pastoralists have developed highly flexible social systems and elaborate set of both individual and collective-based survival strategies that allow them to effectively utilize harsh and extremely variable environment in order to minimize loss of livelihoods (Herlocker, 1999). These include high mobility, herd diversification, herd splitting, and herd maximization

##### **(i) Mobility**

The pastoral production environment is characterized by varying temporal and spatial variation in the distribution and quantity of rainfall and forage. As such, pastoralists and their livestock must possess a high degree of resource utilization mobility in response to unpredictable forage and water availability. The prime objective is to maximize livestock survival. Two types of mobility can be identified. The first is *resource utilization mobility*, which is a response to unpredictable forage and water availability. The strategy allows pastoral herds to make use of dispersed forage resources when they are available, and most nutritious. The second type is *drought-escape mobility*, which involves long distance migration to evade drought conditions in one locality (Homewood and Rogers, 1991).

##### **(ii) Herd diversification**

Herd diversification involves keeping several species/types of livestock. The use of different livestock species has ecological and economic advantages. It allows for an



efficient use of pasture resources and facilitates a more reliable supply of food. For example cattle and sheep mainly feed on grasses but during times of herbage scarcity, sheep shift towards mixed feeding, and supplementing grass with low shrubs. The overall scenario is that although animals lie within the same habitat boundary, they feed on different plants. The diverse attributes of the different animal species are an advantage. For instance goats and sheep are important in the pastoral economy due to their higher reproductive rate and hardiness, which makes them more suitable for herd reconstruction after catastrophes (Swift *et al.*, 1996).

### **(iii) Herd maximization**

It is generally more rational for pastoralists to maximize a herd of animals beyond a 'basic' minimum, whatever that would be. The herd plays an important role as risk 'capital' during stressful periods, for example during prolonged drought and livestock disease outbreaks, the large herds will spread thin the risk of total loss. In the pastoral nomadic system, being largely isolated from national cash economies, surplus stock serve as an investment and some kind of insurance during periods of pasture and water scarcity, when some animals may be sold to purchase food grains. The herds are also necessary for building social alliances through transfer of animals to friends and kinsfolk as loans, especially during times of need. This is an essential element in a production system operating in an environment where government insurance or formal banks are non-existent (Bekure *et al.*, 1991).

### **(iv) Splitting of herds**

With increasing dryness, pastoralists split their herds into smaller groups in order to visit different grazing areas simultaneously. Thus, by moving substantial numbers of livestock away from areas of concentration, the rate of use of pastures around dry seasonal water

holes is minimized. In effect, each range area is utilized only for a short period such that pastures remain in good condition. Such intermittent use of resources improves forage vigour and growth (Swift *et al.*, 1996).

### **2.5.3.2 Pastoral traditional knowledge**

Pastoral traditional knowledge (PTK) consists of a large body of knowledge generated by pastoral communities over time. It is unique to a culture or society, and believed to be consistent with coherent sets of cognitive techniques. Otherwise known as indigenous knowledge, traditional wisdom, indigenous technical knowledge and community environmental knowledge, it is made up of an elaborate system of knowledge including concepts, beliefs, perceptions and processes. This knowledge is acquired, augmented, stored and disseminated. It is developed over generations as a product of pastoralist-environment interactions, and through creativity and innovation. Traditional pastoral knowledge remains dynamic and borrows from other knowledge domains through contact. It is environmentally derived and embedded in the cultures of pastoral communities. Furthermore, it is adaptable, appropriate, and technical. Its technical nature being its capacity to provide sustainable environmental services. These include practical application to natural resource management and general human survival strategies in unpredictable environments. Until about a decade and a half ago, pastoral traditional knowledge was ignored and marginalized and pastoral communities and their knowledge were seen as primitive, irrational, simple and static.

However, these negative views and beliefs have been counteracted by an increasing recognition of PTK by governments and international development agencies as basis for participatory approaches to development that have proved to be cost-effective and sustainable (Herlocker, 1999). PTK is closely related to survival and subsistence of pastoralists. It therefore provides a basis for decision making on food security, human and

animal health, education, natural resource management, and other community based activities. PTK has the capacity to blend with knowledge based on science and technology and should therefore be considered as complementary to scientific and technological efforts to solve social and economic problems (Herlocker, 1999).

#### **(i) Characteristics of PTK**

PTK has certain unique characteristics (Shem, 2004, Maundu, 1996) including:

- It is generated within pastoral communities wherein it forms the basis for decision-making and survival strategies.
- It is location and culture specific, but allows for some degree of overlap due to contacting between communities or cultures.
- It concerns with critical issues of humans and natural resource management.
- It is oral in nature and not systematically documented.
- It is dynamic and based on innovation, adaptation and experimentation.

#### **(ii) Biological basis of pastoral land use**

The human population of pastoralists in arid and semi arid rangelands include many ethnic groups, cultures and attitudes. Although other social factors are involved, the biological approach is the most helpful in understanding the root causes of the land use problems in range area today (Herlocker, 1999).

Pastoralists depend wholly upon their livestock for food and other necessities, whereby milk is always the basic constituent of pastoral man diet. It is estimated that the average daily dietary requirement is about 2,300 calories per adult (Pratty and Gwyane, 1975). FAO census data in East Africa indicate that an average pastoral family consists of about eight individuals, half of these being children below 14 years of age (Shem, 2004). This equals

6.5 adult equivalents; and it follows that the daily food need is about 15 000 calories per family (Shem, 2004). This can be provided by any combination of milk, meat and blood (Herlocker, 1999). Because milk is the pastoralist's basic need, his herd is composed very differently to that of the commercial rancher (a pastoralist depending on the production of meat). Only lactating females produce milk, and nomadic pastoralists therefore strive to maintain as many females as possible. Typically, pastoralists' herds include 50 to 60 per cent of breeding females, compared to the rancher's 20 to 25 per cent. This, in turn, leads to herd with an inherent capacity for very rapid increase when conditions are favourable (Pratty and Gwyney, 1977). Since, in rangeland, rainfall is always very erratic (the lower, the more erratic) rapid increase in good conditions leads to over-population in the bad years which inevitably follow. This is one of the principal causes of overgrazing today, since the animals destroy or damage their environment before they die of starvation. A beef rancher, in contrast, is uninterested in milk except as food for his young animals, and will maintain no more females than are needed to breed his slaughter stock, which he will dispose prematurely if need be (Swift *et al.*, 1996).

Therefore a herd needed to provide for a pastoralist and his family must be composed of large milking stock, augmented by small stock to provide most of the meat ration. Ecologically, such a herd is quite sound since, for a given biomass of animals, the effect on range vegetation is less selective and severe. As such, the human carrying capacity of the land is maximized by emphasizing milk, rather than meat and can therefore support more people per animal (Brown, 1991). In much of East Africa, and especially in the more arid areas, critical population density is less than 4 persons per km<sup>2</sup> even when the land is in optimum condition; and for the range land area as a whole, including the semi-desert zone of northern Kenya, the mean may not much exceed the figure of 3 persons per km<sup>2</sup>. For any

area, of course, the critical human population density can be calculated from the number of stock units required per capita for substance and the land area needed to support one unit.

### **(iii) Causes and remedies of overstocking**

Of the many effects of man on the range ecosystem, overgrazing is by far the most widespread and important. Overgrazing successively reduces plant vigour and the carrying capacity of the land, leading ultimately to a depleted ground cover, invasion of dense unpalatable and usually thorny bush, and severe gully erosion. This point may be called the ‘overgrazing end-point’: a stage at which economic recall to productive management is impossible at present day prices (Shemu, 2004).

The biological argument presented above indicates that overgrazing may often be the direct result of human biological needs, coupled with the capacity for rapid herd increase in good times resulting from the herd composition, itself dictated by these biological needs. It is, however, also a common situation that a pastoralist maintains a herd far larger than needed for his own subsistence (Shemu, 2004).

### **(iv) Range land characteristics and management**

Rangelands have been defined in various ways Pratty and Gwyane (1975) defined rangeland as those areas of the world, which by reason of physical limitations (low and erratic precipitation, rough topography, poor drainage, or cold temperatures) are unsuited to cultivation and which are a source of forage for free-ranging native and domestic animals, as well as source of wood products, water, and wildlife. The Society for Range Management (1989) has offered a more complete definition: “Rangeland is land on which the native vegetation (climatic or natural potential) is predominantly grasses, grass-like

plants, forbs, or shrubs suitable for browsing or grazing by animals”. Thus, rangeland represents a type of land and not a use.

The vast rangeland resources of Sub-Saharan Africa including Tanzania, occupy a unique position in the production system of the region, in that their management is tied closely to the natural vegetation and wildlife. As the human population increased, lands best suited to tillage agriculture are encroached, leaving the vegetation of arid, non-tillable lands intact. Lands of inherently low productivity are left for grazing animals. Management of these lands is crucial and necessitates maintenance of healthy natural plant communities. Therefore, management of grazing is the most important phase of any range management, especially in pastoral societies.

#### **2.5.3.3 Importance of pastoralism and pastoral lands to East Africa’s development**

It has been argued in the past that pastoral production does not contribute significantly to the national economies - that goals and practices of pastoralists are characterized by irrationality, and that the systems are environmentally destructive. Therefore pastoral production systems be replaced with more “modern” production systems such as ranches. Economists have argued that if relief and development costs are all put together, for example, the per capita investment per person per year could be ten times as much in pastoral lands than in the agricultural lands (Ekaya, 2004).

These arguments sound logical in the first instance. However, they are not based on socio-economic analysis. Contrary to the above arguments, pastoralism and pastoral areas may be contributing more than their fair share to national economies when compared to agricultural lands. For example Wekasa (2000) observes that in Kenya, arid and semi-arid lands, where pastoralism is practised over 80% of the country. The lands support 50% of cattle, 75% of

sheep and goats, 100% camels and 25% of human population. Pastoralism makes the best use of natural resources in the drylands, and is currently the most suitable production system to the development of arid lands of Kenya. The cost of putting these lands to alternative uses could be 50 times or higher than supporting the current land use. The value of the livestock resource base in the arid and semi-arid lands is estimated to be about 70 billion Kenya shillings, and the potential to grow still exists (Ekaya, 2004).

#### **2.5.3.4 Interaction between pastoralism and wildlife in East Africa**

There has always been a close and relatively harmonious association between livestock and wildlife in East Africa. For example, seasonal migration patterns and foraging strategies of the Maasai livestock and wildlife species are so similar that their niches are intermingled and inseparable. It has also been suggested that pastoralists have had a significant influence on the evolution of the ecology of their homelands and the type and distribution of wildlife species in the ecosystem. The ferocity of the Maasai warriors in the past kept Maasai land free of hunting for wild animals by Bantu tribesmen. This has contributed in the wildspread survival of game in their area and a blessing to east Africa as the best game parks and reserves are found in Maasai land (Gichuki *et al.*, 1996)

The pastoralists can be seen as “ecosystem people”, in the sense that they have evolved a way of life integral to the surrounding ecosystem. Thus, they have adapted to and influenced their environment without destroying its sustainability. Their survival strategies require an intimate knowledge of their environment (Shem, 2004).

## **2.6 Resource - Use Conflicts**

### **2.6.1 The concept of social conflicts**

There are many perspectives and therefore, definitions of conflicts. Some definitions focus on open struggle as criteria for the existence of conflict. Others focus on competing claims to scarce resources. Robbins (1994) defines conflict as a process that begins when one party perceives that another party has negatively affected something that the first party cares about. Wallensteen (1988) define conflict as a social interaction in which a minimum of two parties strives at the same moment in time to acquire the same resources. Notwithstanding, the divergent views on the concept of conflict, a couple of general themes can be found in most definitions. Firstly, a conflict is viewed as mainly a perception issue, because for a conflict to exist the situation must be perceived as a conflict by parties involved. Therefore many situations that could be described as situation of conflict may be not, if the parties involved do not perceive the conflict.

In case of resource-use conflicts, most of the parties exhibit blocking behaviour. Since resources are limited and scarce, and peoples' needs (or wants) often exceed availability, this leads to blocking behaviour, with both parties trying to get more of the resources than the other side. When one party is perceived to block the access to the resources of another, a conflict will probably result.

Conflict theorists argued that societies are in constant state of change, in which conflict is a permanent feature. Conflict is often thought as the opposite of cooperation and peace and is commonly associated with violence. Lewis (1996) argues that many of the conflicts are counterproductive and destructive, leading to bad results and hostile relationships. Yet, conflicts have been said to play crucial roles not only for social change but also for the continuous creation of societies. Therefore, conflicts should not only be viewed as a



dysfunctional relationship between individuals and communities that should be avoided at all cost, but also as an opportunity for constructive change and growth (Kisoza *et al.*, 2004). According to Guerrero-Arias (1995) the term also encompasses not only the observable aspects of the opposing forces but also the underlying tension between them. As such, conflicts can be expressed at different levels including outright violence, tensions, hostility, competition and disagreement over goals and values.

Resource-use conflicts may arise in any situation in which there is a clash of interests or ideas amongst groups of resource users. Usually, the interests and needs may be incompatible amongst different resource users, and sometimes these interests and needs are not properly addressed in natural resource management policies or programmes (FAO, 2000). In the context of resource conservation, resource-use conflict suggests that there is a group or groups whose interests are opposed to those of conservation institutions and authorities. Resource use conflicts, as such, may involve disagreements and disputes over access to, and control over resources use (FAO, 2000).

Conflicts over use of natural resources such as land, water, wildlife and forestry have been reported to be ubiquitous (Anyling and Kelly, 1997; Ortiz, 1999). People in different parts of the world have competed for use of natural resource they need to enhance their livelihoods. Nevertheless, the dimensions, levels, and intensity of conflicts vary greatly. They can be of different forms and at different levels ranging from local to global scale and the occurrences depend on their relevance or result from local actors who influence decision-making process (Oviedo, 1999). The intensity of these conflicts have been reported to vary enormously from confusion and frustrations among members of the community over poorly communicated development and or conservation policies, to violent clashes between groups over resource ownership, rights and management responsibility (Kant and Cooke, 1999).

### **2.6.2 Perspectives on conflicts**

Different theorists on the role of conflicts on social relations have advocated different views. At the one end of the continuum, some theorists posit that conflict is harmful, must be avoided and that the group relationship is breaking down and not functioning. This attitude is known as functionalism, the traditional view of conflict (Kumar, 1998). The human relations view of conflict, believe that conflict is natural and inevitable outcome in any human relationship, and that not always destructive, but has a potential to bring about positive outcomes for a group relationship. This attitude is known as humanism.

Another perspective believes that conflict is absolutely necessary for a relationship on group's survival and effective performance. This is referred to as the interactionist or subjectivist approach. The structuralists believe that conflict is a dynamic force rooted in the structure of domination based on opposing interests. This implies that there is always an underlying structured conflict between the producers of economic wealth and those who benefit most from the economic system. The structuralists acknowledge that a society is always full of conflicting interests, but that major conflicts comes from the underlying social structures (CWS, 1998).

### **2.6.3 Outcome of conflict**

The analysis of any conflict is subject to variation in the theoretical view on outcome of conflicts. It is, therefore inappropriate to advocate that all conflicts are either good or bad. Whether a conflict is good or bad depends on the way it is handled (CWS, 1998). While the interactionists believe that conflict is an essential part of human relations, it does not necessarily follow that all conflicts are good. If a conflict leads to improved group performance in achieving goals, then is a functional constructive form of conflict. But

where a conflict hinders the achievement of goals then the conflict is destructive or dysfunctional. The measure that can differentiate functional from dysfunctional conflicts is group performance, as groups exist to achieve goals. As such it is the impact that conflict has on the group that defines whether the conflict is functional or not (CWS, 1998).

#### **2.6.4 The conflict paradox**

The variation between theorists on conflict is symptomatic of the division between macro and the micro levels of analysis and explanations. All these theories have their strengths and weaknesses. Each of these theories has also different implications on the recommended interventions during conflict resolution processes. Nevertheless, the conflict behaviour needs to take into account the social structural factors, on one hand, and behavioural and attitudinal on the other. Social conditions do have a significant impact on people, but it is the perception of individuals which makes them see certain social conditions as undesirable or as being the underlying cause of their problems (CWS, 1998). Any attempt that ignores one of these factors fails to provide a comprehensive understanding of a conflict resolution. A multi-faceted approach is recommended in conflict resolution process. Therein, several dimensions of the problem need to be considered including social structures, individual characteristics of parties and social attitudes, as well as the underlying social institutions (CWS, 1998).

#### **2.6.5 Conflict resolution philosophy and processes**

Of recent, a considerable interest is being generated in both theory and practice of conflict resolution. This interest is reflected in alternative dispute resolution procedures and conflict resolution programmes (i.e. in practical techniques and professional procedures) that are being developed. Resolution of conflict means changing or transforming the relationship between the conflicting parties by solving the problems, which lead to the conflict in the

first instance. The search for a reduction/ or resolution of conflict is as old as humankind. Lewis (1996) posits that, although assessment of conflict is necessary precursor to designing an effective conflict management approach, but effective assessment should establish the stakeholders, the historical context and other pertinent scientific, socio-political and economic issues.

Burton (1990) introduced the term “*conflict prevention*” to mean promotion of conditions that create cooperative relationships as a basis for identifying the cause of the conflict and the changes needed to remove it. As such, conflict *prevention* emphasizes about modifying the circumstances that create conflict and developing situations that mitigate conflict. The process invariably requires a third party facilitation to assess and analyse the interactions, which may lead to acceptable solutions. The solutions must be fair and just and the conditions acceptable to the parties (Mckie *et al.*, 1995). Therefore, the facilitator needs to have an understanding of issues and must enable the parties to understand in some detail the situation and circumstances of the dispute.

All conflict resolution processes consist of three elements: the participation of protagonists, communication between parties and the decision-making powers enjoyed by the third party. Its nature and /or degree of these elements that determine the type and procedure adapted in resolving conflicts. The traditional method of seeking a conflict resolution is via a court settlement, where the third party – the court – has decisive authority. There is little direct communication and limited participation by the parties (Burton and Duke, 1990). A quasi – judicial arbitration involves the protagonists nominating representatives and select a third party to preside. This arrangement allows for rather more participation but still limited communication between parties and decisive third party. Arbitration is a procedure where a third party is asked to make a decision following consultations with parties, this allows for additional participation on a degree of direct communication, with the third party role still

dominant. Conciliation or mediation process represents a significant reduction in the decision-making powers of the third party who basically acts as an honest broker where the parties are prepared to interact and to communicate directly. Finally, is the direct negotiation between the parties, where the role of the third party is minimal or non – existent (Mackie *et al.*, 1995).

The role of third party or facilitator in conflict resolution forum is to develop an analytical approach to the causes of the conflict, to increase the scope of protagonists understanding of the situation, to enable the parties to question information and assumptions, which have led to the conflict. Burton (1990) describes the problem-solving forum as “a filter to screen out false assumptions and implications from existing knowledge, cultural and ideological orientations and personal prejudices”. He posits that the main task of the third party/facilitator is to provide this filter.

Conflict resolution is decision making process, which seeks to achieve agreements that explore the situation but do not either restrict or prejudice the outcome in advance. What is sought is a realistic basis on which to base future decisions. It is concerned with identifying the cause(s) of a dispute and an analytical process with four distinct characteristics: the solution is not an end product but a continuous process, requires a change in conceptualisation of the problem, deals with the conflict in its total context and the basis of resolution is effective problem solving (Burton, 1990). Conflict resolution requires also a holistic view which reaches into the aspects of human behaviour, whilst at the same time being politically realistic. However, most of the players in resource management tend to confuse between conflict resolution and conflict containment, or suppression, or an enforced conflict settlement, but these terms do not mean the same thing. Thus, there is still a strong emphasis, under various settings, on the treatment of symptoms rather than their causes. In particular, under protected area settings, management of conflict has been

regarded as a solution. It has become accepted as problem- solving, so much so that the terms “conflict management” and “conflict resolution” have become interchangeable (Mackie *et al.*, 1995).

Hence, there is considerable temptation, in most conflict situations, to focus on management causes to contain a conflict, rather than addressing the total situation with all its inherent challenges and complexities. As Burton (1990) states, *..”the causes or sources of conflict between individuals and groups cannot be separated from the totality of relationships, and the environmental conditions that promote relationships”*. Lewis, (1996) observes that .... *“Compromises produced by conflict resolution may be better for the environment than forced decisions that nobody respects”*. Therefore, it is critical in conflict resolution to get the aggrieved parties in consultative process so that they appreciate each other’s perspectives.

## **2.6.6. Factors underlying resource - use conflicts**

### **2.6.6.1 Overview**

A number of factors have been identified to be underlying different resource-use conflicts. Hence, pluralistic approaches that recognize the multiple perspective of the stakeholders and the concurrent effects of diverse causes in natural resource use conflicts is essential for understanding the initial situation and in identifying strategies for promoting change (Buckles and Rusnak, 1999). The most important factors underlying resource-use conflicts include levels of resource degradation, population pressure, characteristics of resource users, and policies and laws governing use and access to resource.

#### **2.6.6.2 Levels of natural resource degradation**

The natural resources utilized as common pool resources, are in many cases facing increasing degradation. This creates scarcities where the demand for the resources is basically greater than the supply. In turn this leads to increased competition, and ultimately into resource-use conflicts (Mandel, 1998). The greater unequal distribution of scarce resources in a system, the greater will be the conflicts of interests between dominant and subordinate segments of the society (Kisoza *et al.*, 2004).

#### **2.6.6.3 Population pressure**

Population pressure has many influences on resource use conflicts (Deslodes and Gauthier, 1996). This can arise as a result of increased demand and competition for definitive resources through population increase. Alternatively, resource-use conflicts may arise from immigrations, where user groups with different interests and attaching different values to the resources share the same ecological range. Borrini-Feyerabend (1997), reported migration to be one of the main contributing factors to population dynamics and subsequently to natural resources use conflicts. This is because people always move from place to place. The immigrations may also lead to disruption of local mechanisms controlling use of local common pool resources creating conditions for resource-use conflicts. According to Borrini-Feyerabend (1996) many rural areas in developing world today are experiencing rapid population increase. This implies an increased demand for land, water, grazing lands and fuelwood. The author further argues that, increase in population size does not always signal a decline in environmental quality. In some cases, higher population density leads to agricultural intensification, higher yield per hectare and increased opportunity to produce for the local market. Thus, the effect of population growth on the local productive capacity will depend on a number of factors including soil fertility,

resilience of natural resource base, technologies employed by local populations and the political as well as the socio-economic environment at large.

According to Ghimire and Pimbert (1997), population decline can also have a negative impact on local resources. It can be beneficial, particularly when the ecosystems left undisturbed revert to a richer level of biodiversity. Yet, population decline can be harmful to the environment, especially in cases where human managed environments provide a rich habitat for a wide variety of species. The breakdown of interaction between human communities and local systems may even lead to a net loss in local biodiversity.

#### **2.6.6.4 Characteristics of resource users**

The characteristics of resource users depend on their cultural backgrounds which include: ethnicity, norms, values and indigenous technologies by different resource users. According to Kajembe et al. (2000), people use natural resources in different ways. For example, land, forest, and water are not just material resources people compete over, but are part and parcel of a particular way of life - farmers, ranchers, fishers, loggers – ethnic identity and asset of gender and age roles. The cultural and religious diversity of resource users have implications for the way land and other resources are managed.

The socially defined group may perceive themselves as having incompatible interests with those dependent upon particular resources, but who are unable to participate in planning or in monitoring its use as they are marginalized in decision-making (Desloges and Gauthier, 1996). More importantly, the resource conflicts occur in settings that involve an array of culture, economic, and political arrangements that have some bearing on the outcomes of the conflict process (Kumar, 1998).



#### **2.6.6.5 Policies and laws**

A number of resource-use conflicts have been attributed to failure of policies governing use of resources both at national and local levels. Lewis (1996) argues that, resource-use conflicts usually results from policies governing resource use that do not involve all stakeholders in the planning or management of the resources. Also conflicts occur if policy, legal and institutional contexts are being developed without the participation of resource-dependent communities and without due considerations of their needs and aspirations (Desloges and Gauthier, 1996). Sometime resource - use conflicts emanate from personal centered interest of policy, project or program implementers at the local level. Resource-use conflicts can also result from failure of the central governments to recognize and empower local institutions to manage the local resources (Wyckoff-Baird, 1997). At most, central governments lack the in-depth local knowledge, of resource management pattern, to be able to make and enforce appropriate natural resource management regimes. Kisoza *et al.*, (2004) argues that policies and laws governing land tenure, deficiency of local institutions for community as well as environmental degradation are some of underlying causes of resource-use conflicts. Conflicts may also arise due to poor incentive structures and institutional framework.

### **2.7 Resource-use Conflicts in Multiple-use Pastoral Systems**

Multiple resource use is a central feature of many production systems, in particular the pastoral and agro-pastoral systems. These systems typically involve complex combinations of resource users and uses, and different sets of rights and obligations for users. Land is the most important complementary resource for pastoral production systems. Because land is multiple-use resource it is more liable for resource-use conflicts. The conflicts may stem from land resource scarcity or from different ways parties perceive how land should be used. This can enable a distinction of scarcity based or value based conflicts. A number of

authors have described pastoralism in Africa in recent years in terms of resource conflicts (NOPA 1992; Velded, 1992). These resource conflicts imply that the institutional frameworks that currently exist often fail to deal adequately with disputes and conflicts (Niamir-Fuller, 1994). However, the main resource-use conflict determinants in the different pastoral and agro-pastoral land use systems of Tanzania are not well known.

## **2.8 Community Based Conservation**

### **2.8.1 Overview**

The prospects for community-based conservation have recently been of concern to a broad range of conservationists, social scientists, and resource management professionals. On one hand, there have been increasingly greater efforts and investment in community-based conservation. On the other hand, there has been increasingly greater concern that community-based conservation is not working and that the emphasis on “community” and “participation” is diluting the conservation agenda (Abbot, 2000). Community-based approaches to conservation are in part a reaction to the failures of exclusionary conservation, in a world in which social and economic factors are increasingly seen as key to conservation success (Ghimire and Pimbert, 1997). Emphasis of community - participation is motivated by the idea that “if conservation and development could be simultaneously achieved, the interests of both conservation and development could be served”. Thus, the old narrative of ‘fortress conservation’ was largely displaced by the counter-narrative of development through community conservation and sustainable use (Murphree, 2002, Songorwa, 1999).

However, the results of community-based conservation experiments have been mixed at best, and the performance of many has been well below expectations (Barret *et al.*, 2001). This has led to various debates in the conservation literature over the merits of community-

based conservation (Agrawal and Gibson, 1999) and to criticisms from a number of different perspectives (Redford and Sanderson, 2000; Brosious and Russell, 2003). Two positions have been emerging one holds that the failure of community conservation is not due to the weakness or impracticality of the concept, but rather to its improper implementation, especially with regard to the devolution of authority and responsibility (Murphree, 2002).

The second position holds that conservation and development objectives, both important in their own rights, should be de-linked because the mixed objectives do not serve either objective well (Redford and Sanderson, 2000). This dilemma is part of the larger debate of preservation versus sustainable use and the participation of rural populations in decisions that affect their lives. The debate has its counterparts in other environmental fields such as resource management and development, with respect to the merits (or lack thereof) of centralized resource management (Holling and Meffe, 1996), participatory development planning (Chambers, 1983), and the significance of local perspectives and knowledge in environmental management in general (Berkes and Farvar, 1989).

The issue of community-based conservation can be approached from two different vantage points. First, community-based conservation can be seen in the context of larger, historical conceptual shifts (paradigm shifts) that have been occurring in ecology and applied ecology. These changes are not specific to conservation ecology but have implication for it; they provide context and benchmarks for all areas of applied ecology. Second, in light of this “bigger picture,” community-based conservation can be viewed with an eye to lessons from emerging new interdisciplinary fields that deal with coupled systems of humans and nature. Researchers in several fields, such as common property and indigenous knowledge, have been pursuing various aspects of social-ecological system relationships. These

interdisciplinary fields provide insights into the community-based conservation debate and may contribute to the development of a fuller understanding of socio-ecological interactions, providing firmer ground for a truly interdisciplinary conservation science (Ludwig, 2001).

### **2.8.2 System view of the environment**

A complex adaptive system often has a number of attributes not observed in simple systems, including non - linearity, uncertainty, emergence, scale as self-organization (Gunderson and Holling, 2000). These characteristics of complex systems have a number of important implications for conservation and environmental management, as can be seen from a consideration of non - linearity scale. The issue of non - linearity comes up with respect to management institutions. The older, conventional emphasis on centralized institutions and command and control-resource management is based on linear cause-effect thinking and mechanistic views of nature. It aims to reduce natural variation in an effort to make the ecosystem more productive, predictable, and controllable. But the reduction of the range of natural variation is the very process that may lead to a loss of resilience in a system, leaving it more susceptible to crises (Holling and Meffe, 1996).

The issue of scale has implications for the match between institutions and ecosystems and for perspective that may be held by different agents. The aspect of match address a question to whether a given conservation problem could be managed by a centralized agency or are there more appropriate structures of governance in which the scale of management institution is matched to the scale of the ecosystem? Often, one-size fits-all kinds of management and ignore scale issues. Such mismatches of scale may be one of the key reasons for the failure of environmental management regimes (Folke, 2002).

One of the insights from complexity thinking is that a multiplicity of scales prevents existence of one “correct” perspective in a complex system. Phenomena at each level of the scale tend to have their own emergent properties. The system must be analyzed simultaneously at different scales. In biodiversity conservation, for example, different groups of conservationists focus on different levels of biological organization. All these levels are the “correct” level to consider at the same time. Similarly, a number of agents or actors may hold different but equally valid perspectives on a conservation problem. Redford and Sanderson (2000) emphasizing this phenomenon by stating that “...*they (forest people) may speak for their version of a forest, but they do not speak for the forest we want to conserve*”.

### **2.8.3 Humans as part of the ecosystem**

#### **2.8.3.1 Socio-ecological systems**

There is general agreement that we can ill afford to consider humans separately from natural resources, especially in today’s heavily human-dominated world (Gunderson and Holling, 2000). It has become increasingly important to incorporate the dynamic interactions between societies and natural systems, rather than viewing people merely as “managers”. There is little agreement, however, on how this can be accomplished, conceptually or methodologically.

Berkes *et al.* (2000) use the term social-ecological system to refer to the integrated concept of human in nature. A number of different terms are in use to denote the idea of humans as part of ecosystems. One of them is the dwelling perspective of Ingold (2000), which refers to the “... *practical engagement of humans with others of the dwelt-in ecosystem*”. This practical engagement, building knowledge and ecological relationships, is the basis of repositioning humans back into the ecosystem. It involves the “skills, sensitivities and

orientations that have developed through long experience of one's interaction with a particular environment". The social-ecological system has many levels. The links between social and environmental systems are different at the level of the community as they are at the level of the nation state. For example, Gibson and Mark (1995) work on political economy of conservation in four African countries, shows that the forces operating at the level of the nation state (many of them related to the peculiarities of post-colonial governments) are quite different from those at the levels of region and community.

Putting humans back into the ecosystem requires using all possible sources of ecological knowledge and understanding as may be available. Using knowledge and perspectives from the community level can help build a more complete information base than may be available from scientific studies alone (Berkes *et al.*, 2000). The partnership of local communities with scientists is not an unusual phenomenon. Details of such research collaboration, and its positive outcomes for ecosystem management, have been documented, for example, by Olsson and Folke (2001) and Blann *et al.* (2003).

### **2.8.3.2 Involvement of local communities in conservation of natural resources**

Brosious *et al.* (1998) observes that the term community, in community-based conservation is a gloss complex phenomenon because social systems are multistage. The term community also idealizes a great deal of complexity. It idealizes images of coherent, long-standing, localized sources of authority tied to what are assumed intrinsically sustainable resource management regimes. However, as many conservationists know, it is often difficult to find a cohesive social group to work with in the field. Communities are elusive and constantly changing. A community is not a static, isolated group of people. Rather, it is more useful to think of communities as multidimensional, cross-scale, social-political units or networks changing through time (Carlson, 2000). Hence, it is more productive to

focus not on communities but on institutions, defined as the set of rules actually used, the working rules, or rules-in-use (Ostrom, 1990). The focus here should be to examine those institutions that mediate between social and ecological systems and focus on the dynamics of these institutions: their renewal and reorganization, learning and adaptation, and ability to deal with change (Berkes *et al.*, 2003).

#### **2.8.4 Approaches to analyzing environmental conservation problems**

Kates (2001) contends that many of our environmental problems, including those related to conservation, do not lend themselves to analysis by the conventional, rational approach of defining the problem, collecting data, analyzing data and making decisions based on the results. There is too much uncertainty; targets keep shifting, and the issues must often be redefined. These make a class of problems that Ludwig (2001) and others called “wicked problems” those with “no definitive formulation, no stopping rule, and no test for a solution”, problems that cannot be separated from issues of values, equity, and social justice. Ludwig (2001) argues that where there are no clearly defined objectives and where there are diverse, mutually contradictory approaches the notion of an objective, disinterested expert no longer makes sense. Hence, a new kind of approach to science and management must be created through processes by which researchers and stakeholder collaborate to define important questions, objectives of study relevant evidence, and convincing forms of argument. This kind of research referred to by Kates (2001) as sustainability science require place-based models because understanding the dynamic interaction between nature and society requires case studies situated in particular places.

To deal with the implications of complex systems, working partnerships can be build between managers and resource users. This is done for example, in adaptive management, which recognizes, as a starting point, that information will never be perfect (Holling, 2001).

The use of imperfect information for management necessitates a close cooperation and risk-sharing between the management agency and local people. Such a process requires collaboration, transparency, and accountability so that a learning environment can be created and practice can be built on experience.

This approach, bringing the community actively into the management process, is fundamentally different from the command-and control style. These three conceptual shifts in ecology toward systems view, inclusion of humans in the ecosystem, and management by participatory approaches are related. They all pertain to an emerging understanding of ecosystems as complex adaptive systems in which human societies are necessarily an integral part we cannot abandon.

#### **2.8.5 International Institutional framework for conservation of biodiversity**

There are a number of international environmental treaties and agencies that provides framework for conservation of biodiversity. Among them, the Convention of Biological Diversity stands as a general framework. Article 8 of the Convention calls for, the establishment of protected areas and definition of management guidelines. (McNeely, 1997).

The International Union for the Conservation of Nature (IUCN) recognises six wildlife management categories: Category I - Strict Nature Reserve/Wilderness Area - protected area managed mainly for science or wilderness protection; Category II - National Park-protected area managed mainly for ecosystem protection and recreation; Category III - Natural Monument/Natural Landmark - protected area managed mainly for conservation of a specific natural feature; Category IV - Habitat and Species Management Area - Protected



area mainly for conservation through management intervention; Category V - Protected Landscape/Seascape - protected area managed mainly for Landscape/Seascape protection and recreation; Category VI - Managed Resource Protected Area - protected area managed mainly for the sustainable use of natural resources, associated cultural resources, and managed through legal or other effective means (IUCN, 1994).

Internationally accepted criteria for defining protected areas (IUCN, 1994) now recognise a wide spectrum of categories ranging from strictly protected nature reserves to managed resource protected areas. The inclusion of a category in the list, which allows the sustainable use of resources in protected areas, is particularly noteworthy in this context. It is implied that protected areas should be managed in ways that sustain both local livelihoods and the conservation of nature. This view sharply contrasts with the conservation thinking that has informed much of protected area management during the past century.

The follow-up of various biodiversity agreements and conventions has led to policy goals, measures and instrument debates on international, national and local arenas for decision-making. The Biodiversity Convention stresses conservation of biodiversity, the sustainable use and aspects of equity and fair sharing of benefits. It also emphasizes on ethical, cultural, scientific and economic dimensions of biodiversity management. Local participation is stated as a key element to “ensure the implementation” in the national follow-up strategies (CBD, 1992).

## **CHAPTER THREE**

### **3.0 STUDY AREAS AND METHODOLOGY**

#### **3.1 Description of the Study Areas**

This study covered two areas namely Mkata plains in Kilosa district and Ngorongoro Conservation Area in Ngorongoro district (Figure, 3). This section describes the setting of the study areas including the attributes of the ecological and social environment.

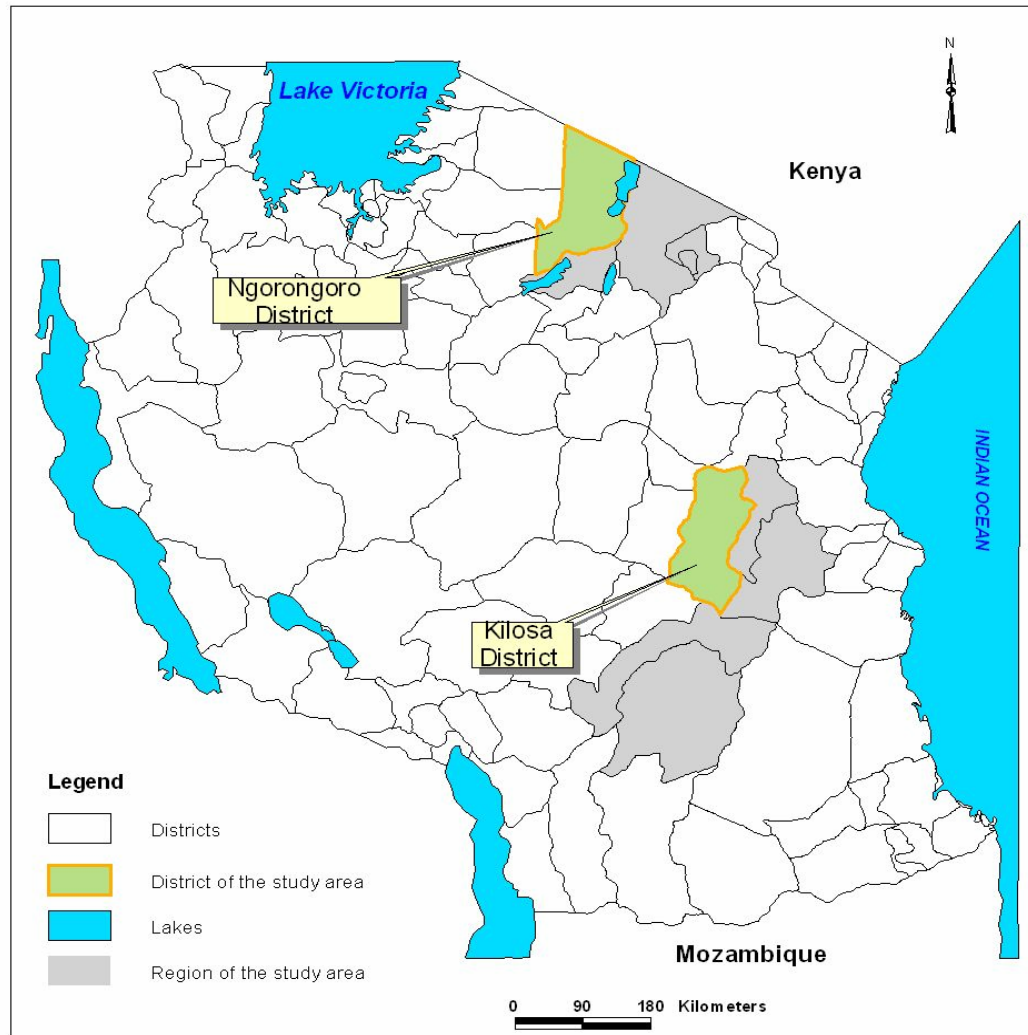
##### **3.1.1 Description of Kilosa district**

###### **3.1.1.1 Location**

Kilosa district is one of five districts of Morogoro region, and covers an area of about 14, 2445 km<sup>2</sup>. It is located in east – central Tanzania, 300km west of Dar - es - Salaam, and bounded between 5°55' and 7°53' S; 36°50' and 37°30' E. Kilosa is bordering Kiteto district (Manyara Region) and Handeni district (Tanga Region) to the North; Mvomero district to the East; Kilombero district (Morogoro region) and Iringa Rural district (Iringa Region) to the South and Mpwapwa district (Dodoma Region) to the West (KDC, 2000).

###### **3.1.1.2 Administrative organization**

Administratively the district comprises 9 divisions, which are subdivided into 37 wards and 101 villages. The institutional framework determining the administrative structures in Kilosa district is provided by legislations guiding reforms of local government authorities in Tanzania.



**Figure 3: Location of Kilosa and Ngorongoro districts**

Source: SUA. Remote Sensing Laboratory

Constitution of the United Republic of Tanzania through Act No. 15 of 1984 which render existence of local government authorities' constitutionally sanctioned (Max, 1991). The local government comprise of two tiers of government authorities including the district council and the village council. Under the law the village council is corporate body which can sue or be sued, enter into legal contract and own property (Max, 1991).

The Regional Administration Act No. 19 of 1997 (URT, 1997b) provides for district authorities to interact directly with the central government ministries or Non- governmental organizations on issues of concern to their areas of jurisdiction. As far as the environment is concerned the Regional Administration Act of 1997 which amended the Local Government (District Authorities) Act of 1982, establishes three standing committees: Economic Affairs, Works and Environment Committees. More importantly, the district authority duties have been explicitly laid out with regard to the environment. The Act states that, "*... local authorities in performing their functions shall provide for the protection and proper utilization of the environment ....*" (Liviga, 1999).

### **3.1.1.3 Topography and climate**

The district can be characterised into three physiographic units, which also constitute different agro-ecological zones: mountains and uplands, plateau (cultivation steppe) and flood plains (KDC, 1997; Shishira *et al.*, 1997). The highland zone is part of the Eastern Arc Mountains with altitudes up to 2200 m a.s.l. The plateau (cultivation steppe) zone is mainly located in the north of the district. It reaches an altitude of about 1100m a.s.l., and is characterized by plains and dissected hills with moderately fertile, well drained soils. The flood plains lie at about 400 to 550 m a.s.l and are dissected by three main rivers Wami and Mkata rivers draining Eastwards and Ruaha river draining South – East wards.

The climate of Kilosa is a typical tropical semi - arid type regulated by seasonal movements of the Inter-tropical Convergency Zone (ITCY) (Misana *et al.*, 1997). The district experiences bimodal climate with an average of 8 months of rainfall. The short rains start from October to January, followed by long rains from mid-February to May peaking in April (Nduwamungu, 2001). The topography has local effect on rainfall. Whereby, mean annual rainfall ranges between 1000 – 1400mm in southern flood plain, while further North (Gairo Division) has a mean annual rainfall of 800-1100mm. The highland forest areas receive up to 1600 mm of rainfall annually (KDC, 1997, Nduwamungu, 2001). Temperature in Kilosa town is about 25 °C.

#### **3.1.1.4 Vegetation**

The vegetation of Kilosa district is complex (Table 1), but four main vegetation types have been described as the most dominant types. These include: natural forests, woodlands, bushland and grassland (Shishira *et al.*, 1997; Misana *et al.*, 1997; Nduwamungu, 2001). Most of the natural forests are found at the higher altitudes (1400-2200 m.a.s.l.) where there is higher rainfall and are protected as forest reserves. The vegetation is typically characterized by miombo woodlands in the mountains and hilly areas and in the pied plains, while bushlands and grasslands are found in the alluvial plains (Misana *et al.*, 1997).

**Table 1: Land cover types for Kilosa District**

| <b>Land Cover Types</b>                 | <b>Area km<sup>2</sup></b> | <b>Percentage</b> |
|---|----------------------------|-------------------|
| Forest plantation                       | 13.78                      | 0.09              |
| Natural forest                          | 910.98                     | 6.26              |
| Dense woodland                          | 4,595.02                   | 31.55             |
| Open woodland                           | 1,422.27                   | 9.77              |
| Woodland with scattered cultivation     | 1,460.38                   | 10.03             |
| Bush land with emergent trees           | 570.58                     | 3.92              |
| Wooded grassland                        | 730.95                     | 5.02              |
| Wooded grassland (seasonally inundated) | 39.55                      | 0.27              |
| Bushed grassland                        | 688.97                     | 4.73              |
| Open grassland (seasonally inundated)   | 200.70                     | 1.38              |
| Grassland with scattered cropland       | 1,162.10                   | 7.98              |
| Cultivation                             | 1,301.83                   | 8.9               |
| Cultivation with tree crops             | 78.29                      | 0.54              |
| Inland water                            | 0.69                       | 0.00              |
| Permanent swamp                         | 72.65                      | 0.50              |
| Open bush land                          | 208.02                     | 1.43              |
| Bush land with scattered cropland       | 691.07                     | 4.75              |
| Urban Area                              | 15.32                      | 0.11              |
| Grand Total                             | 14,563.57                  | 100.00            |

Source: KDC (1997)

The dominant woodland species include: *Brachystegia sp*; *Combretum sp*; and *Albizia sp* (Sishira *et al.*, 1997) while the dominant grass genera are *Andropogon*, *Heteropogon*, *Panicum* and *Themeda* (Mwilawa *et al.*, 1997). The dominant tree species in bushlands comprise *Acacia sp*, *Commiphora sp*, *Combretum sp*, *Dichrostachys* and *Albizia sp*. While grassland woody species include *Balanites aegyptiaca*, *Dalbergia melanoxylon* and various *Acacia sp* (Shishira *et al.*, 1997).

### 3.1.1. 5 Wildlife and conservation value

Kilosa has a number of game reserves including Mikumi National Park and Selous Game Reserve. The available estimates of wildlife population in Mikumi national park are given in Table 2. A central feature of Mikumi national park is parts of Mkata plains where large

**Table 2: The wildlife population of Mikumi National Park in 1986**

| Type of animal   | Estimated number   |
|------------------|--------------------|
| Wildbeest        | 12,500             |
| Buffalo          | 12,000             |
| Zebra            | 3,000              |
| Elephant         | 2,000              |
| Impala           | 1,500              |
| Warthog          | 1,000              |
| Baboon           | 500                |
| Ground horn bill | 200                |
| Eland            | 200                |
| Sable antelope   | 100                |
| Hartebeest       | 100                |
| Giraffe          | 100                |
| Hippopotamus     | Data not available |
| Leopard          | Data not available |
| Lion             | Data not available |

Source: KDC (1997)

herds of animals including giraffe, elephants and hippopotamus - from adjacent wooded grassland and woodlands co verges on the plains.

### 3.1.1.6 Socio- economic profile of Kilosa district

The human population during 2002 census was 489,513 with a growth rate of 2.2%, and a population density of 33 persons per km<sup>2</sup>. The average household size is estimated at 4.6 (National Census, 2002). About 80% of the population live in rural areas, while the

remaining live in relatively large centers such as Gairo, Kimamba, Mikumi and Kilosa town.

There are three major indigenous tribes: Kaguru (48%) in the north, Sagara (30%) in the central zone and Wavidunda (20%) in the south. Other minority tribes (2%) include immigrant sisal and sugarcane estate workers and pastoralists Maasai and Barbaig, and the agro-pastoralists Gogo and Sukuma. The district has a highest livestock population accounting to 70% of livestock population of Morogoro Region. The livestock population in 1997 was estimated at 187,051 Cattle; 12,263 goats, 8,652 sheep and 710 donkeys (KDC, 2000). The increasing number of immigrant pastoralists, with large livestock herds has led into high competition for land and water particularly between crop cultivators and herders. In some cases this has flared up into violent clashes (Kisoza *et al.*, 2004).

The main economic activity is peasant farming, producing both food and cash crops. Whereby, the main food crops are; maize, rice, cassava, sweet potatoes and coconuts. While cash crops are simsim, sunflower, cowpeas and sisal. Production level is generally low and most of the produced crops are sold outside the district (KDC, 2000).

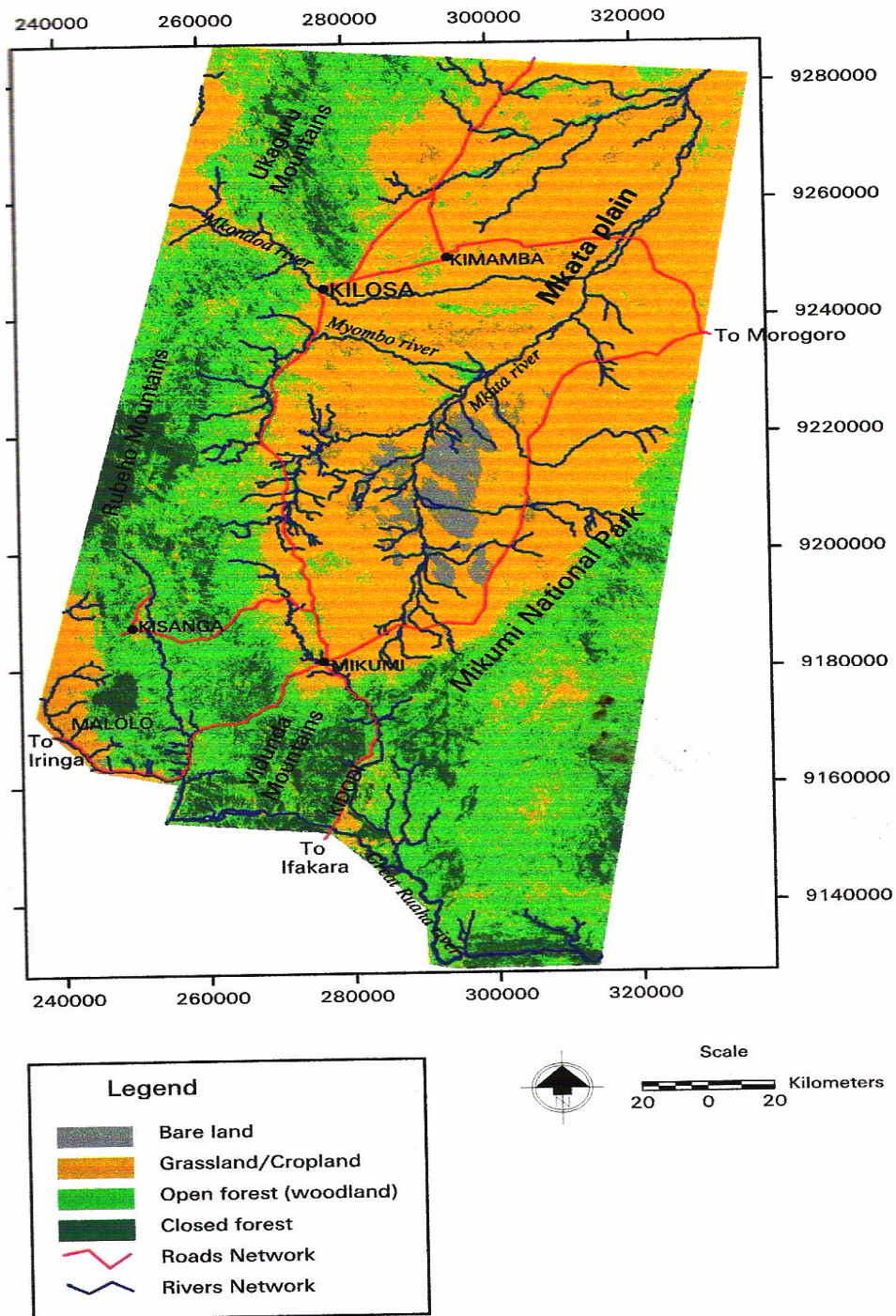
### **3.1.2 Description of Mkata plains**

Mkata plain occupies parts of Kilosa and Mvomero districts in Morogoro region, whereby the plains extending in Mvomero district form part of Mikumi National Park and Mkata state ranch. The plains are bounded between 5° 4' to 7° 15' S; 37° 00' to 37° 55' <sup>E</sup>, and cover approximately 7,000 km<sup>2</sup>. The plains are bordered by Uluguru Mountain in the north - west and south eastern parts. Parts of Eastern Arc Mountains of Nguru, Ukaguru and Usagara border the plains in the northwest, and Lubungo and Lukobe Mountains in the south eastern parts (Figure 4).



The plains are generally low lying land with a slope ranging from 0.2 to 2 percent and a general elevation not exceeding 500 m (a.s.l). The area is comprised of both flood plains and pied Mont plains. It is drained by four major rivers namely Mkata, Mkondoa, Msowero and Wami draining eastwards. Most parts of the area are seasonally flooded. The climate in the plains is characterised by some variations. The north-western parts experiences high mean annual rainfall, ranging between 1100 and 1200 mm, distributed in the bimodal mode. The south-eastern parts, receive relatively lower rainfall with a mean annual rainfall of about 800mm in a similar bi-modal pattern. The central parts receive even lower rainfall, with a mean annual rainfall of about 730 mm.

The main land-uses in the plains include subsistence farming, large scale farming (estates) and transhumance pastoralism practised by immigrant pastoral tribes from Northern Tanzania. Four villages under study in Kilosa district are located in the Central and Northern parts of Mkata plains.



- Adopted from J. Nduwamungu 2001

**Figure 4: Location map of Mkata plains in Kilosa District**

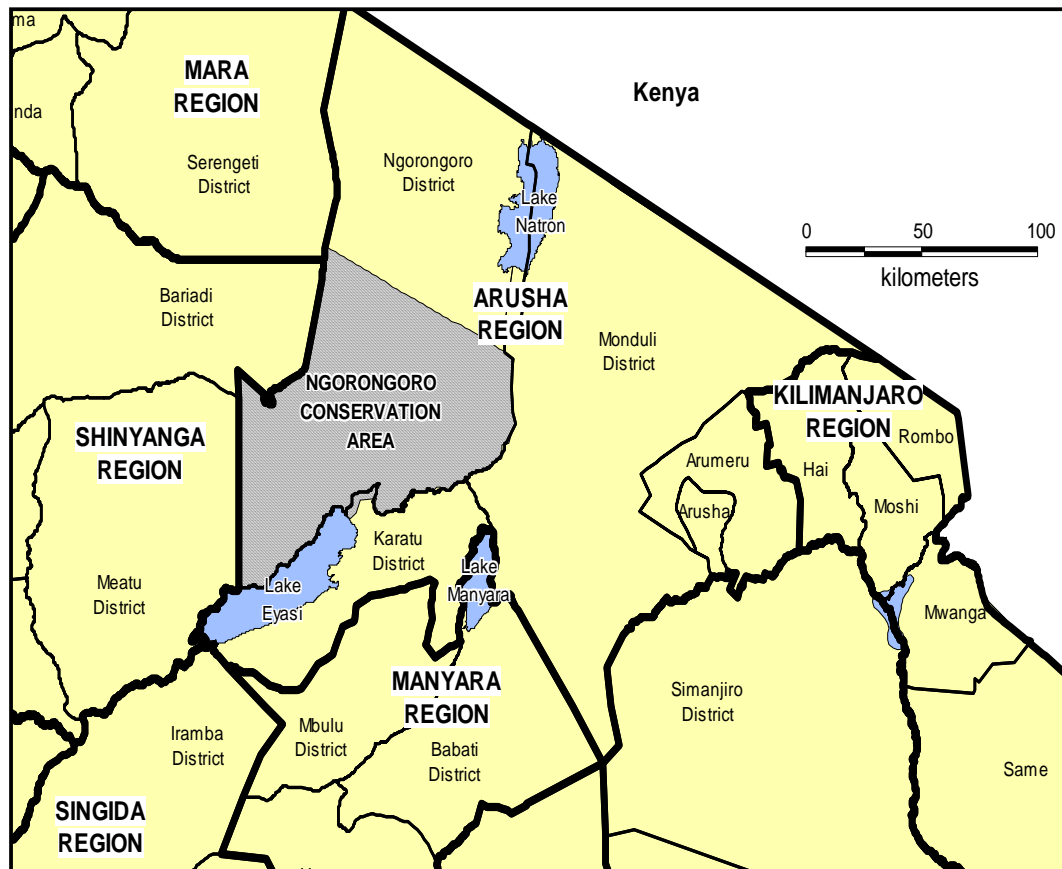
### **3.1.3 Description of Ngorongoro district**

#### **3.1.3.1 Location**

Ngorongoro district is one of the five districts of Arusha region in Northern Tanzania. It is located at about 400 km on the North - West of Arusha town. The district covers a total area of 14,036 km<sup>2</sup> and bounded between 1°34' and 3°42' S; and between 34°47' and 36°6' E. It borders Karatu district (Arusha region) in the south, Monduli district (Arusha region) in the East, Meatu district (Shinyanga region) in South-West, Serengeti Nation Park in the West, and in the North it borders Naorok division in Kenya.

#### **3.1.3.2 Administrative organisation**

Administratively Ngorongoro district is divided into 3 divisions; these are further subdivided into 14 wards and 31 villages. Due to high conservation value of the area the entire district has, since 1959, been designated various status of reserved lands including Loliondo Game Conservation Controlled Area in the northern parts including Loliondo and Sale divisions. Where as, Ngorongoro division in the south is congruent with the Ngorongoro Conservation Area (NCA) - a multiple land-use area which combines both wildlife conservation and habitation of Maasai pastoralists (Figure 5). The district is also part of the ancestral land of Maasai pastoralists, which also harbours high concentration of wildlife populations that coexisted with the pastoralists.



**Figure 5: Map of NCA in relation to Ngorongoro District**

Furthermore, the area is a part of the Serengeti – Ngorongoro – Maasai Mara ecosystem, a cross border “biosphere reserve” which supports large populations of wildlife. Both Loliondo Game Controlled Area and Ngorongoro Conservation Area were excised from the Serengeti National Park in 1959, and the resident Maasai pastoralists were evicted from the eastern Serengeti plains and moved to Loliondo area and Ngorongoro highlands.

Politically the Ngorongoro district constitutes one parliamentary constituent, and has an elected district council. Nevertheless, the institutional framework operational in the district is characterised by overlapping jurisdiction between the district authority and other

corporate bodies. For instance the NCAA, alongside other central government organs, have some mandate of maintaining law and order in the Ngorongoro Conservation Area, while TANAPA and the Wildlife Division reserve some rights of access in the Loliondo area.

#### **3.1.3.4 Topography and climate**

Ngorongoro district is characterised by different topographic features including the open plains, highlands, highland plateaus and depressions. The open plains occupy vast areas of the district including: the Serengeti, Salei and Angata – Salei plains. The plains are interrupted by highlands, hills, craters and escarpments. The main highland areas are located in southern parts of Ngorongoro Conservation Area. These include the Crater highlands - a vast volcanic massif with several calderas (Ngorongoro in the central parts, and Olmoti and Empakai in the eastern parts). Other Mountains are Lemogarot and Oldeani in the central parts,; while Lomalimalasini and Kerimasi Mountains are located in the east. Oldonyo Lengai, an active volcanic Mountain, lies at the edge of Salei plains and the Rift valley. The main highlands in Loliondo area are the Ololoswani highlands (Potkanski, 1994). The altitude varies from about 1,000m on the Rift valley floor (a.s.l.) to 1,500 and 1,700 m (a.s.l.) on Salei and Serengeti plains peaking to 2,100 and 2,800m. (a.s.l.) on the highland plateaux .The crater highland records up to 3 000 m (a.s.l.).

Ngorongoro district has a great variation in climate due to the different land forms and the associated dynamics of air masses. The area lies within the semi-arid zone and experiences highly seasonal and variable rainfall. Whereby, the local topography modifies the large scale tropical weather patterns leading to variable rainfall patterns. The area experience short rains starting from October end up in December; while long rains start in February and end up in June. The highlands receive about 1000 mm rainfall per annum, decreasing to

between 800 – 1000 mm on the plateaux and below 600 mm in the rain shadow areas of Serengeti and Salei plains (Homewood and Rogers, 1991).

### **3.1.3.5 Vegetation**

The vegetation of Ngorongoro was described by Herlocker and Dirschl (1972), Homewood and Rogers (1991) and Misana (1997). The area is characterized by grassland, open woodlands, closed woodlands and open and thick forests in areas of altitude between 1,100 and 1,300 metres (above sea level). The dominant tree species in highland forest area include *Podocarpus spp*, *Olea capensis*, *Fagaropsis angolensis*, *Juniperous procera*, and *Olea spp*. The dominant species in woodland vegetation types include *Euphorbia bussei*, *Commiphora spp*, *Acacia xanthophloea*, *Acacia seyal*, *Acacia tortilis*, and *Acacia drepanolobium*. Grasses that have been identified and found in both woodlands and open grasslands are *Panicum minimum*, *Sporobolus pyramidalis*, *Digitaria macroblephara*, *Themeda triandra* and *Cynodon dactylon*.

The crater highlands forests and Northern Highlands Forest Reserve (NHFR) forms the main catchment areas in the NCA. These are the major sources of water for the people, wildlife and livestock in adjacent plains to the west as well as for agricultural areas in the south and east of the NCA. Much of the drainage in the area, comprise of small internal streams flowing either in the craters, or into depressions such as Olbalbal depression that may hold water for up to 10 months in a wet year. The natural water supplies are very limited and water supply is especially precarious during the dry season (Potanski, 1994).

### **3.1.3.6 Wildlife and conservation values**

Wildlife species that are found in Ngorongoro district are more or less similar to those found in Serengeti National Park because together with this Park, NCA, Maswa, Ikorongo

and Grumeti Game Reserves in Tanzania and Maasai – Mara National Reserve in Kenya, makes the greater Serengeti – Mara ecosystem. Animals move freely in all these protected areas because the migratory routes are still intact. Animals particularly zebra (*Equus burchelli*), wildebeest (*Cannochaetes taurinus*) and elephant (*Loxodonta Africana*) utilize the Loliondo game reserve in wet seasons which start in November through to May. The most abundant species in the area include: wildebeest (*Cannochaetes taurinus*), zebra (*Equus burchelli*), gazelles (*Gazella* spp), impala (*Aepyceros* spp) and hartebeest. Others include giraffe (*Giraffe giraffe*), Lion (*Panthera leo*), the leopard (*Panthera felis*) and hyena (*Caricutta caricutta*).

Ngorongoro Conservation Area is a unique multiple land use area comprises of geological features of high outstanding scenic beauty and highest concentration of mammalian wild game which exhibits a magnificent seasonal migration. The central attraction of the area is the crater (Ngorongoro crater) - one of the largest inactive, unbroken and unflooded calderas in the world. The crater floor teems with large carnivores, herbivores, primates and birds. The crater has one of Africa's largest wildlife concentrations. It is also a home to a small and isolated relict of the black rhino population which was once a common and widespread group across southern and eastern Africa. It was been approved as Biosphere reserve in 1982.

In addition to wildlife the area has an outstanding cultural heritage. The NCA has palaeotological and archaeological sites over a wide range of dates. The four major sites are: *Olduvai* gorge, *Laetoli* site, Lake *Ndutu* site, and the *Nasera* Rock Shelter. The variety and richness of the fossil remains, including those of early hominids, has made Ngorongoro one of the major areas in the world for research on the evolution of the human species.

Olduvai Gorge has produced valuable remains of early hominids including *Australopithecus boisei* (Zinanthropus) and *Homo habilis* as well as fossil bones of many extinct animals. Nearby, at Laetoli, fossil hominid footprints of Pliocene age have been found. These conservation values led to its inscription on the UNESCO World Heritage sites list in 1979.

### **3.1.3.7 Socio- economic profile of Ngorongoro district**

The Ngorongoro district total human population in 2002 national census was 167,900 with a density of 4.4 people/km<sup>2</sup>. The projected population growth rate from 1988 to 2002 was 3.4% per annum (national census, 2002). Typical to the pastoral areas, Ngorongoro district is generally sparsely populated. But recently it has been experiencing rapid population increase. The main ethnic groups in Ngorongoro district are the Maasai pastoralists which constitute the majority ethnic group (95%) residing in both Loliondo and Ngorongoro areas. Others are the Sonjo agro-pastoralists (1%) restricted to Loliondo area, the pastoral Tindiga (1%) and Barbaig (3%) found in Lake Eyasi escarpment area, and the Ndorobo gatherers who have been assimilated in various Maasai sections (Runyoro, 2001). Other ethnic groups reported to be living permanently in the area are to a large extent employees or those who retired from government service and have decided to settle in the area. These are referred to as “Waswahili” however are reported to have very little influence in everyday life decision-making

While the Maasai may seem to constitute one group (95%), there are also differences within this group that may be sources of conflicts. The differences are largely due to origin of the different Maasai groups. There are six major groupings of the Maasai, namely *Purko*, *Laitayok*, *Kisongo*, *Loita*, *Salei* and *Sonjo* (agro-pastoralists). The *Purko*, *Laitayok*, *Lita*, *Laitayok* and *Salei* are found in Loliondo area. *Kisongo* Maasai are found in Ngorongoro



area and are widely distributed in Kiteto, Simanjiro district (Runyoro, 2001). The *Loita* Maasai have recently immigrated from Kenya, and they are frequently involved into resource-use conflicts with other Maasai clans as well as the Sonjo who have settled in the area for a long time.

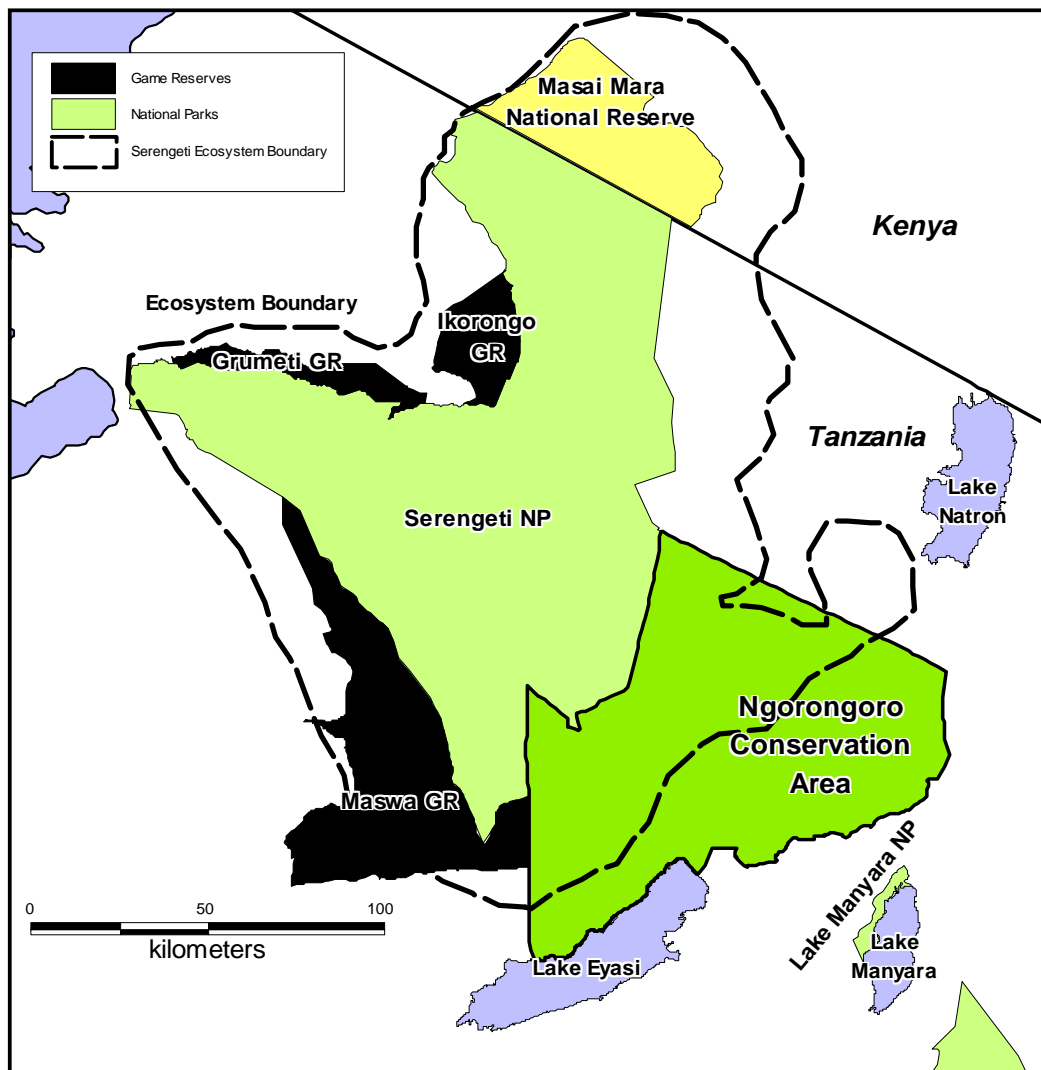
Most areas in Ngorongoro district are semi-arid plains, which cannot support crop cultivation, and only limited areas are suitable for cultivation. The main economic activity in the area is pastoralism with limited cultivation. However, the area that has been converted to cultivation is on increase. This is particularly so in the highland areas. The total arable land available is estimated to be 50,000 ha, and the total land under cultivation is 10,250 ha (ARCO, 1997). Ngorongoro district, like other pastoral areas, have very limited social services like schools, health facilities and transport network. The district total road length is 515 km, and road density is about 0.04 km/ km<sup>2</sup> (ARCO, 1997). The roads present in most areas are dry weather tracks, which are not passable during rain seasons.

#### **3.1.4 Description of Ngorongoro Conservation Area**

The NCA is situated at 3° 15' S and 35° 30' E in northern Tanzania. It lies at the western edge of the East African Great Rift Valley and covers about 8,292km<sup>2</sup>. The NCA headquarter is located approximately 160km NW of Arusha Town, the tourists' center of northern Tanzania.

The NCA is part of Serengeti-Maasai Mara ecosystem (Figure, 6). Ecologically the area is diverse and can be categorized into five zones: the crater highlands, Salei plains, Gol Mountains, Serengeti plains and Kakesio/Eyasi escarpment. The altitude within the five zones varies from 1,000 m (a.s.l) on rift valley floor to 1,500 to 170 m (a.s.l.) on the Salei and Serengeti plains, rising to 2,800 m (a.s.l) on the highland plateaux then peaks to 3,000,

(a.s.l.) on the crater highlands. The NCA is within the semi – arid zone of Tanzania, with rainfall ranging between 260 and 1890mm. Typical of semi-arid environments, the rainfall is highly seasonal and variable within and between seasons and years.



**Figure 6: Ngorongoro Conservation Area in relation to Serengeti – Ngorongoro – Maasai Mara “Biosphere Reserve”.**

The large scale tropical weather patterns is locally modified by local topography. For instance, the windward side of the crater highlands receives relatively higher rainfall than the rain shadow side. Whereas larger part of the NCA is on the rain shadow.

**Table 3: Main Land Units of the Ngorongoro Conservation Area**

| Unit                  | Altitude     | Land form   | Vegetation type                        |
|-----------------------|--------------|---|--|
| Crater highlands      | 2000 – 3000m | Volcanic plateau with extinct volcanic peaks and calderas | Forest, woodland with grassland glades |
| Angata /Salei Plains  | 1750m        | Flat  | Grasslands                             |
| Oldongyo Ogal Hills   | 1750 – 2200m | Rifted and eroded hills                                   | Grassland and bushland                 |
| Serengeti Plains      | 1750 – 2200m | Extensive plains  | Grasslands                             |
| Eyasi / Kakesio scarp | 1000 – 2000m | Steep scarp, rolling plains and low ridges                | Bushlands, woodlands, wooded grassland |

Source: Herlocker and Dirschl, 1972

The relative coverage of vegetation types were described by Herlocker and Dirschl (1972). These include health, bamboo, evergreen forest, highland woodland, lowland woodland, medium grasslands, short grasslands, sand dunes grasslands. The NCA is a part of the Serengeti Ecosystem, and is utilised as a main wet season grazing area for the majority of Serengeti's migratory herds numbering approximately 1.5m wildebeest (*Cannochaetes taurinus*); 470,000 (*Gazella* spp), and 260,000 zebra (*Equins burchelli*). Other important animals are buffalo (*Syncerus caffer*) and elephant (*Loxodonta Africana*).

The human population dynamics of NCA is featured by resident Maasai characterised by temporary in – and out – migration which creates alternating peaks in the overall trend of populations increase. The current human population is estimated at 52,000, with a population growth rate of 2 – 3 percent per annum. The pastoral Maasai have inhabited the NCA for almost two centuries, and co-existed with the wildlife of the area. The indigenous Maasai social and economic life centers on livestock. Cattle, sheep and goats form the basis for their subsistence. Their pastoral economy is basically subsistence oriented and pure pastoral diet of milk, blood and meat is still highly valued. However, in practice agricultural foods now form a very important part of the diet and replace the pastoral diet, particularly during drought and at the height of dry season (Homewood, 1995; Galvin *et al.*, 1994).

## **3.2 Methodology**

The primary data for this study consisted of both ecological and socio-economic data. The ecological data were collected through range inventory surveys and GIS data acquisition techniques. While socio-economic data were collected through PRA approaches and questionnaire surveys.

### **3.2.1 Ecological data collection and analysis**

Collection of ecological data involved range surveys as well as processing and interpretation of satellite imagery of parts of Mkata plains, Kilosa district and Ngorongoro Conservation Area, Ngorongoro district.

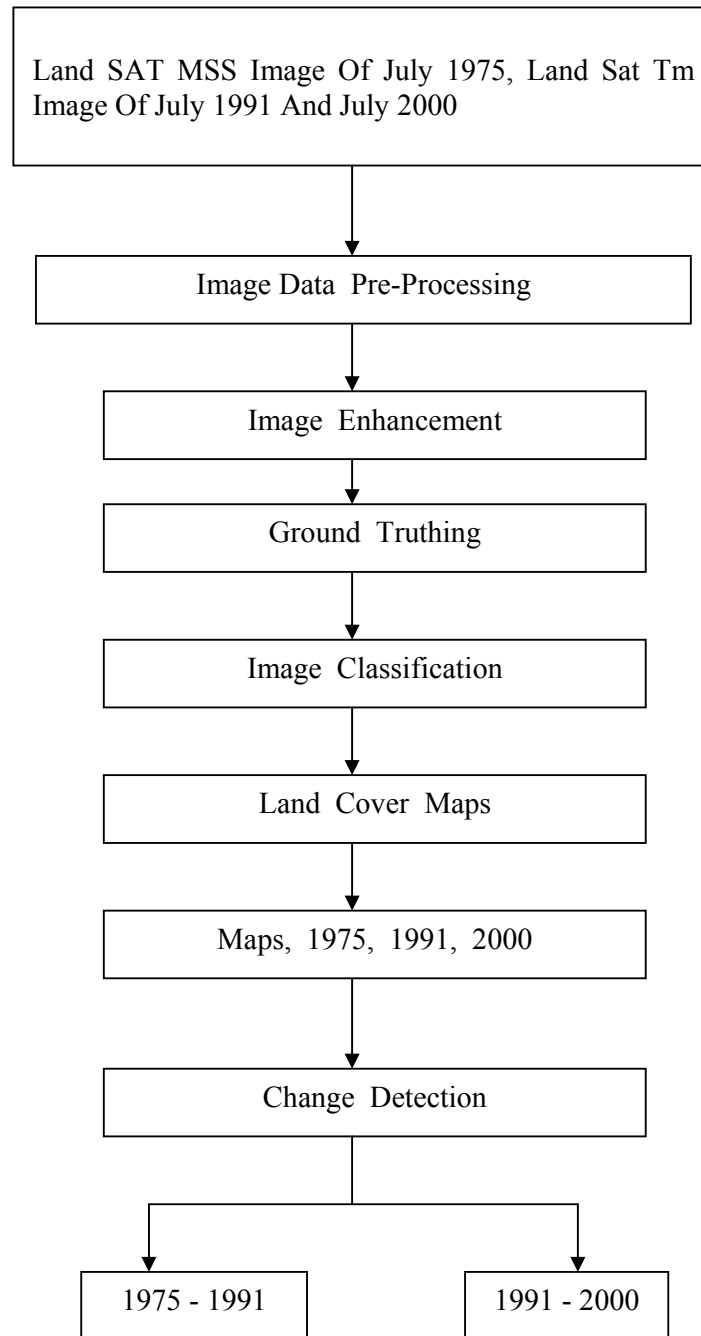
#### **3.2.1.1 Land-cover changes determination**

A combination of Geographic Information System (GIS) methods and information generated through community resource mapping and transect walks during PRA exercises,

were used to determine land-use and land cover changes, and trends in access to range resources in the past 25 years in the two study areas. Data sources for GIS methods included available aerial photographs (of late 1950s and early 1960s), topographic maps (1975) and Landsat satellite images (of 1975, 1991 and 2000). Local communities provided timeline data, which together with geo-referencing using GPS supplemented information obtained during, transect walks.

A combination of these data sets generated local knowledge, which was used as an input to information obtained through conventional GIS methods. Map features and delineated vegetation classes were digitised using ArcView software and processed following standard GIS procedures. Change detection analysis was conducted by using overlays generated from GIS land cover/use maps plus local perception information.

The geo-referenced topographic maps for each of the study area were produced using ArcView, ArcInfo and Erdas Imagine softwares. Change detection matrix tables were developed and used for quantification of land cover changes. Assessment of major land cover classes and the detection of changes associated with these classes were carried out through a number of steps shown in the methodology flow chart illustrated in Figure 7.



**Figure 7: Change detection flow chart**

#### **3.2.1.1.1 Reference input materials**

The materials used in the assessment of land cover classes and land cover change detection includes:

- i. Topographic map sheets at a scale of 1:50000 (UTM zone 37 south) for Kilosa district and topographic sheets UTM zone 36 south, for Ngorongoro conservation area. These are the best available detailed maps covering the two study areas.
- ii. Landsat MSS scene 169/65 of 27<sup>th</sup> July, 1975; Land sat TM scene 167/65 of 15<sup>th</sup> July 1991, Land sat TM scene 167/65 of August, 2000; Landsat MSS scene 169/62 of 17<sup>th</sup> April, 1975, Landsat TM scene 169/62 of 27<sup>th</sup> April , 1991, Land sat TM scene 169/62 of 20 April of 17<sup>th</sup> 2000.
- iii. A number of small scale maps (1:1,000,000 scale) describing different attributes of the study areas (villages, road net work map, relief maps and administrative map) for Kilosa and Ngorongoro districts were reproduced from various documents.

#### **3.2.1.1.2 Pre-processing of the satellite images**

Three sub scenes of the same size one from the landsat MSS and the other two from Landsat TM image – for each of the two study areas – were extracted from the full satellite scene using ERDAS imagine version 8.3.1

#### **3.2.1.1.3 Interpretation of satellite images**

##### **(i) Colour composition for visual interpretation**

A number of band combinations were tried on the seven bands of the TM image. Subsequently the colour composition from Landsat TM bands 4, 5 and 3 combinations proved to produce the best image for visual interpretation of physical and vegetational features. A number of subset for the landsat TM developed as training areas were enhanced and printed for use in ground truthing.

## **(ii) Collection of ground truthing information**

Ground truthing was based on the Landsat TM image of 2000. The enhanced colour composite image printouts were used for training purposes in the field. The villages that were randomly selected for socio-economic household and range surveys were also used as training areas. At each of the survey sites, the recognizable features on both the ground and the colour composite print outs were marked on the colour composite print out. The identification of features was done through first locating easily-observable features such as roads, railway lines, river networks, plantation boundaries, there after were related to other features such as vegetation types. The features were georeferenced using GPS. The local community members provided the onsite local knowledge including administrative locations (names of village, ward, and division), type of present land cover and use, and land cover changes. Additional information on landscape and soil features (texture and relief) was also recorded.

Despite the small changes in land use/cover which have taken place in the last three years, several land cover details were identified in the field; from the enhanced colour composite print outs for the landsat TM images of 2000. The following land cover classes were identified for Kilosa and Ngorongoro districts; with the corresponding characteristics on the 4-5-3 colour composite.

- a) Closed forest: deep red, speckled
- b) Woodland: Bright red, smooth (dense woodland, montane health) as speckled (open woodland)
- c) Bush land: Pink, smooth (dense bushland), bright pink scrubland speckled (open bushland), smooth red (Highland grassland)
- d) Grassland: Blue-green plus red or pink speckles (open shrubland)



- e) Intensive cultivation (e.g. sisal estates, sugar cane plantation, rice fields) pale cream or reddish.
- f) Riverine vegetation: bright red
- g) Water features (lakes, dams): black
- h) Settlements: grey/mauve.
- i) Road network: grayish crooked lines network.

Some of the details which were obtained on the Landsat TM image with a spatial resolution of 30x30m were lost or reduced on the Landsat MSS image with a spatial resolution of 79x79m. Hence, by taking into consideration these factors, the land cover classes were generalized into 4 main categories.

The main land cover types retained for classification were:

- a) Bare land: including areas with no active vegetation, these have lowest NDVI values (ranging from -1 to approximately -0.27 for the MSS image and between -0.69 to approximately -0.40 for the TM image). This class include bare soil (recently cultivated areas, overgrazed areas, rocky area etc) and water bodies (like lakes, dams, and rivers).
- b) Grassland/cropland: comprising sites with very low active vegetation, thus with (lower) NDVI values (ranging from about -0.26 to approximately -10.01 for the MSS image and from about -0.39 to approximately +0.25 for the TM image). This class comprises mainly of grasslands, farmlands and shrub grasslands
- c) Woodland: this has high active vegetation and relatively high NDVI values varying from about +0.02 to approximately +0.25 for the MSS image and from about +0.26 to approximately +0.50 for the TM image. The class includes the woodlands, thickets and bushlands.

- d) Closed forest class has the highest active vegetation, thus the highest NDVI values (ranging from about 0.26 to approximately +0.54 for the MSS image and from about +0.51 to approximately +0.65 for the TM image). The class comprise of closed woodlands, and montane forests.

### **(iii) Image classification**

The study combined both visual and digital image classifications. The digital image classification mainly based on the grey scale ranges of the calculated NDVI, used to establish main vegetation cover units. Two methods were used for digital image classification the *density slicing* method (Richards, 1993) and *level slicing* method (Lillesand and Kiefer, 1987). The slices which are intervals of series of brightness value corresponding to the ranges of NDVI values, these were established basing on the grey scale images and on training printouts.

A number of indices are used in remote sensing to create output images by computing mathematically the digital number (DN) values of different bands. The Normalized Difference Vegetation Index (NDVI) is by far the most commonly used in vegetation. According to Cohen (1994) the NDVI is simple to compute and exhibits strong relationship with a number of vegetation characteristics. A combination of supervised classification and visual classification was used to classify the land cover types in all study areas.

#### **3.2.1.2 Range inventory surveys**

Data on range condition and trends were measured using the method described by Range Improvement Task Force (1985). Generally, four or five range condition classes are recognized: excellent, good, fair, and poor. Differences between condition classes are somewhat arbitrary since they rarely form a continuum from badly depleted ranges to those

with maximum cover and productivity. Differences in range condition are often indicated by differences in species composition, but range condition is generally defined as departures from some conceived potential for a particular range site. A range site is defined as “a distinctive kind of rangeland, which in the absence of abnormal disturbance and physical site deterioration, has the potential to support a native plant community typified by an association of species different from that of other sites” (Society for Range Management, 1974, 1983). The method used in this study was adopted from Dyksterhuis (1958). This approach is ecological, in that range condition is measured in degrees of departure from climax. The approach assumes that climax can be determined for each range site. Excellent condition class would represent climax, and poor condition, the most removed from climax. The following ratings were used to determine condition:

| <u>Range condition</u> | <u>Percent of climax</u> |
|------------------------|--------------------------|
| Excellent.....         | 76-100                   |
| Good.....              | 50-75                    |
| Fair.....              | 26-50                    |
| Poor.....              | 0-25                     |

Originally, species occurring on each site were classified by their reaction to grazing as: *decreaser*, *increasers*, or *invaders*. *Decreasers* are highly palatable plants that decline in abundance with grazing pressure. Plants classified as *increaser I types* are moderately palatable and serve as secondary forage plants. They may increase slightly or remain stable under moderate grazing. As grazing pressure increases or as range condition reaches fair condition, these species also decline. Other plant species present in the climax vegetation but that are unpalatable may increase under grazing pressure or as site deterioration occurs. These species are classified as *increaser II plants*. *Invaders* are species that encroach onto

the site from adjacent sites in later stages of deterioration. *Type I invaders* may eventually decrease if forced utilization occurs at later stages of deterioration. *Type II invaders* are generally unpalatable and increase through final stages of deterioration.

#### **(i) Range inventory sampling design**

A systematic sampling with a random start was adopted in this study; to setting transect lines in sampled range sites. A range site is considered as an association of range species which is distinct from other sites in terms of proportion of species as well as productivity. Quadrant surveys were conducted on 1-km line transects set in each of the range sites (distinct ecological units) identified during community resource mapping, 3 transects were set in each of the range sites. Sampling units were  $0.5 \times 1\text{m}^2$  quadrants set at 100 m intervals along each transect. Data on vegetation cover, forage yield, species composition and range condition were recorded. Data on forage yields were determined by a dry and weigh method.

#### **ii) Percentage plant cover and species composition determination**

Plant cover was estimated concurrently with forage yield determination. In each sampling unit (quadrant), the leaf spread as basal area of the under growth herbaceous plants was recorded as percentage ground cover. Corresponding estimates of bare ground was also recorded.

#### **iii) Forage yield determination**

Potential forage yield was determined in each of the study village. Transects were set in different range units, which were identified in each village during transect walks. A clipping technique described by Pieper (1978) was used for forage yield determination. Vegetation sampling was carried out on a 1 km geo-referenced transects which were set along the

catena in each of the range sites. The sampling units were  $0.5 \times 1\text{m}^2$  rectangular quadrants. Ten samples were taken from each transect at 100m intervals. Vegetation were clipped to ground level and weighed to obtain total fresh weight. Sub-samples for dry weight determination were drawn from samples and put into paper bags. Thereafter the sub-samples were oven dried at  $28^{\circ}\text{C}$  in order to determine the dry weights proportions.

#### **iv) Range condition determination**

Range condition was determined according to the method reported in the Range Improvement Task Force handbook (1985). Range condition is based on estimated health of a rangeland under study, and the method is applied to open grassland and shrub lands. Range condition trend has been defined as the “direction of change in range condition” (Society for Range Management, 1989). Generally, trend is considered upward (or improving) or downward (declining) or stable. Trend ratings were initially used to establish conditions for livestock grazing as indicated by increasing productivity, cover, and succession toward climax conditions. Thus, to say whether a trend is upward or downward, one must specify the use or criteria used. If the trend is used to correspond to succession stages, upward trend would be toward climax and for downward trend - one must specify the use or criteria used. In this study a range condition trend is applied with respect to grazing cattle.

Paced transect was used to determine range condition. The paced 1 km transects run along transects previously used for determining potential forage yield. A 3/4 cm diameter metal loop placed immediately in front of foot was used as sampling point. A total of 100 points were scored in each transect. Hits on vegetation, litter, rock and base ground were recorded. The composition score was determined from a rating scale (Appendix 3)

The range quality was computed using a formula:

$$RQ = \sum_{i=1}^n (i H_i)$$

Where:

- RQ = range quality
- i = the score of range unit
- H<sub>i</sub> = proportion i<sup>th</sup> range quality
- n = number of range units

### 3.2.1.3 Animal counts

To determine the actual stocking rates and herd mobility, livestock counts were conducted in homesteads in all of the study villages. The actual counting was carried out by the interviewers during both dry and wet seasons. However, the data obtained were in most cases approximate figures, obtained through recall by head of household. Moreover, a large proportion of herders are reluctant to disclose to outsiders the actual number of cattle they own. In order to guarantee quality of the data the researcher conducted sample counting in each village. In Ngorongoro Conservation Area where there are regular livestock vaccination programmes, the number of livestock was counter checked using the vaccination records.

Livestock herd mobility was computed for each herd. The formula for computing herd mobility was adapted from Range Improvement Task Force handbook (1985), given as:

$$Mo = Ni/No_t$$

Where:

- Mo = livestock mobility
- Ni = number of animal moved from the area

$No_t$  = total population of animals in the area at time  $t$

### **3.2.2 Socio-economic data collection and analysis**

#### **3.2.2.1 Description of socio-economic research design**

A longitudinal study design was adopted for this research. The design allowed for the collection of data from more than one point in time for comparison purposes. The design was considered to be the most appropriate for this study taking into consideration the mobile nature of the pastoralists, the spatial-temporal variation of range resources and the dynamic nature of resource - use conflicts. Furthermore, a combination of methods was used in the collection of both quantitative and qualitative data, that is, triangulation. The results from each of the research methods were integrated in the overall results. The data collected by different methods provided a reliability check, while at the same time provided additional insights into particular issues and relationships. This approach allowed multiple measurements of the same variables (Monela, 1995). Qualitative methods provided an insight into reasons for some issues arising from the quantitative methods. They particularly, answered the questions of why and how.

#### **3.2.2.2 Research phases**

The study was carried out in two phases. Phase one involved reconnaissance surveys of the study area followed by PRA exercises. During this phase the researcher obtained research permits from the Regional, District, Division, Ward and Village government authorities. A permit to conduct research in the Ngorongoro Conservation Area was processed through the Permanent Secretary, Ministry of Natural Resources and Tourism. At this stage the researcher got familiarised with the social settings of the study areas, and selected the study villages. The questionnaires were pre-tested during this phase, in order to identify weaknesses, ambiguities and/or omissions before they were administered. Fifteen

households, from Kiduhi village in Kilosa district, and Oloirobi village in Ngorongoro district were selected for pre-testing the questionnaire. These villages were not included in the subsequent field surveys. During the second phase the detailed formal questionnaire surveys were carried out.

### **3.2.2.3 Sampling design**

Both probability and non-probability sampling methods were used in the selection of study units. A purposive procedure was employed to select the divisions and wards that have high population of pastoralists and high prevalence of resource - use conflicts. A stratified sampling procedure was used to select two pastoral and two agro-pastoral villages from each of the study areas. In case of Ngorongoro Conservation Area, the main farming systems are pastoralism or agro-pastoralism, while in Mkata plains there are villages that were set aside for pastoralists, mainly for the immigrant Maasai and Barabaig pastoralists.

The agro-pastoral villages in this study are defined as those in which the pastoralists coexist with cultivators (in Mkata plains) or where the majority of pastoralists have adopted crop production (Ngorongoro Conservation Area). Two divisions (Kimamba and Magole) and four wards (Kimamba, Rudewa, Msowero and Dumila) were selected from Mkata plains. In Ngorongoro Conservation Area one division (Ngorongoro) and four wards (Kakesio, Enduleni, Nainokanoka and Naiyobi) were selected for the study. The four wards from Mkata plains are located on the central parts of the flood plains; where the district authorities had designated the pastoral villages.

On the other hand the Ngorongoro division coincides with the jurisdiction of Ngorongoro Conservation Area. The study villages in Mkata plains include: Twatwatwa and Mabwegere (pastoral villages), Mbwa and Msowero (agro – pastoral villages). The study villages in



the Ngorongoro area include Kakesio, Irikeepus (pastoral), Enduleni and Naiyobi (agro-pastoral) (Table 4).

A sampling frame for this study was the names of all household heads from the village registers, obtained from the village government offices; these were used in selecting the households for the interviews. The households interviewed were selected by a random sampling procedure, using a table of random numbers. According to Boyd *et al* (1981), the sampling intensity should not be less than 5 percent. The number of households in the study villages ranged from 90 to 1,053.

**Table 4: Sample size and sampling intensity in the study villages in Ngorongoro Mkata plains and Conservation Area**

| Mkata plains |              |             |                        | Ngorongoro Conservation Area |              |             |                        |
|--------------|--------------|-------------|------------------------|------------------------------|--------------|-------------|------------------------|
| Village      | No. HH       | Sample size | Sampling intensity (%) | Village                      | No. HH       | Sample size | Sampling intensity (%) |
| 1. Msowero   | 1,700        | 170         | 10                     | Naiyobi                      | 1,053        | 105         | 10                     |
| 2. Mbwade    | 146          | 30          | 20                     | Erikeepus                    | 816          | 81          | 10                     |
| 3. Twatwatwa | 250          | 37          | 15                     | Enduleni                     | 840          | 84          | 10                     |
| 4. Mabwegere | 90           | 30          | 30                     | Kakesio                      | 175          | 35          | 20                     |
| <b>Total</b> | <b>2,186</b> | <b>267</b>  |                        |                              | <b>2,884</b> | <b>305</b>  |                        |

Key: HH – House hold

In order to obtain a sufficiently large sample size for satisfactory statistical inferences a minimum of 30 households was targeted for each study village. Therefore the sampling intensities for this study ranged between 10 and 30 (Table, 4).

#### 3.2.2.4 Units of analysis for socio-economic data

A unit of analysis is the one from which information is obtained or a unit whose characteristics we describe (Kajembe, 1994). In most of pastoral and agro-pastoral production systems, decisions are taken both at household and supra household levels. These levels are the basic units of analysis for this study. A household is defined as family members living in specific area, sharing a pot and having one household head as a decision-maker (Ishengoma, 1998). The household structure among the crop cultivators is relatively simple, mainly consisting of husband-wife-children and relatives. However, a more complex household structure characterized most of polygamist Maasai pastoralists. In this case a polygamous family (*Olmerei*) occupies a certain home-steady or boma (*enkang*), in which each wife has a separate house (*enganji*). Within the “boma” there may be separate houses for relatives, whose presence is more fluid. A pastoral household (*enkang*) in this study is defined as a group of people who normally share dwelling houses or encampment, claim a kinship relationship, sharing responsibilities for managing a communal herd and may or may not eat from a common pot, but they are under the authority of one person. The household head is the ultimate decision maker. Thus, in pastoral communities the household was determined by shared encampment and claim to a communal herd.

According to Kajembe (1994) supra household levels include either a community or an interest group. A community is defined as a group of people living in a particular area or a group of individuals with some common characteristics. The communities, however, are relatively heterogeneous. On the other hand an interest group is defined as a group of people with more or less common goals and relatively homogenous in terms of resource endowment.

### **3.2.2.5 Data collection methods**

Both primary and secondary data were collected during this study. Secondary data sources included: documentary materials (government reports, research reports, village records and various publications); obtained from libraries and district offices. Primary data were obtained from selected study villages and households through PRA approaches, household surveys and informal discussions with local people.

#### **(i) Socio-economic surveys**

The socio-economic surveys were conducted under two stages. The first stages involved Participatory Rural Appraisals and Focused Group Discussions, this was followed by Interviews. The use of a combination of different research methods was justified by the fact that it allowed for cross checking and verification of data obtained through different methods, that is, triangulation.

#### **(ii) Participatory Rural Appraisal**

Participatory Rural Appraisal aimed at involving the community members to evaluate their own situation and familiarize the researcher with the real world of the local people in the study areas. Furthermore, PRA arise self-critical awareness of the attitude on part of the researcher towards the people (Matata *et al.*, 2001).

The tools used in PRA include problem ranking, needs assessment, wealth ranking, trend diagramming, transect walks, and village resource mapping. During village resource mapping exercises, villagers in a participatory manner, drew village resource maps using locally available materials. During transect walks a researcher was accompanied by village leaders and elders to verify the resources indicated on the resource village map drawn by villagers. The main features and geographical units were identified and geo-referenced

using a hand-held Global Positioning System (GPS). These were then transferred to a large-scale (1: 50,000) village map. The type of information obtained through PRA include: trends in land-use changes, conditions in rangelands, accessibility to natural resources, the existing local institutions governing accessibility and use of natural resources, main risks felt by people, types of resource - use conflicts and conflict resolution mechanisms at local level.

### **(iii) Formal interviews**

A structured questionnaire was used for household interviews, and a sample of the questionnaire schedule is attached as Annex 2. The household questionnaire was translated into Swahili. This aimed at minimizing mis-interpretation of questions that could have arisen among different interviewers. As most of the Maasai respondents could not express themselves sufficiently in Kiswahili, most of the interviews with this group were conducted through Maasai speaking interpreters. The type of data obtained through structured questionnaire include: general information on main economic activities, farm sizes and livestock ownership, livestock mobility and pastoralists' migration patterns, access and management of grazing lands, local institutions governing communal resources, resource-use conflicts and mechanisms for conflict resolution.

### **(iv) Focus group discussions**

Focused group discussions were conducted with three groups in each study village. The groups included men only, women only and mixed group including equal number of men and women. Each group included youth representatives of respective sex. The separation of sexes was adopted because according to most pastoral tribal customs, women may not feel free to speak in presence of men. The criterion for selection of the group members was the willingness to participate in the discussions.

Focused group discussions normally generate large body of knowledge about the community (Mikkelsen, 1995; Borrini–Feyeraben, 1997), and are cheaper and quicker to conduct than individual interviews (Katani, 1999). The focus group discussions were envisaged to fill in gaps of missing information and help to clarify issues which arose from formal interviews. The type of information obtained through Focused Group Discussions include: people perceptions on effectiveness of local institutions for governing natural resources, changes in tenure-ship of natural resources, ratings of resource - use conflicts and their underlying causes, rating of the effectiveness of conflict resolution mechanisms, peoples' attitudes towards externally sponsored institutions and incentives to preserve existing local institutions.

#### **(v) Informal interviews**

Informal interviews were carried out with government officials, village government leaders, traditional leaders, and extension workers. These were considered as key informants. According to Meteric (1993) key informants are people who are accessible, willing to talk and having great knowledge regarding the issues under discussion. At the regional level, officials interviewed included: 2 Regional Administrative Secretaries, 2 Regional Agricultural Advisors, 2 Regional Livestock Development Advisors – each from Arusha and Morogoro regions respectively. Officials interviewed at district levels include 2 District Commissioners, 2 District Executive Directors and 2 District Agricultural and Livestock Development Officers – each from Kilosa and Ngorongoro districts respectively. Others were: the District Land Planning Officer, District Community Development Officer, District Water Engineer, and District Cultural Officer in Kilosa.

The functional officers interviewed in Ngorongoro Conservation Area include the Conservator of Ngorongoro Conservation Area; Community Development Director, Natural

Resource Management Director and the Principal Ecologist. Below district levels the interviewed officials included: 3 Divisional Executive Officers, 8 Ward Executive Officers, 4 Councillors, 8 Village Chairpersons and 8 Village Executive Officers. Others were 4 Agricultural and Livestock Development Field Assistants, and 6 Traditional Leaders. The information obtained through these interviews include: main land-use systems, existing land tenure systems, demographic changes, main resource - use conflicts, and mechanisms for resolving resource-use conflicts. The interviews were guided by a checklist (Appendix 1).

#### **(vi) Participant observation**

When carrying out participant observation the observer becomes part of the situation being studied (Kajembe and Wiersum, 1998). Participant observation allowed validation and understanding of the community incentives to retain or change common property institutions. The method was also used to gain more understanding on the capacity of local pastoral institutions in the management of communal resources and resolving resource-use conflicts. Kajembe (1994) emphasises that the method allows tying together discrete elements and information collected by other methods.

#### **3.2.2.6 Socio-economic data analysis**

A combination of data analysis methods including: content and structural - functional analysis for qualitative data and a Statistical Package for Social Sciences (SPSS version 11.5) was used for quantitative data analysis. The qualitative data obtained during PRA exercises were analysed in collaboration with the communities and the findings were used along with the quantitative data to triangulate and enrich the understanding of the social - cultural changes of communities under study.

**(i) Content and structural – functional analyses of qualitative data**

A content analysis of the components of verbal discussions held with respondents was carried out. The recorded dialogue was broken into smallest units of information, themes and tendencies. In this way the information was organised in a more objective and systematic manner (Kajembe, 1994). This aided the researcher in ascertaining beliefs, values and attitudes of respondents. Structural-functional analysis sought to establish relationship among social facts, and how these relate to the physical surroundings. Structural - functional analysis in this study helped to understand the existing types of local institutions and their effectiveness in organisational performance, and in resolving social as well as resource-use conflicts.

**(ii) Quantitative statistical analysis**

Both descriptive and inferential statistical analyses were carried out for quantitative data. The completed questionnaire schedule was coded, cleaned and the open ended questions were categorized and transformed into a form amenable for further analysis. A Statistical Package for Social Sciences (SPSS 11.5) was used in analyzing the quantitative data.

**(iii) Analysis of factors affecting strength of local institutions governing management of common grazing lands**

Following substantive conclusions of Wade (1988), Ostrom (1990), Baland and Platteau (1996), Agrawal (2001) and Stern *et al.*, (2002) about 30 - 40 factors have been identified to affect performance of common-pool resource management regimes. However, not all of these factors are independent of each other. Some of them are empirically correlated. According to Agrawal (2001) currently there is no reliable way of assessing the degree of correlation among these and other variables that have emerged as important. Furthermore, because the effects of some variables and interaction effects among variables may also

affect outcomes, any careful analysis of sustainability on the commons needs to incorporate interaction effects among variables. In this case the researcher need to explicitly take into account the relevant variables that might affect success, then the number of selected cases must be (much) larger than the number of variables.

Taking these facts into consideration the factors affecting strength of local institutions under study were analysed by developing a logistic model to test the likelihood of socio-economic and environmental factors, which affect the performance of local institutions.

#### **(a) Dependent variable**

The institutional performance as a dependent variable was determined by developing a cooperative index, as the measure of communities under study to participate in cooperative management of communal grazing lands. The co-operative index is a multivariate index comprising of five variables each having a score of 1 for presence or score of 0 for absence, and is given as:

#### **Cooperative index =**

- Local community mobilization = 1
- Existence of rules governing use  
of common grazing land ..... = 1
- Monitoring of rules..... = 1
- Local enforcement of rules .....= 1
- Conformance to rules..... = 1
- **Total score** ..... = **5**



The co-operative index ranges from **0** to **5**, and a mean score was computed for each study area, as a measure for institutional strength.

### **(b) Independent variables**

Since a large number of causal variables may affect outcomes of participation in management of common pool resources, therefore outcomes are multiple causative i.e. different variables may lead to similar outcomes. Thus, in order to minimize the multiple causative effects and contextual issues (i.e. actual settings of sample units), the conceptual causal chains adopted from Agrawal (2001) were developed in order to specify a model to test the hypothesis. The following causal chains were developed:

$$\begin{aligned}
 \text{Strength of local institution} &= f \text{ (Strong enforcement; Predictable benefits flow; } \\
 &\quad \text{Recognition by government) + Error} \\
 \text{Strong enforcement} &= f \text{ (Dependence on resources; Migration level; Social } \\
 &\quad \text{capital) + Error} \\
 \text{Dependence on resources} &= f \text{ (Market pressure; Population pressure; Income } \\
 &\quad \text{level) + Error,}
 \end{aligned}$$

### **Therefore:**

$$\begin{aligned}
 \text{Strength of local institutions} &= f \text{ (Income level; Population pressure; Market Social } \\
 &\quad \text{capital; Migration level; Predictability of resource } \\
 &\quad \text{flow; Recognition by government) + } \\
 &\quad \text{Error.....(1)}
 \end{aligned}$$

Then **logistic model 1** was developed to test factors affecting cooperation in management of common grazing lands.

The **logistic regression model 1** specification was of the form,

$$\frac{\ln p(Y_i = 1)}{1 - p(Y_i = 1)} = \gamma_0 + \sum \gamma_1 Z_1 + \dots + \sum \gamma_k Z_k \dots \dots \dots (2)$$

Where:

$Y_1$  = dependent variable indicating herders co-operation in management of communal grazing lands expressed as co-operation index.

$Z_1 \dots \dots Z_k$  were the independent variables

The independent variables are:

$Z_i$  = Population pressure (a dummy variable) expressed as family size compared to village average

$Z_2$  = Integration to market

$Z_3$  = Wealth category

$Z_4$  = Economic diversification

$Z_5$  = Herd size

$Z_6$  = Strength of local leadership

### **(iii) Logistic regression analysis for prediction of occurrence of resource-use conflicts**

A logistic regression analysis was adopted to analyse the likelihood of occurrence of resource-use conflicts. The dependent variable – occurrence of resource-use conflicts – was conceived as a dichotomous dummy variable with the responses: “**yes**” for high conflict magnitude with value **1**, or “**no**” for none to low conflict magnitudes with value “**0**”. The conflict magnitude in each study village was rated on conflict scale with scores: violent clashes (6), animosity (5), disagreements (4), arguments (3), tensions (2) no conflict (1). Score 4 was used as a cut off point for high magnitude of resource-use conflicts.

The logistic model predicts the likelihood of occurrence of the event (Menard, 1995), which is predicted by odds ( $Y = 1$ ). That is the ratio of the probability that  $Y = 1$  to the probability that  $Y \neq 1$ .

This was given by equation:

$$\text{Odd } Y = P(Y = 1)/(1 - P(Y = 1)) \dots \dots \dots (3)$$

The logit (Y) is given by the natural log of Odds ; that is

$$\frac{\ln p(Y_i = 1)}{1 - p(Y_i = 1)} = \log \text{ Odds} = \text{logit } (Y) \dots \dots \dots (4)$$

Where:

$Y_i$  =  $i^{\text{th}}$  observed value of resource use conflict

**The logistic regression model II** specification was of the form:

$$\frac{\ln p(Y_i = 1)}{1 - p(Y_i = 1)} = \beta_0 + \sum \beta_l X_l + \dots \dots + \sum \beta_k X_k \dots \dots \dots (5)$$

Where;

$Y_i$  = dependent variable, resource-use conflict

$X_i$  = explanatory variables ( $X_1$  = Perceived environmental degradation);  $X_2$  = Crop-livestock integration);  $X_3$  = State policies,  $X_4$  = socio-economic factors;  $X_5$  = market integration (proxied as distance to market in km);

The statistic significance of relationship between independent variable and the predictors was tested by the Model – Chi square at a significance level of  $p (< 0.05)$ . A proportional reduction in the absolute value of the log-likelihood measure,  $R_L^2$ , was used to test the model goodness of fit. The static forms of models were adopted in this study.

### 3.2.3 Study Limitations

The following are the limitations, which were experienced during data collection stage of the study:

- i) Most of the study villages were not easily accessible by motor vehicles during rain season which interrupted field data collection. This problem was overcome by visiting the particular villages on foot which prolonged data collection period.
- ii) The mobile nature of pastoral production system delayed data collection due to frequent absence of head of households who are spokesmen on issues related to livestock production. This was overcome through revisits of the study villages, which was taken into consideration when selecting a longitudinal study design adopted in this study.
- iii) Most of pastoralists were reluctant to disclose the actual number of livestock they own in fear of taxation by the local governments. A solution to this problem was attained through building trust with local communities particularly through participatory research approaches like transect walks which involved fully the local communities.
- iv) The hierarchical and closed nature of Maasai society required a lengthy period for building rapport with the communities in order to facilitate data collection process. Good relationship between the researcher and local communities was facilitated through local teachers and livestock field officers who were employed as enumerators and interpreters during this study.
- v) Owing to long term conflicts and mistrust between Ngorongoro Conservation Area Authority and local communities, most respondents were suspicious of the researcher because he was sometimes accompanied by the NCAA staff members. Improved relationship and free expression by local communities did take place when the research started to visit only in company of interpreter.
- vi) During the data collection period Kilosa district was recovering from violent clashes between farmers and pastoralists. Therefore some of responses with regard to resource-use conflicts were reflecting the positions of different ethnic

groups; while some respondents were reluctant to discuss the issue. Prolonged study period and revisiting helped to build trust that enabled the conflicting parties to confide with the researcher.

- vii) Some of the data were based on memory recall by respondents; these are considered to be a close approximation of the variables which were intended to measure. This limitation was overcome by verifying data obtained using one method through triangulation.

Despite of the limitations encountered during this study, but sufficient measures were taken to overcome them. Therefore, the data obtained were sufficient to allow for the inferences made from the study results.

## **CHAPTER FOUR**

### **4.0 RESULTS AND DISCUSSION**

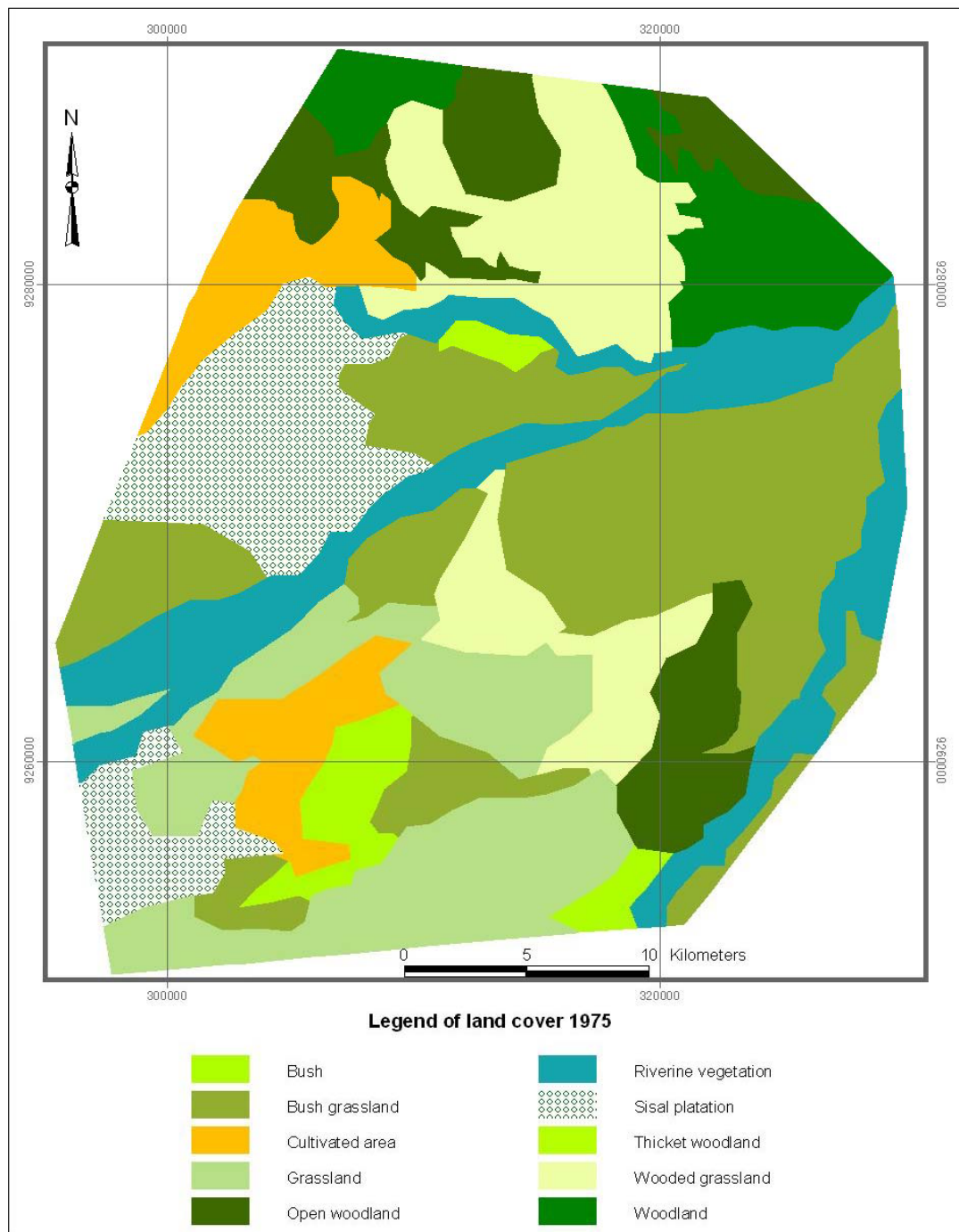
#### **4.1 Land Cover and Land use Changes in Mkata Plains and Ngorongoro Conservation Area**

##### **4.1.1 Land cover/Land use categories in Mkata Plains**

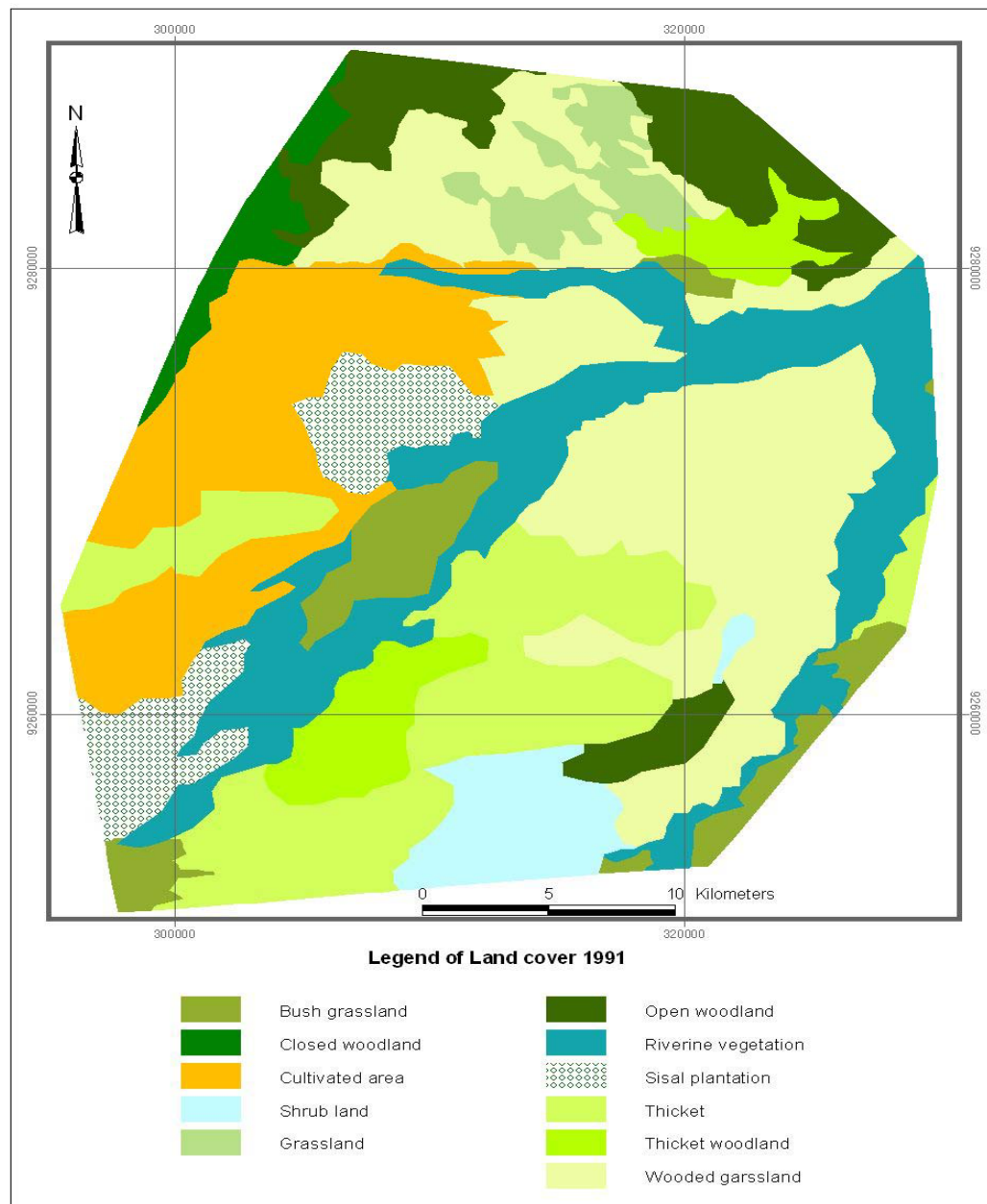
##### **4.1.1.1 Distribution of main land cover types in Mkata plains**

The distribution of major land cover/use types for the study area in the northern parts of Mkata plains are shown in Figures 8, 9, 10 and Table 5. The sub-scenes cover the northern-parts of Mkata plains on an area of 104,411.9 ha (1, 441.1 km<sup>2</sup>). The August 2000 sub-scene was employed in ground truthing of features delineated from satellite images on ground. It was assumed that three years difference from the time the satellite images were taken and when the field surveys were carried out between March 2003 and June 2004 was not long enough to allow substantial changes in main land cover types. Therefore, the features delineated on satellite imagery were representative of features on ground in March 2003 and June 2004.

Table 5 show areas and percentage coverage of the main land cover types identified on the studied satellite image sub-scenes. The main land cover types in Mkata plains are grasslands accounting for 48.8% of the total area and consisting of open grassland (5.2%), bush grassland (20.12%) and wooded grassland (23.55%). Other main land cover types are cultivation area accounting for 18.6%, bush lands comprising 15.15% and woodlands comprising 11.6%.

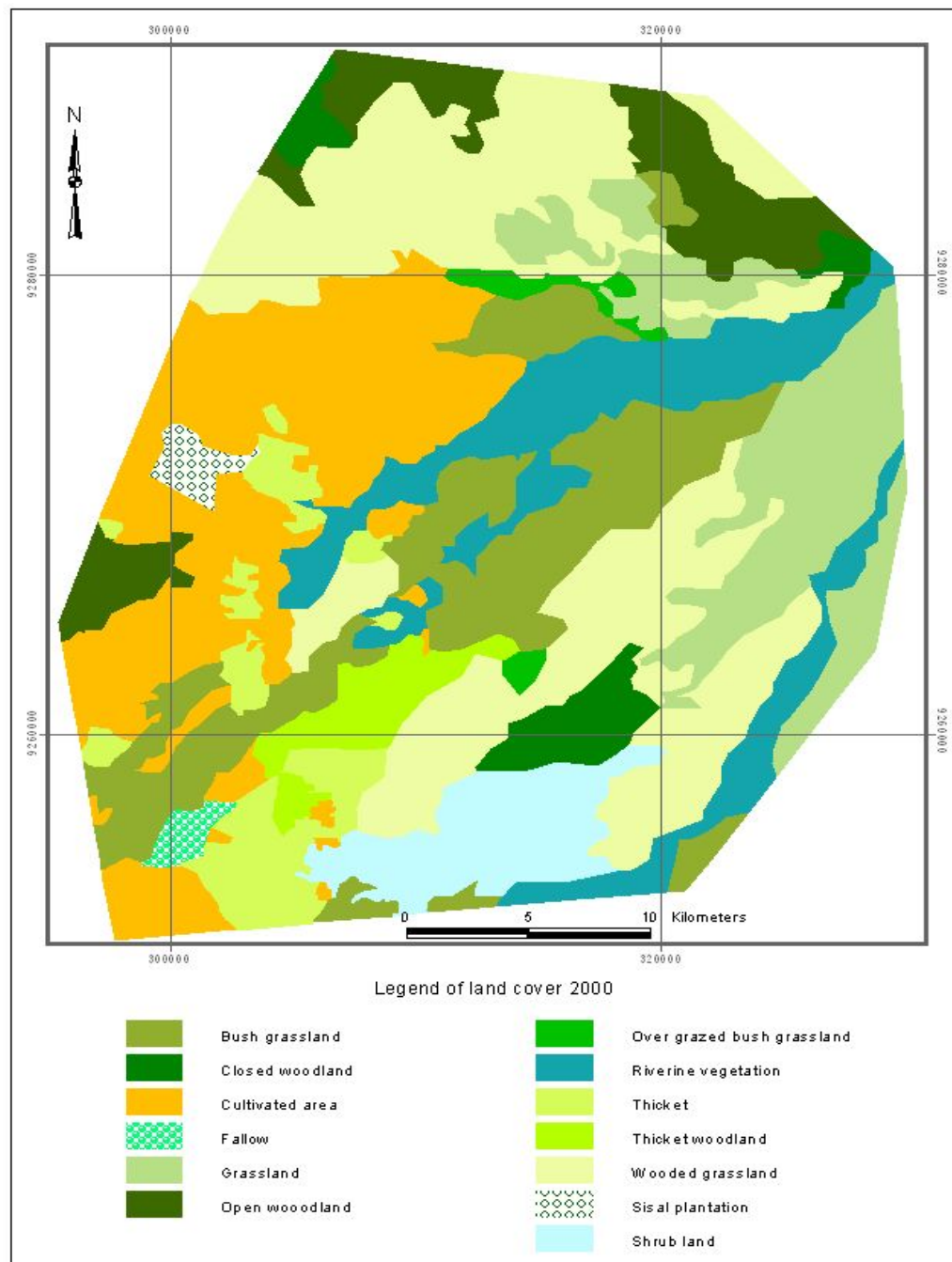


**Figure 8: Map of land cover types of northern parts of Mkata plains in July 1975**



**Figure 9: Map of land cover types of northern parts of Mkata plains in July 1991**





**Figure 10: Map of land cover types of northern parts of Mkata plains in August 2000**

**Table 5: Distribution of land cover types in northern parts of Mkata plains in July 1975, July 1991 and August 2000**

| Cover type                              | July, 1975         |              | July, 1991         |              | August, 2000       |              |
|---|--------------------|--------------|--------------------|--------------|--------------------|--------------|
|   | Area cover<br>(ha) | %<br>cover   | Area<br>cover (ha) | %<br>cover   | Area<br>cover (ha) | %<br>cover   |
| <b>Grasslands:</b>                      |                    |              |                    |              |                    |              |
| • Grassland                             | 16,055.4           | 15.5         | 4,233.2            | 4.10         | 5,380.3            | 5.2          |
| • Bush grassland                        | 25,754.9           | 24.84        | 19,416.4           | 18.73        | 20,856.8           | 20.12        |
| • Wooded<br>grassland                   | 12,499.0           | 12.10        | 14,867.3           | 14.34        | 24,414.5           | 23.55        |
| <b>Sub-Total<br/>(Grasslands)</b>       | <b>54,309.3</b>    | <b>52.38</b> | <b>38,516.90</b>   | <b>37.15</b> | <b>50,651.6</b>    | <b>48.85</b> |
| <b>Bushlands:</b>                       |                    |              |                    |              |                    |              |
| • Bush land                             | 3,086.0            | 3.0          | 15,569.9           | 15.02        | 10,683.4           | 10.30        |
| • Shrub land                            | -                  | -            | -                  | -            | 5,026.6            | 5.02         |
| <b>Sub-Total<br/>(Bush lands)</b>       | <b>3,086.0</b>     | <b>3.0</b>   | <b>15,569.9</b>    | <b>15.02</b> | <b>15,710.0</b>    | <b>15.15</b> |
| <b>Woodlands:</b>                       |                    |              |                    |              |                    |              |
| • Closed woodland                       | 7,246.1            | 5.6          | 6,961.8            | 6.31         | 5,529.5            | 6.32         |
| • Open woodland                         | 5,865.4            | 7.0          | 6,541.8            | 6.71         | 6,556.1            | 5.33         |
| <b>Sub-Total<br/>(Woodlands)</b>        | <b>13,111.5</b>    | <b>12.65</b> | <b>13,503.6</b>    | <b>13.02</b> | <b>12,085.6</b>    | <b>11.65</b> |
| <b>Cultivation area:</b>                |                    |              |                    |              |                    |              |
| • Small hold farms                      | 6,859.2            | 6.62         | 13,985.6           | 13.5         | 18,584.9           | 17.93        |
| • Sisal plantation                      | 12,908.6           | 12.50        | 5,713.8            | 5.5          | 766.9              | 0.74         |
| <b>Sub-Total<br/>(cultivation area)</b> | <b>19,767.8</b>    | <b>19.07</b> | <b>19,699.4</b>    | <b>19.0</b>  | <b>19,351.8</b>    | <b>18.64</b> |
| <b>Fallow land</b>                      | <b>-</b>           | <b>-</b>     | <b>-</b>           | <b>-</b>     | <b>551.9</b>       | <b>0.53</b>  |
| <b>Riverine vegetation</b>              | <b>13,392.9</b>    | <b>12.90</b> | <b>16387.8</b>     | <b>15.8</b>  | <b>5,327.2</b>     | <b>5.18</b>  |
| <b>Total Area</b>                       | <b>103,677.5</b>   | <b>100.0</b> | <b>103,677.6</b>   | <b>99.99</b> | <b>103,677.7</b>   | <b>100.0</b> |

Riverine vegetation type comprises of a mixture of different vegetation types and constitutes 5.18% of the area.

Table 6 show the net area change of main land cover types including bushlands, grasslands, woodlands, cultivation area and riverine vegetation. The overall net changes in main vegetation cover types from 1971 - 2000 include an increase of +12,624.0 ha of bush lands, equivalent to four-fold increase and a net loss of  $-(2,657.7 \text{ ha})$  in grasslands which amounts to  $-(6.7\%)$  loss. The riverine vegetation experienced a net loss of  $-(3,065.7 \text{ ha})$  which is  $-(60.2\%)$  loss. The cultivation area has undergone a slight loss of  $-416 \text{ ha}$  equivalent to  $-(0.2)$  percentage. The loss probably is that cultivation area that reverted to bush and fallow land. Nonetheless, the changes in vegetation cover types were not uniform neither unidirectional. However, it can be asserted that vegetation changes are tending to formation of woody vegetation types dominated by bush lands and wooded grassland. This confirms the non-equilibrium theory, which explains the vegetation dynamics in savanna ecosystems.

According to this theory the grasslands and bush lands are transitory sub-climax stages to woodland vegetation climax. Nduwamungu (2001) described a woodland regeneration cycle in Kilosa district, whereby the “miombo” woodlands exhibits a dynamic state - some open woodlands replenishing into closed woodland, while some woodlands remains open in response to other factors such as edaphic and climatic factors. The changes in open grassland could be relates to increasing grazing pressure in the area during period under consideration.

**Table 6: Net area change of main land cover types in Mkata plains between 1975 to 1991 and 1991 to 2000**

| Land cover<br><br>Type | Net area change<br>1975 - 1991 |                      | Net area changes<br>1991- 2000 |                      | Overall net cover<br>changes<br>1975 - 2000 |               |
|------------------------|--------------------------------|----------------------|--------------------------------|----------------------|---|---------------|
|                        | Area (ha)                      | %<br>cover<br>change | Area<br>(ha)                   | %<br>cover<br>change | Area<br>(ha)                                | %<br>coverage |
| Bush land              | +12,483.9                      | +404.5(33.7)         | +140.0                         | +0.9(0.08)           | +12,624.0                                   | +409.1(34.1)  |
| Grasslands             | -15,792.4                      | -40.8 (-2.5)         | + 12,134.2                     | +31.5(2.6)           | -2,657.7                                    | -6.7(0.6)     |
| -Open<br>grassland     | -11,822.2                      | -73.6 (-4.5)         | +1,147.1                       | +27.1(2.3)           | -10,675.1                                   | -66.5(-5-5)   |
| -Bush grass<br>land    | -6,337.6                       | -24.5(-2.1)          | -1,440.4                       | +7.2(0.6)            | -4,898.1                                    | -19.0(-1.3)   |
| -Wooded<br>grassland   | +2,368.3                       | +18.9(1.6)           | +9,547.2                       | +64.2(5.3)           | +11,915.5                                   | +95.3(7.9)    |
| Woodlands              | + 392.1                        | -40.8(-0.25)         | -1418.0                        | -10.5(-0.9)          | -1,025.9                                    | -7.8(-0.7)    |
| Riverine<br>vegetation | +2,994.9                       | +26.9(1.9)           | -11,060.6                      | -67.0(-5.6)          | -3065.7                                     | -60.2(-5.0)   |
| Cultivation<br>area    | -68.4                          | -8.16(-0.3)          | -347.6                         | -1.8(-0.15)          | -416.0                                      | -2.1(-0.2)    |

- Numbers in brackets are annual percentage changes

The increased grazing pressure probably interfered with natural vegetation succession cycles.

The riverine vegetation cover type experienced an initial annual increase of + 1.9 percent followed by a rapid annual decrease of – (5.6 percent). The results suggest an increased demand for wetland areas for growing irrigated crops during dry seasons. This is also, indirectly related to increase in human population with associated increase demand for cultivation land.

The cropland cover class consisting of smallholder farms and plantations has in overall increased by +9.2%. During the period starting from 1975 to 1991, the sisal plantations had in overall decreased by (-9.2%) of the respective area in 1975. At the same time the small holder farms had increased by + 11.4 %. These changes in cultivation area can be associated with the collapse of sisal industry in the area in mid-1970s, when previous sisal plantation workers started to cultivate on sisal estates. The increase in cultivation area could also be attributed to general population increase and expansion of agricultural land in Mkata plains.

The results on land cover changes in Mkata plains suggest a progressive change from grasslands towards woody vegetation (Figures, 11 and 12). This is a common directional succession process that has been reported to be taking place in East Africa rangelands and other similar savanna ecosystems (Herlocker, 1999). Increasing grazing pressure has been identified as one of the factors driving successional changes in arid rangelands which favour dominance of woody vegetation. The history of study villages in Mkata plain indicates that from 1940s, immigrant pastoralists had progressively been settling in the area. This has in turn led to increase in grazing pressure, which has triggered off successional vegetation changes tending towards woody vegetation cover types. According to Archer and Smeins (2004) grazing animals affect plants directly and indirectly.



**Figure 11: Woodland regeneration in Mkata plains**



**Figure 12: A secondary savanna woodland in Mkata plains**

Over time, this may cause directional changes in community structure and function. Sala *et al.* (1988) suggests that grazing influences interact with climatic variability and other variables to cause changes in plant communities at various spatial and temporal scales. Thus; the impact of livestock grazing on ecosystems varies in relation to the evolutionary history of the site and the level of grazing pressure.

According to Archer and Smeins (2004) the grassland or savanna systems that occur in areas climatically and edaphically capable of supporting trees and shrubs, prolonged grazing may decrease the capacity of grasses to competitively exclude woody plants, while at the same time reducing fire frequency and (usually) intensity by preventing the accumulation of fine fuels. Salihi and Norton (1987) argues that where grazing has reduced plant and litter cover, sealing of soil surfaces via raindrop impact and hoof compaction may reduce infiltration and increase erosion and runoff. In addition, germination and survival of perennial grasses may be greatly reduced on such sites and recovery of surface soil properties following cessation of grazing may require decades. Collins *et al.* (1987) argues that certain levels and combinations of grazing or disturbance increase overall plant species diversity by decreasing the capacity of competitive dominants to exclude other species and by creating gaps available for occupation by other species. However Connell (1978) points out that above certain frequencies or intensities, disturbance typically lowers diversity. This phenomenon of increased diversity at moderate levels of disturbance has been termed the “intermediate disturbance hypothesis” Discussing on impact of grazing, Tothill and Mott (1985) observes that grazing animals in combination with other human activities, have caused the degradation of woodlands in Africa, Asia, and India. On the other hand, grazing has also been implicated in the spread of bush in Africa, desert and thorn scrub in North and South America, and acacia and eucalyptus woodlands in Australia, at the expense of grasslands and savannas. Increased grazing intensity may favor woody plants by decreasing

herbaceous standing crop, reducing fire frequency and intensity, and enhancing the dispersal and germination of woody plant seeds. Other researchers observe that quantitative and historical assessments indicate woody plant abundance has increased substantially in grasslands during the last century in Africa (van Vegten, 1983), Australia (Harrington *et al.*, 1984), India (Singh and Joshi, 1979), North America (Smeins, 1984), and South America (Schofield and Bucher, 1986). Emmanuel *et al.*, (1985) argues that the remaining grasslands and savannas may become increasingly susceptible to woody plant encroachment in response to anticipated global changes that may generate warmer, drier climates characterized by greater variability.

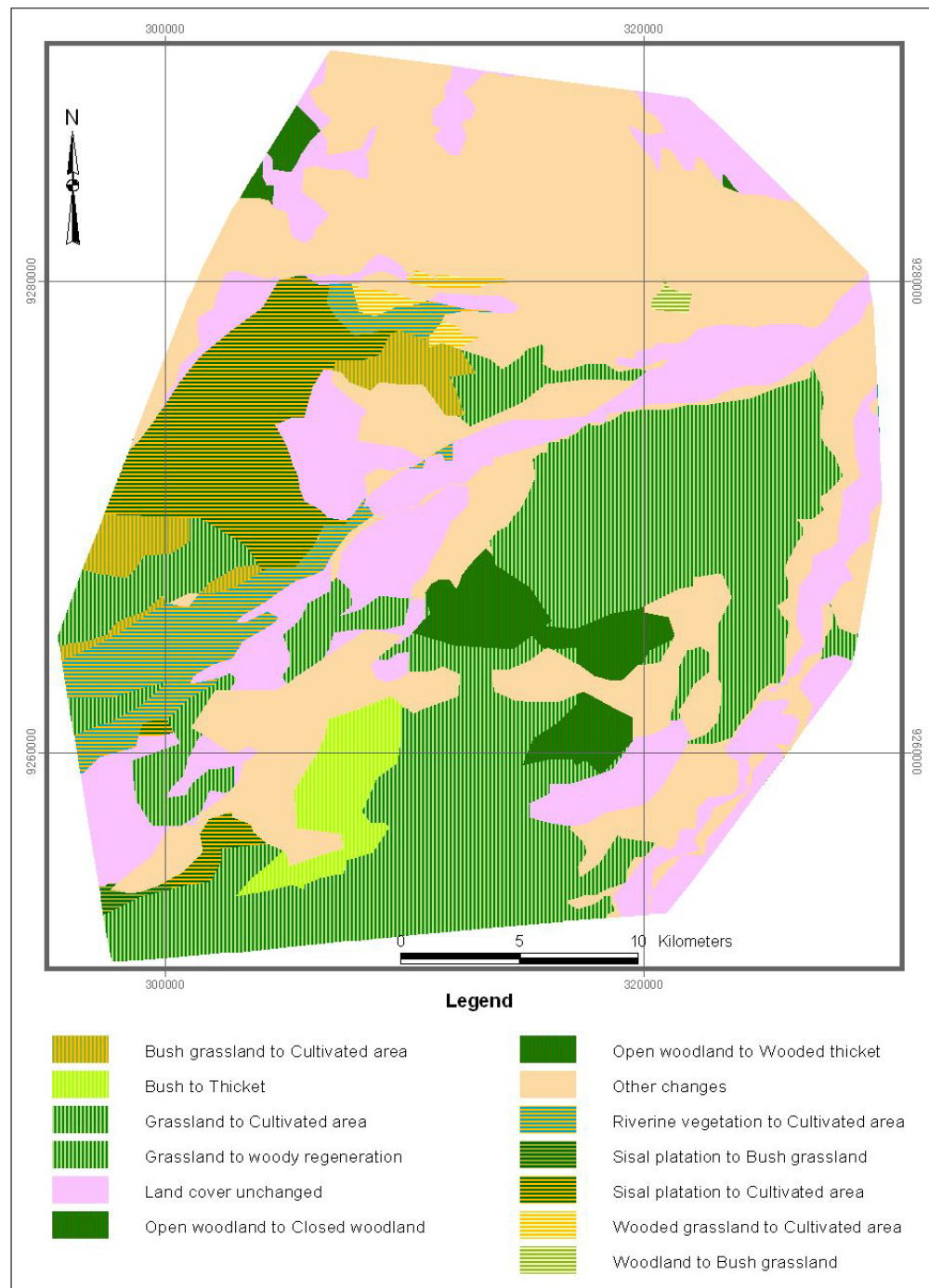
#### **4.1.1.2 Land cover change detection matrix between 1975 to 1991, and 1991 to 2000 in Mkata plains**

As from July 1975 to August 2000 Mkata plains had experienced substantial vegetation cover changes, which were determined from processed satellite image sub-scenes. However, a simple analysis based on subtracting areas may be inaccurate and misleading; therefore it was important to be supplemented with change detection matrices analysis. Table 7 and Figure 13 show the land cover change detection matrix for 1975 and 1991 and estimates of change in terms of area and percentage, using 1975 as base year.



**Table 7: Land cover change detection matrix between July 1975 and August 1991 in Mkata plains**

| <b>Land cover type</b>                 | <b>Area changes(ha)</b> | <b>% change</b> |
|--|-------------------------|-----------------|
| Bushed grassland to cultivated area    | 2,117.0                 | -2.0            |
| Grassland to cultivated area           | 1,499.7                 | -1.4            |
| Wooded grassland to cultivated area    | 508.9                   | -0.5            |
| Riverine vegetation to cultivated area | 4,095.0                 | -3.9            |
| Sisal plantation to small hold farms   | 7,311.9                 | -7.00           |
| <b>Sub - Total</b>                     | <b>15,532.5</b>         | <b>-14.9</b>    |
| <b>Woodland to bush grassland</b>      | <b>141.9</b>            | <b>-0.1</b>     |
| Bush to thicket                        | 2,316.0                 | +2.2            |
| Open woodland to closed woodland       | 439.6                   | +0.4            |
| Grassland to shrub land                | 27,996.7                | +26.8           |
| Open woodland to wooded thicket        | 3,375.8                 | +3.2            |
| Sisal plantation to bush grassland     | 151.1                   | +0.1            |
| <b>Su-Total</b>                        | <b>34,279.3</b>         | <b>+32.9</b>    |
| <b>Unchanged Land cover</b>            | <b>54,457.9</b>         | <b>52.1</b>     |
| <b>Total</b>                           | <b>104,111.9</b>        | <b>100.0</b>    |



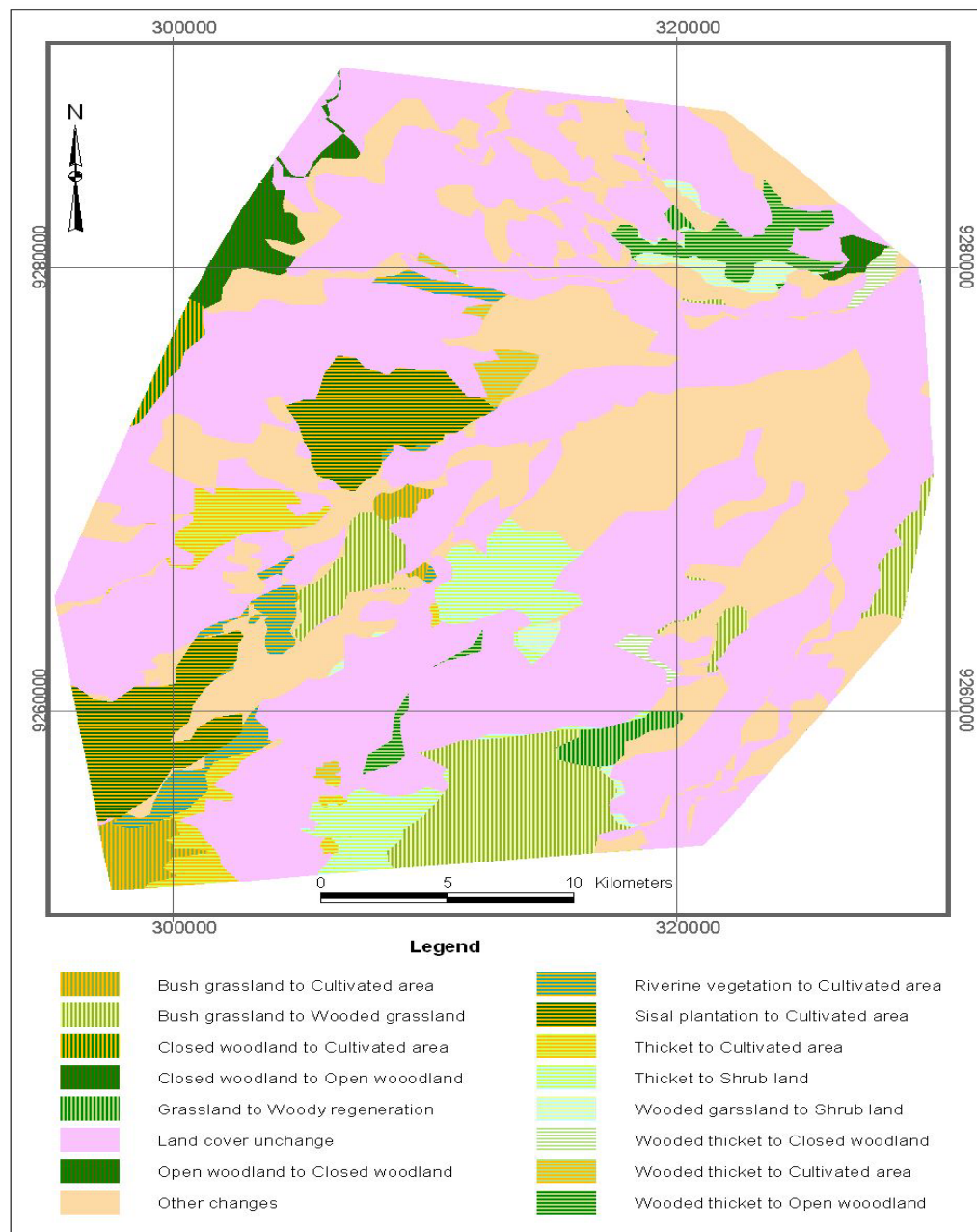
**Figure 13: Map of land cover changes between 1975 and 1991 on northern parts of Mkata plains**

The major changes that occurred during the period under consideration were conversion of different land cover types to cultivation area totalling to 15,532.1 ha, equivalent to 14.9%. Other changes involved either succession or retrogression processes. The succession processes involved conversion to higher stages of succession towards woody vegetation climax. A total of 34,256.6 ha (33.0 %) progressed in a succession cycle, where as the area that regressed to bush grassland amounted to 141.9 ha, equivalent of 0.2 percent. The land cover changes, which represent advancement in the succession cycle include change of grassland to shrubland (woody regeneration) (+26.81%), bushland to thicket (+2.2%), open woodland to thicket (+3.2%), open woodland to closed woodland (+ 0.4%). However, some of land cover changes that are characterised as advancement in ecological succession are considered as degradation for other land-use, in this case rangeland. Therefore, conversion of grassland to shrub land as well as change of open woodland to thicket that are associated with loss of grass cover is considered a degradation of rangelands intended for livestock grazing.

Table 8 and Figure 14 show the land cover change-matrix in Mkata plains between 1991 and 2000. The main land cover changes that took place during this period involved conversion of different land cover types to cultivation area totalling up to 11,276.7 ha equivalent to 10.8% of the land area. Another main change involved retrogression of various land cover types from a climax of woodland (or forest) cover to other intermediate stages, which amounted to 6,912.9 ha or 7.2 percent of the total area.

**Table 8: Land cover change detection matrix between 1991 and 2000 in Mkata Plains**

| <b>Land cover type</b>                  | <b>Area changes (ha)</b> | <b>% Change</b> |
|---|--------------------------|-----------------|
| Bush grassland to Cultivation area      | 1,096.8                  | -1.1            |
| Closed woodland to Cultivation area     | 443.4                    | -0.4            |
| Thicket to Cultivation area             | 1,979.0                  | -1.9            |
| Wooded thicket to Cultivation area      | 565.3                    | -0.5            |
| Riverine vegetation to Cultivation area | 1,581.4                  | -1.5            |
| Sisal plantation to small hold farming  | 5,630.8                  | -5.4            |
| <b>Sub -Total</b>                       | <b>11,276.7</b>          | <b>-10.8</b>    |
| Closed woodland to Open woodland        | 1,163.7                  | -1.2            |
| Wooded grassland to Shrub land          | 860.2                    | -0.8            |
| Thicket to Shrub land                   | 3,302.5                  | -3.2            |
| Wooded thicket to Open woodland         | 1,595.5                  | -1.5            |
| <b>Sub- Total</b>                       | <b>6,921.9</b>           | <b>-6.7</b>     |
| Bush grassland to Wooded grassland      | 6,022.3                  | +5.8            |
| Grassland to Woody regeneration         | 665.2                    | +0.6            |
| Open woodland to Closed woodland        | 382.7                    | +0.4            |
| Wooded thicket to Closed woodland       | 379.2                    | +0.4            |
| <b>Sub-Total</b>                        | <b>7,449.4</b>           | <b>+7.2</b>     |
| <b>Land cover unchanged</b>             | <b>78,019.3</b>          | <b>75.3</b>     |
| <b>Total</b>                            | <b>103,677.3</b>         | <b>100.0</b>    |



**Figure 14: Map of land cover changes between 1991 and 2000 on northern parts of Mkata plains**

The changes that occurred on grasslands include conversion of 6,033.3 ha (5.8%) of bush grassland to wooded grassland, and conversion of 1,096.8 ha (1.1%) bush grassland to cultivation area. Others were change of 860.2 ha (0.8%) of wooded grassland to shrub land. The land cover types that advanced in a succession cycle amounted to 7,449.4 ha (+7.2%) including change of 6,022.3 ha bush grassland to woody grassland (+5.8%). The land cover types that retrogressed were closed woodland to open woodland (-1.1%), wooded grassland to shrub lands (-0.8%), wooded thicket to open woodland (-1.5%). While no notable changes that took place on 75.2 % land cover of 1991 values (Figure 14). The results suggest that changes occurring on different vegetation types are multi-directional and caused by a wide range of factors.

Nonetheless, the change-detection matrix results were similar to the trend in vegetation changes established from net cover change analysis that indicates the main trend is conversion of grass cover types into woodlands. These results are similar to findings by other researchers, for example Herlocker (1999) who concludes that the ecological succession in the savanna ecosystems tends to move towards a climax of woody vegetation. Thus under savanna ecosystems both overgrazing as well as under grazing may result into regeneration of woody vegetation.

#### **4.1.1.3 Range condition and trends in the study villages in Mkata plains**

Table 9 presents species composition, vegetation cover, and forage yield in Mkata plains. The results show that the dominant grass species in the three of the four study villages (Twatwatwa, Mabwegere and Mbwade) were “*decreaser*” annual grass species including *Bracharia* spp, *Urochloa* spp and *Commelina* spp.

**Table 9: Species composition, vegetation cover and forage yield in the study villages in Mkata plains**

| Village   | Species composition          | (%)<br>Composition | Vegetation<br>cover (%) | Forage<br>Yield<br>Kg/Dm/Ha |
|-----------|------------------------------|--------------------|-------------------------|-----------------------------|
| Msowero   | <i>Brachiaria deflexa</i>    | 25.0               | 65.0                    | 3,200.0                     |
|           | <i>Dichanthium spp</i>       | 7.1                |                         |                             |
|           | <i>Echinochloa spp</i>       | 1.8                |                         |                             |
|           | <i>Urochloa pullulans</i>    | 25.0               |                         |                             |
|           | <i>Leptochloa spp</i>        | 15.5               |                         |                             |
|           | <i>Heteropogon contortus</i> | 1.8                |                         |                             |
|           | <i>Cyperus rotundus</i>      | 3.6                |                         |                             |
|           | <i>Fimbristris spp</i>       | 5.4                |                         |                             |
|           | <i>Commelina</i>             |                    |                         |                             |
|           | <i>benghalensis</i>          | 5.4                |                         |                             |
|           | <i>Sporobolus cordofanus</i> | 5.4                |                         |                             |
|           | <i>Indigofera spp</i>        | 3.0                |                         |                             |
| Mbwade    | <i>Sporobolus cordofanus</i> | 52.0               | 40.0                    | 1,050.0                     |
|           | <i>Commelina</i>             | 25.0               |                         |                             |
|           | <i>benghalensis</i>          |                    |                         |                             |
|           | <i>Unkown Weed spp</i>       | 23.0               |                         |                             |
| Twatwatwa | <i>Urochloa pullulans</i>    | 61.0               | 55.0                    | 2,170.0                     |
|           | <i>Brachiaria deflexa</i>    | 29.0               |                         |                             |
|           | <i>Leptochloa spp</i>        | 5.0                |                         |                             |
|           | <i>Dichanthium spp</i>       | 3.0                |                         |                             |
|           | <i>Heteropogon contortus</i> | 2.0                |                         |                             |
| Mabwegere | <i>Commelina</i>             | 17.9               | 50.0                    | 1,807                       |
|           | <i>benghalensis</i>          |                    |                         |                             |
|           | <i>Sporobolus cordofanus</i> | 44.0               |                         |                             |
|           | <i>Cyperus rotundus</i>      | 23.1               |                         |                             |
|           | <i>Fimbristris spp</i>       | 15.0               |                         |                             |

Key: DM = Dry matter

The rangelands were also being encroached by “increaser” species including *Sporobolous* spp and *Dicanthium* spp. Dominance of these “increaser” and “decreaser” species is an indication that the range condition at the three villages was declining. The dominant grass

species composition at Msowero village consists of “*decreasers*” - *Brachiaria deflexa*, *Urochloa pullulans*, *Leptochloa spp* and “*increasers*” *Dichanthium spp*, and *Sporobolus cordofanus* species. These species indicates that the range trend at Msowero was stable. Traditionally, plants have been classified as decreasers, increasers and invaders with respect to their response to grazing (Dyksterhuis, 1949 in Archer and Smeins, 2004).

However, the functional response of a given species to grazing can vary from site to site and across topographic and edaphic gradients. The *invaders*, typically annuals or unpalatable (and sometimes toxic) perennial herbaceous or woody plants are often undesirable for livestock production because they displace more palatable grass species, are of lower nutritive value; or have low, erratic, or highly seasonal productivity.

The estimated forage yield varied from 3,200 kg DM/Ha at Msowero village; 2,170 kg DM/Ha at Twatwatwa; 1,807 kg DM/Ha at Mabwegere and 1,050 kg DM/Ha at Mbwade village. The results indicate that the forage yield in the villages under the study were moderately to low productive (Table, 9). The vegetation cover was 65% at Msowero, 55% at Twatwatwa, 50% at Mabwegere and 40% at Mbwade village. The low vegetation cover (50% and below) indicates increasing risks for soil erosion. A relatively low vegetation cover at Mbwade village could be related to high bush encroachment. The poor range condition in the study villages in Mkata plains could be attributable to high grazing pressure. The KDC (2000) livestock estimates in the study villages in year 2000 totalled up to 92, 711 Livestock Units Equivalent (LUE).

Table 10 shows range condition trend on the villages under study. The results indicate that the range condition class at Twatwatwa and Mabwegere villages was fair with condition



score of 54 and 50 % respectively, but with a declining trend. While the range condition class at Mbwade village was poor with a condition score of 24% with a declining trend.

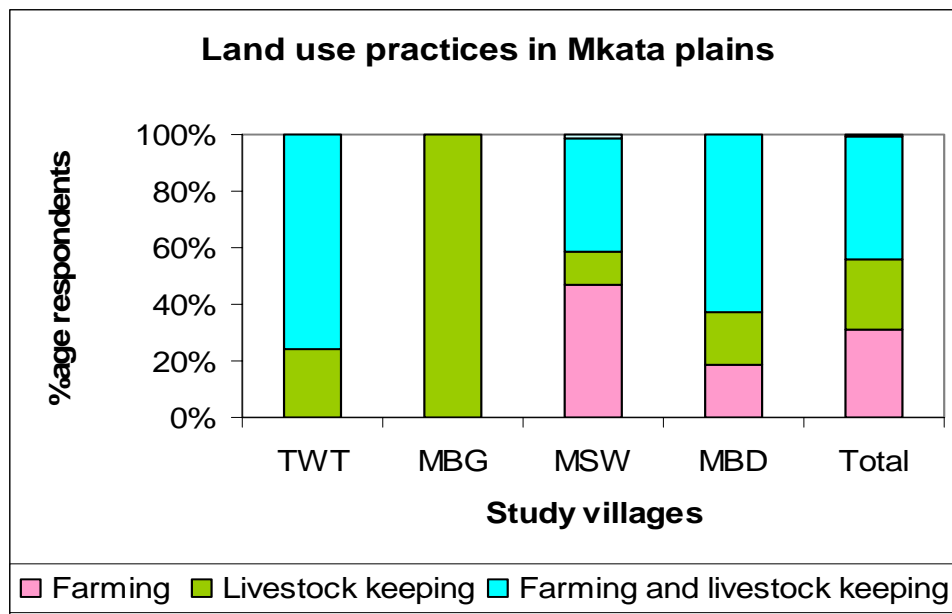
**Table 10: Range condition trend in the study area in Mkata plains**

| <b>Village</b> | <b>Condition score (%)</b> | <b>Class</b> | <b>Trend</b> |
|----------------|----------------------------|--------------|--------------|
| Twatwatwa      | 54                         | Fair         | Declining    |
| Mabwegere      | 50                         | Fair         | Declining    |
| Msowero        | 60                         | Good         | Stable       |
| Mbwade         | 24                         | Poor         | Declining    |

The range condition class at Msowero was rated *good* with a condition score of 60% and in a stable state. The range class gives an indication of the vegetation cover (thus site erosive capacity) as well as presence of palatable grass species for particular herbivores in this case livestock. A low range condition score and a declining trend indicate a deterioration process. The fair range condition at Mabwegere could partly be attributed to strong local institutions, which limits the number of livestock that could be grazed on the village lands. It could also be attributed to high mobility by herders from the village, suggesting that livestock mobility is an important management strategy which easy pressure on grazing lands. If well co-ordinated this strategy could enhance sustainability of rangelands. On the other hand the fair to poor condition class and a declining trend in three villages (Twatwatwa, Mbware, and Mabwegere) suggests that the village lands are subjected to high grazing intensities that have induced a deterioration process. Whereas a stable range condition at Msowero village suggests that the stocking rate in the village is at sustainable level.

#### 4.1.1.4 Trends in land - use in Mkata plains

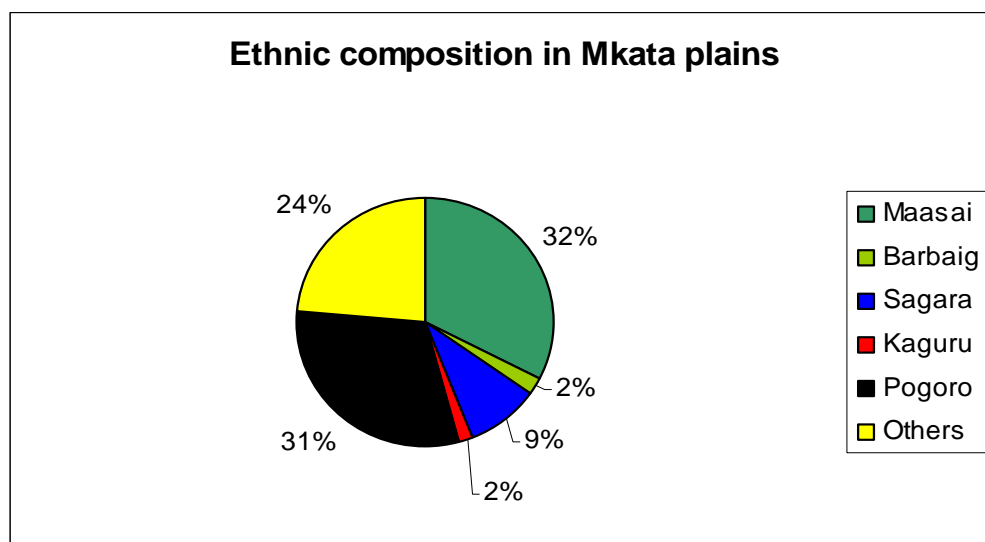
The main land use practices in the study villages in Mkata plains are shown in Figure 15 and Appendix 4. The results show that more than half of respondents (56.7%) were agro-pastoralists combining both farming and livestock keeping and less than a quarter of respondents (22.1%) were engaged in pure pastoralism, while 23.27% of respondents were practising subsistence farming. This indicates that extensive forms of land - use are the dominant production systems in the study area, therefore land is a major resource needed for subsistence production. Furthermore, the results indicate that farming is being practised in both agro-pastoral and pastoral villages with exception of Mabwegere village where there are no cultivators. The absence of cultivation at Mabwegere village is probably due to land scarcity experienced there and high livestock population, so that the available land is only utilized for livestock keeping. The land use systems practised in Mkata plains could also be associated with ethnic composition in the area.



**Figure 15: Land use practises in the study villages in Mkata plains**

Key: TWT- Twatwatwa, MBG – Mabwegere, MSW – Msowero, MBD – Mbwade

Results in Figure 16 and Appendix 5, show that Maasai who accounts for a third of respondents (33.0%) are the majority. Other ethnic groups including the Pogoro (31.1%), Gogo (10.6%) and Sagara (9.1%). It is important to note that whereas the study area is located within the Sagara territory, but the majority of residents in this study were mainly immigrant ethnic groups. This can be attributed to demographic as well as historical processes that led to high immigrations in the area. The processes continue to influence land uses and resource tenure in the area to date. According to Koponen (1994), towards the end of 1890s, the Germans introduced plantation economy in the area. This was followed by expropriation of customary lands which were transformed into lease hold farms, hence attracted a large number of immigrant estate workers from different parts of Tanzania. The immigrations continued during the British administration (1918 – 1961). The immigrant labourers were settled in dispersed squatter settlements within estate holdings, where they were allowed to cultivate (Koponen, 1994). Following the collapse of sisal estates during 1970s these settlements had established themselves as foci of multi- ethnic villages' characteristic in the study area.



**Figure 16: Ethnic composition in the study villages in Mkata plains**

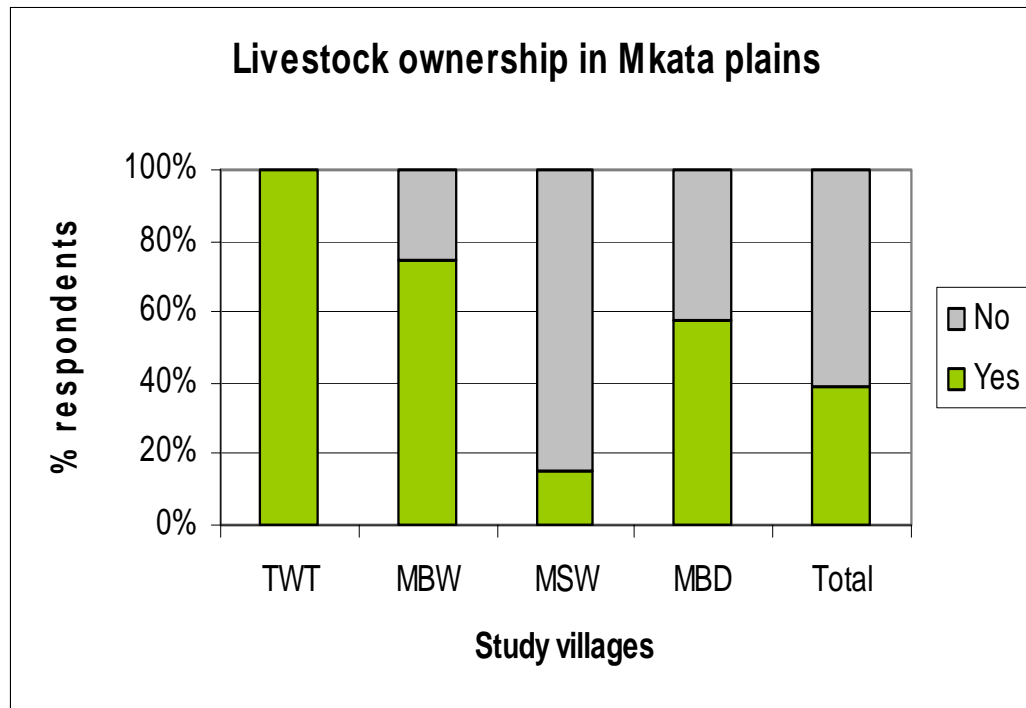
Another demographic process, with a direct bearing on the present land use practises, was the immigration of the nomadic pastoralists into the study area (Kisoza *et al.*, 2004). At the advent of the Germany Colonial rule in Tanganyika during 1880s, the Maasai pastoralists were undergoing a southward territorial expansionism mainly thorough raids and military conquest of farming tribes (Beidelman, 1960). By 1885, the Maasai pastoralists had settled in the northern part of Kilosa at Gairo, neighbouring Mkata plains. Suitable resource condition and economic factors in Mkata flood plains had attracted a number of immigrant pastoralists, and by 1940s and 1950s they had settled in the area. The collapse of sisal industry during mid 1970s, led to abandonment of most of the sisal estates and most of former employees settled on the leased farms and started cultivation. During this study there was a second generation of the descendants of immigrant workers. Establishment of commercial estates and the immigration of plantation workers and pastoralists into the study area continue to influence on demographic composition, land use patterns and resource relationships in the area to date.

Co-existence and sometimes overlapping of different land use systems, associated with rapid population increase has increased pressure on land resources and strained relationships between different user groups. This is particularly prevalent between the pastoralists and farmers. For example Beidelman (1960) reported increasing farmer/pastoralist tension in Mkata plains by late 1950s. Increasing social conflicts between farmers and pastoralists prompted the local government in Kilosa district during mid 1960s (acting on directives of Prime Minister's Office) to establish settlements for pastoralists. The designated pastoral villages include: Twatwatwa, Mabwegere, Kiduhi, Luhoza, Mfilisi and Msowero. These villages are located within Mkata Plains. The establishment of pastoral villages had attracted more immigrant pastoralists, which in turn led to significant land use pressure in the study area.

Most of areas designated for pastoral villages when first allocated were unoccupied bush lands, which were considered as expansion areas by indigenous tribes, but regarded as open areas by government officials. Most of these areas lack basic infrastructure like roads, health services and schools. Nonetheless, the areas are endowed with permanent water sources from swamps and rivers. The main rivers draining these areas include: Miyombo, Wami, Mkata, Msowero, and Kikundi rivers.

Patchy wetlands and valleys bottoms which retain sufficient moisture to support plant growth, are multiple use areas needed by both farmers and pastoralists. These areas have increasingly contested by these groups. The sites are used as key grazing areas by the pastoralists during dry seasons, at the same time they are increasingly being used by farmers for irrigation purposes. During “villagisation” programme in mid 1970s, the pastoral villages were transformed into pastoral “Ujamaa” villages. This was followed by the nationalization of sisal estates, and expansion of the Mkata State Ranch. However, the nationalization of the lease hold sisal estates did not result in the redistribution of land to the local communities. The nationalized estates were transferred to a private corporation, the KATANI limited.

Figure 17 and Appendix, 6 present livestock ownership in the study villages in Mkata plains. The results indicate that 39.3% of respondents own livestock, whereby the Maasai form a majority of cattle owning ethnic group. However, there is a differential distribution of livestock holds in different study villages. All respondents in Twatwatwa village said that they own cattle, while in Mabwegere village the respondents owning cattle accounted for 70%. In the study villages which are shared by both pastoralists and farmers only the Maasai and Barbaig own cattle. The key informants revealed that other ethnic groups are being discouraged from keeping cattle, due to a tendency of Maasai warriors to steal



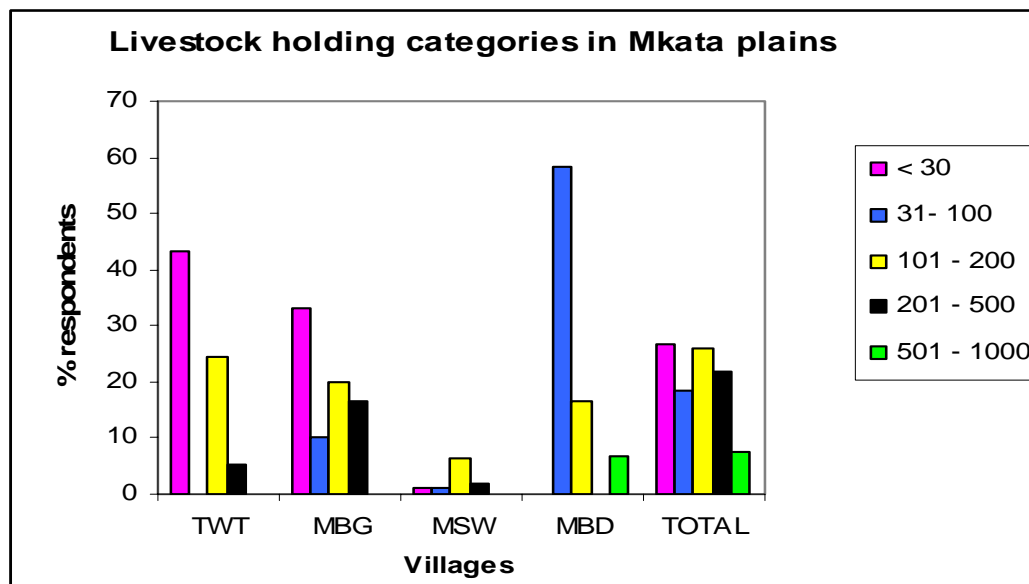
**Figure 17: Livestock ownership by respondents in Mkata plains**

Key: TWT- Twatwatwa, MBG – Mabwegere, MSW – Msowero, MBD - Mbwade

livestock from them. This can partly be explained by an imbedded Maasai culture, which to some extent condones a practice of warriors to stealing cattle from other tribes for purposes of starting their own herd.

This makes some economic sense to a pastoralist family, in that youth obtaining cattle through alternative means, reduce a demand for cattle redistribution from family herd. However, this practice was decried by most Maasai elders interviewed at Twatwatwa and Mbwade villages. This is most probably due to increasing integration of immigrant Maasai into the mainstream economy. It may also be due to high penetration of religion and schooling among Maasai communities in Mkata plains.

Cattle distribution among respondents is given in Figure 18. Results show that cattle distribution among the pastoralist in Mkata plain is highly skewed. Whereby, 26.9% respondents own between 1 to 30 heads of cattle, 18.6% own between 31 to 100 cattle and 27.9 % own between 101 and 500 cattle. Much wealthier livestock owners comprise a very small fraction (7.7 percent) with livestock holdings ranging from 500 to 1,000 cattle.



**Figure 18: Distribution of livestock holdings by herd size categories in the study villages in Mkata plains**

Key: TWT- Twatwatwa, MBG – Mabwegere, MSW – Msowero, MBD – Mwade

During focus group discussions it was realised that households owning below 30 heads of cattle are considered poor. The results imply that 26.9% of cattle owning respondents can be categorised as poor.

The pastoral villages under this study constitute more or less contiguous ecological unit, in which the pastoralists practice extensive pastoral production system. However, the

pastoralists have permanent homes in their registered villages. Only part of livestock herd is moved seasonally between wet and dry season grazing areas. Land resources in pastoral villages are owned communally, whereby right of access is derived from residence in the village or kinship to members residing in respective villages. It should be noted that pastoralists from neighbouring villages are restricted access to grazingland in other pastoral villages. Livestock mobility remains an important production strategy used by all pastoralists in the study villages. Whereby a grazing cycle starts on the village lands during rain seasons and then moved to dry season grazing areas at beginning of the dry season.

During Focused group discussion it was reported that livestock mobility is based on two strategies; short range and long range mobility. The short range mobility involves moving of livestock from respective villages to a wetland located in Mkata ranch in Tindiga / Luhoza area. Livestock herds from all the study villages converge at the wetland areas during the dry seasons. These areas had been used for grazing by Maasai pastoralists since 1930s and were annexed into a Mkata National Ranch during mid 1970s. Nonetheless, the pastoralists have continued to use these wetlands for dry season grazing, and some pastoralists had even settled in parts of this wetland area for almost 8 decades.

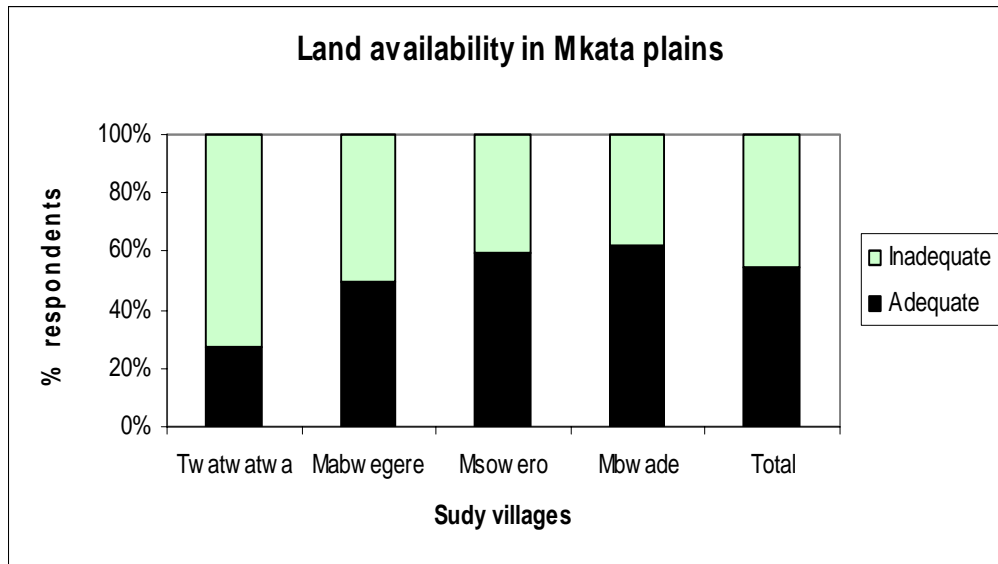
During this study the National Ranching Co-operation (NARCO) - a holding company for state ranches – decided to sub lease the wetland area to private investors. Few pastoralists resident in wetland area, managed to organise themselves into a pastoralists association and sub-leased 1,000 ha grazing block. Conditions set by NARCO in order to qualify to be sub-leased a grazing block include a commitment to operate a commercial livestock enterprise, producing a business plan for the intended enterprise and paying a lease fee amounting to TShs 4 million (USD 4, 000) per 1,000 Ha grazing block. These conditions were not understood by most of pastoralists, and most of them do not consider operating a



commercial livestock enterprise under existing environmental and market conditions as viable venture. Moreover, those pastoralists who managed to obtain a sub – lease were mostly motivated by a need of attaining tenurial security rather than engaging in commercial livestock production.

Following privatization of the wetlands most of the pastoralists from the study area have lost access to important dry season grazing area. On the other hand, most of pastoralists who were residing in the wetland area have lost grazing areas all together. Options available to them include moving to the available general land or forcibly grazing into the farms. Thus privatising of wetland areas, by a state corporation, has in effect reduced the size of communally owned pastoral grazing areas. This implies increased resource-use conflicts.

Tanzania Investment Centre (TIC) is also selling a number of the abandoned sisal farms to new investors. However, there is no transparency on the disposal process of these state farms. Furthermore, there is no policy so far on how to dispose these public estates. In particular, there is no guidelines to redistribute the lands to the immigrant descendants (on their second generation) now cultivating the abandoned sisal farms. The indiscriminate privatisation may end up in eviction of these local inhabitants, leading to increased competition for land resources with farmers. Figure 19 and Appendix 7 show respondents' opinion regarding land availability in Mkata plains. Mixed opinions were expressed by the respondents from different study villages. The majority of respondents (54.8%) were of the opinion that land is adequate and 45.2% considered the land to be scarce.



**Figure 19: Response distribution on land availability in Mkata plains**

Yet, there are variations in responses from different study villages, mostly reflecting location specific demand for land. More than half of respondents (56.8%) in Twatawatwa village reported about land shortages. This is probably due to high livestock population in the village. Data from the district livestock census (KDC, 2000) indicates that the cattle population at Twatwatwa village account for one third of the district total. As such there is a general concern for scarcity of grazing lands. During the time of the study, Twatwatwa village was experiencing high influx of pastoralists who were evicted from villages designated for farmers. The eviction aimed at separating farmers from pastoralists as a measure to reduce resource-use conflicts in Kilosa district. However, this measure increased pressure on land resources in the receiving villages including Twatwatwa. Most of respondents (50.6 %) in Msowero said that land is adequate.

These results can be explained by the fact that Msowero village which is shared by both farmers and pastoralists has a relatively low population of resident pastoralists. Only 15

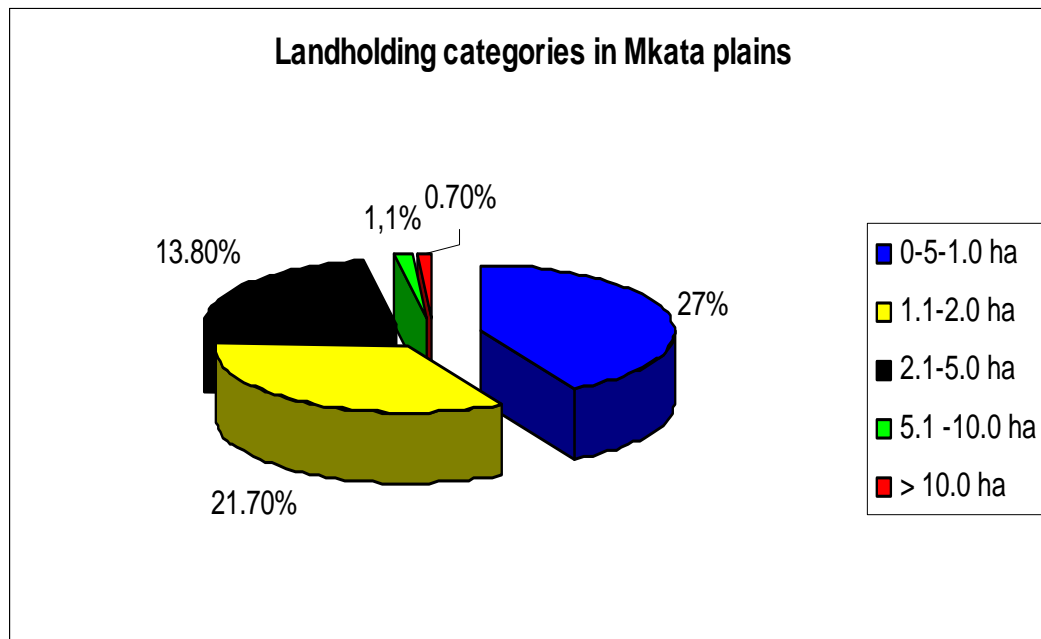
pastoral households were recorded as resident in the village. Furthermore, during Focused group discussion in Msowero it was reported that the KATANI Limited, had recently transferred a total of 2,000 ha to the village government for agricultural purposes. This might have alleviated the land scarcity felt in the village. On the other hand, Msowero village has a mixed population, with a high number of immigrant ethnic groups including descendants of former sisal workers and immigrant pastoralists. Some of these ethnic groups are experiencing severe shortages of land, 34.7% of respondents in the village reported to experience land scarcity.

In the case of Mbwade village which is also shared by both farmers and pastoralists, 43.3% of respondents said that land is adequate while 26.7% reported about land scarcity. Farmers and pastoralists in Mbwade village have different demands for land. In the case of pastoralists Kilosa district government has recently relocated them to an abandoned ranch neighbouring the village where land for grazing is plentiful.

However, in the case of farmers they are facing serious land shortage, as the village was originally a squatter camp designated for plantation labourers, squeezed between leasehold farms. As a result the village is highly populated with immigrant tribes without any customary rights to neighbouring general lands or abandoned leased farms. Land shortages in the village has compelled some farmers to start cultivating in leasehold farms, while others have to travel to nearby villages searching land for cultivation. Such land scarcities have significant implications on resource-use conflicts in Mkata plains.

Figure 20 and Appendix 8 show land holding categories in the study villages in Mkata plains. The majority (30.5 %) of respondents owns between 0.5 and 1.0 ha, and 24.6% own between 1.1 and 2 ha. Where as 15.7% of respondents owns between 2.1 and 5.0 ha. Only

the minority (1.6% and 0.8%) of respondents own between 5.1 and 10.0 ha respectively. These results show that land holding in Mkata plains is highly skewed, ranging from 0.5 to 12 ha per household. Furthermore, the results indicate that the Maasai pastoralists have locally established different claims to communal village land. Whereby, the pastoralists use village grazing lands communally, at the same time they also establish *de facto* individual rights to land they cultivate.



**Figure 20: Response distribution on land holdings in study villages in Mkata plains**

A high tendency of establishing individual ownership of land was observed in Twatwatwa pastoral village. This can be explained by the fact that Twatwatwa is highly integrated in the market economy with a high number of entrepreneurs who had diversified to other economic activities. During the in depth interviews it was reported that most of the pastoralists in Twatwatwa were engaged in cattle marketing. The high market prices for cattle encourage pastoralists to accumulate large herds and adopting farming as a means for

meeting household food requirements. McCabe *et al.* (1997) observed a similar strategy in Ngorongoro conservation area, where the Maasai are adopting agriculture to enable them to restock.

However, no any respondent from Mabwegere village said to own land. These findings can be explained by a differential availability of land in the two pastoral villages, whereby Mabwegere village has a relatively small land area with high livestock population, therefore all the available land is used for communal grazing. Therefore local institutions in Mabwegere prohibit cultivation. This study shows that the study villages in Mkata plains are generally facing serious land shortages and that pastoralists have locally adopted different tenure systems. Other studies that reported land scarcities in other areas of Kilosa district include studies by Shishira *et al.* (1997), and Misana *et al.* (1997).

Furthermore, the recent liberalization of the economy has also brought about other land use dimensions in the study area. A number of local investors and civil servants from urban areas are purchasing land from the local people as well as state sisal estates and ranches offered for sale. This is in turn creating absentee landowners. Others are entering into joint ventures with foreign investors to purchase the mortgaged sisal farms.

So far there is no clear policy, or a transparent process for dispersing off the abandoned sisal farms. In particular there is no policy for redistributing this land to small holder farmers and the pastoralists now facing serious shortage of land. Most of the farmers and pastoralists are now using abandoned sisal estates for grazing or cultivation. However, with growing population and large areas tied, by long-term leases, land availability might be a serious problem in the area. At present, there is not much land left for extensive cultivation. This is partly due to the fact that other land uses like Mikumi National Park, Mkata ranch,

Sisal estates and Selous Game Reserve does occupy areas, which could be suitable for agriculture. It can be speculated that land scarcity may force land hungry peasants to open up the more fragile areas, particularly the wooded hilly areas. Shishira *et al.* (1997) reported similar land scarcities in the northern plateau areas of Kilosa district in Gairo division, where people are forced to cultivate in highly degradable sloping areas.

#### **4.1.2 Land cover/Land-use categories in Ngorongoro Conservation Area**

##### **4.1.2.1 Main land cover types in Ngorongoro Conservation Area**

Ngorongoro Conservation Area (NCA) is ecologically diverse and can be categorized into five zones: the crater highlands, Salei plains, Gol mountains, Serengeti plains and Kakesio/Eyasi escarpment. A comprehensive vegetation cover types of NCA was first described by Herlocker and Dirschl (1972), who delineated eight cover types:

- (i) Montane health,
- (ii) Bamboo forest,
- (iii) Evergreen forest,
- (iv) High woodlands,
- (v) Low woodlands,
- (vi) Medium grasslands,
- (vii) Short grasslands and
- (viii) Sand dunes grasslands.

A system used in this study to describe vegetation cover types of Ngorongoro Conservation Area was adopted from Herlocker and Dirschl (1972) and Pratt and Gwyne (1977) description of East Africa vegetation.

The distribution of main land cover types of Ngorongoro Conservation Area is shown on Table 11 and Figures 21, 22 and 23. Table 11 shows that the main land cover type in Ngorongoro area is grassland which cover 35.3% of the area. The grasslands here refer to short grass and medium grass plains found in lowland and mid altitude areas. These are differentiated from highland grasslands, which are dominated by tall tussock grass species restricted to the highland areas. The highland grasslands comprise 4.3% of the area.

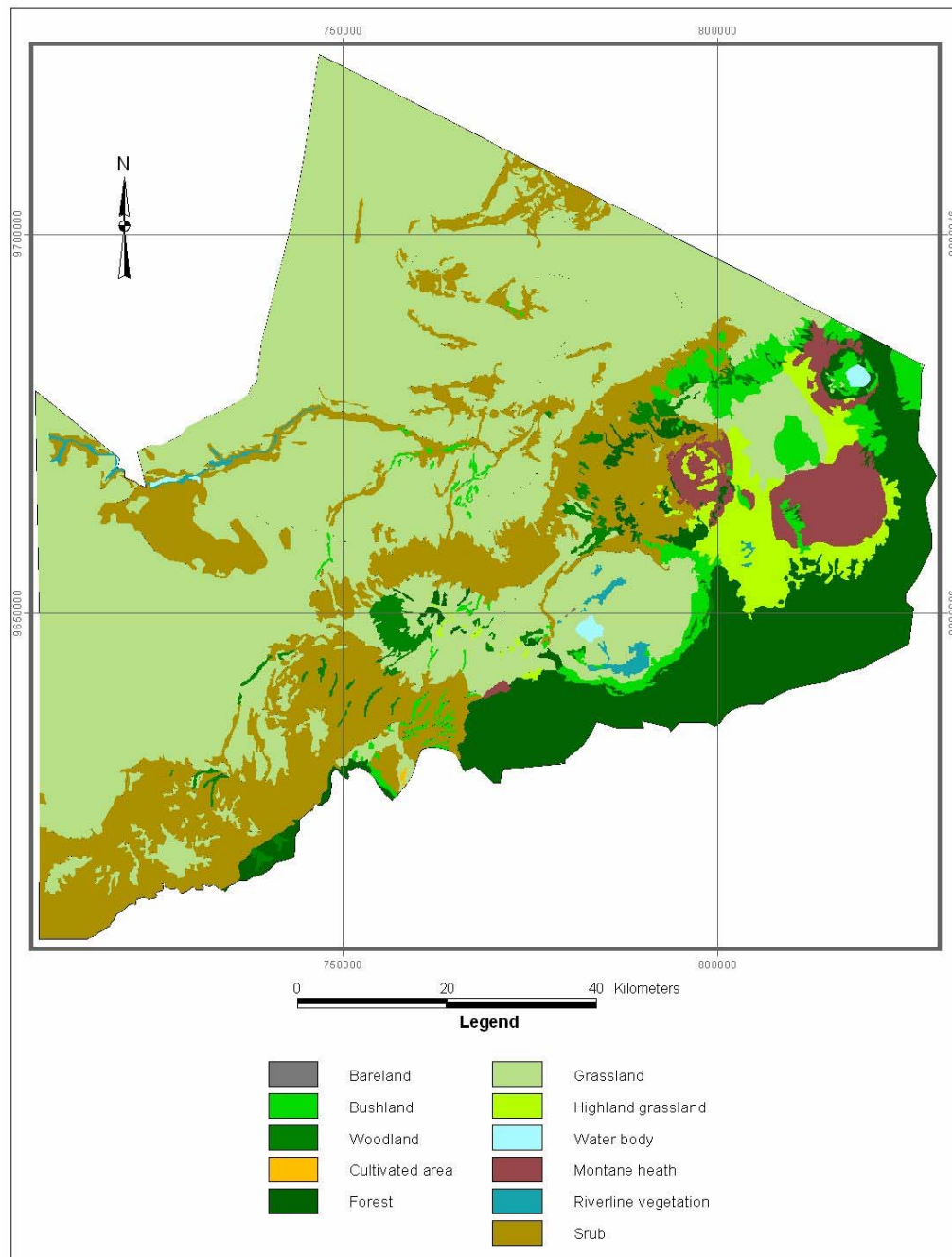
Table 12 show net area cover changes from 1975 to 1991, and 1991 to 2000, with 1975 as base year for computing the net area and percent cover changes. Land cover types that experienced substantial changes include forests, woodlands, bush lands and grasslands. The results show that from 1975 to 1991 the forest cover increased by +52.4% followed by a decrease of – (3.8%) between 1991 and 2000. The increase of forest cover can be attributed to a ban on cultivation imposed from 1975 to 1991.

The woodlands increased substantially between 1975 and 1991 with an 11.9 fold increase followed by a decrease of –(6.2%) between 1991 to 2000. The slight decrease in wood lands by - (6.2%) between 1991 and 2000 might be due to relaxation of a ban on cultivation starting from 1992 as well as increased settlement and high concentration of livestock in mid-altitude woodland areas.

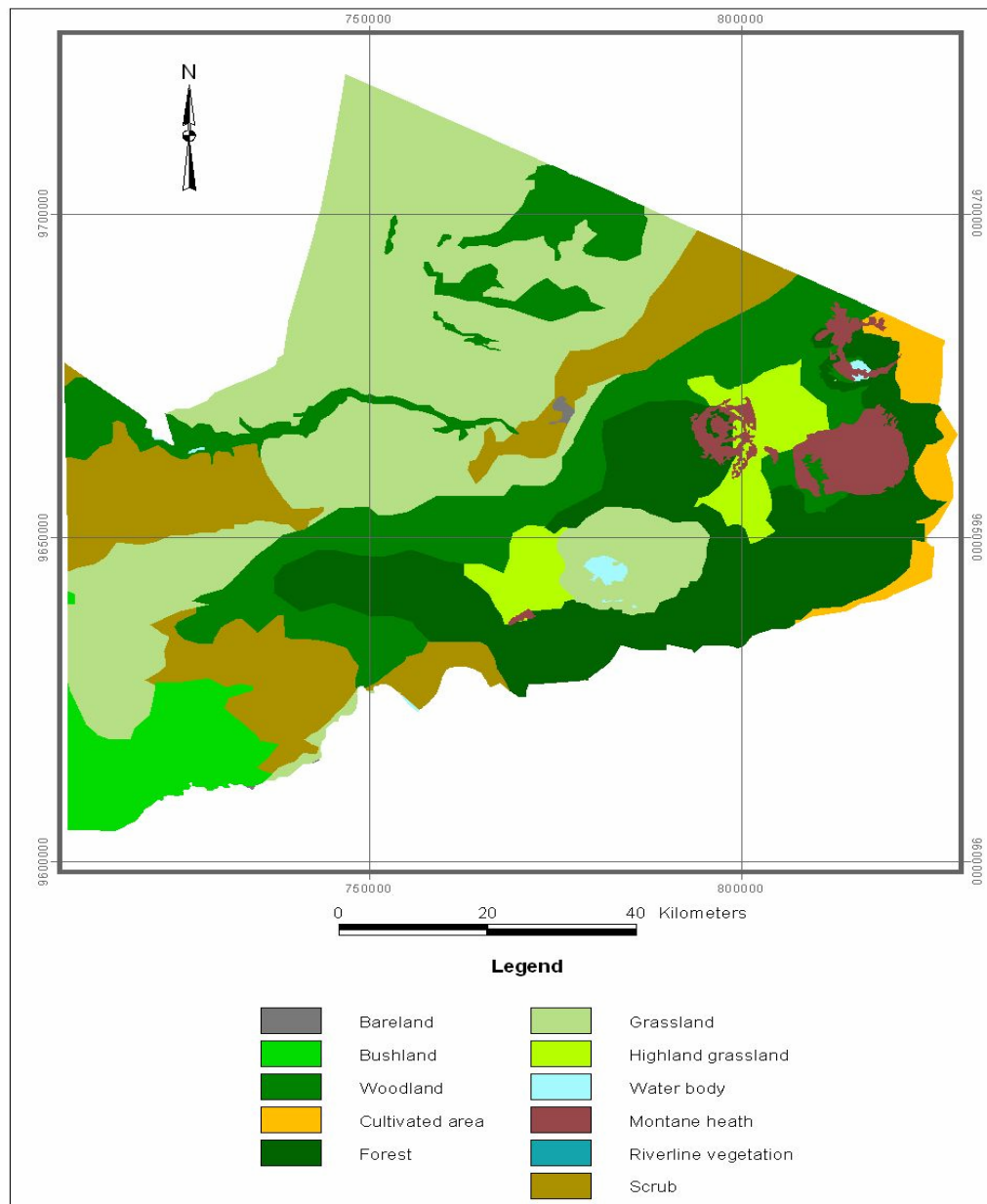
**Table 11: Distribution of land cover types in Ngorongoro Conservation Area for 1975, 1991 and 2000**

|                    | Area cover      | %           | Area            | %            | Area cover      | %            |
|--------------------|-----------------|-------------|-----------------|--------------|-----------------|--------------|
|                    | (Ha) 1975       | Cover       | cover (Ha)      | Cover        | (Ha)            | Cover        |
| Land cover type    | 1975            | 1975        | 1991            | 1991         | 2000            | 2000         |
| Forest             | 93,128.6        | 11.6        | 141,940.6       | 17.7         | 138,437.0       | 17.2         |
| Montane health     | 24,235.4        | 3.0         | 24,235.4        | 3.0          | 24,235.5        | 3.0          |
| Woodland           | 11,066.2        | 1.4         | 143,417.5       | 17.9         | 142,735.7       | 17.8         |
| Scrub land         | 165,290.2       | 20.6        | 117,737.2       | 14.7         | 118,971.6       | 14.8         |
| Bushland           | 28,048.5        | 3.5         | 40,012.2        | 5.0          | 40,012.0        | 5.0          |
| Grassland          | 449,875.1       | 56.0        | 282,977.0       | 35.2         | 283,307.1       | 35.3         |
| Highland grassland | 25,438.8        | 3.2         | 32,453.2        | 4.4          | 34,187.1        | 4.3          |
| Cultivated area    | 108.9           | 0.01        | 16,909.1        | 2.1          | 17,695.9        | 2.2          |
| Bare ground        | 31.2            | 0.004       | 807.7           | 0.1          | 1,021.7         | 0.13         |
| Wetland            | 3,863           | 0.5         |                 |              | 44.0            | 0.01         |
| Water body         | 3,000.0         | 0.4         | 3001.0          | 0.4          | 2,408.5         | 17.8         |
| <b>Total</b>       | <b>802898.6</b> | <b>99.9</b> | <b>802898.4</b> | <b>100.0</b> | <b>803056.5</b> | <b>100.0</b> |

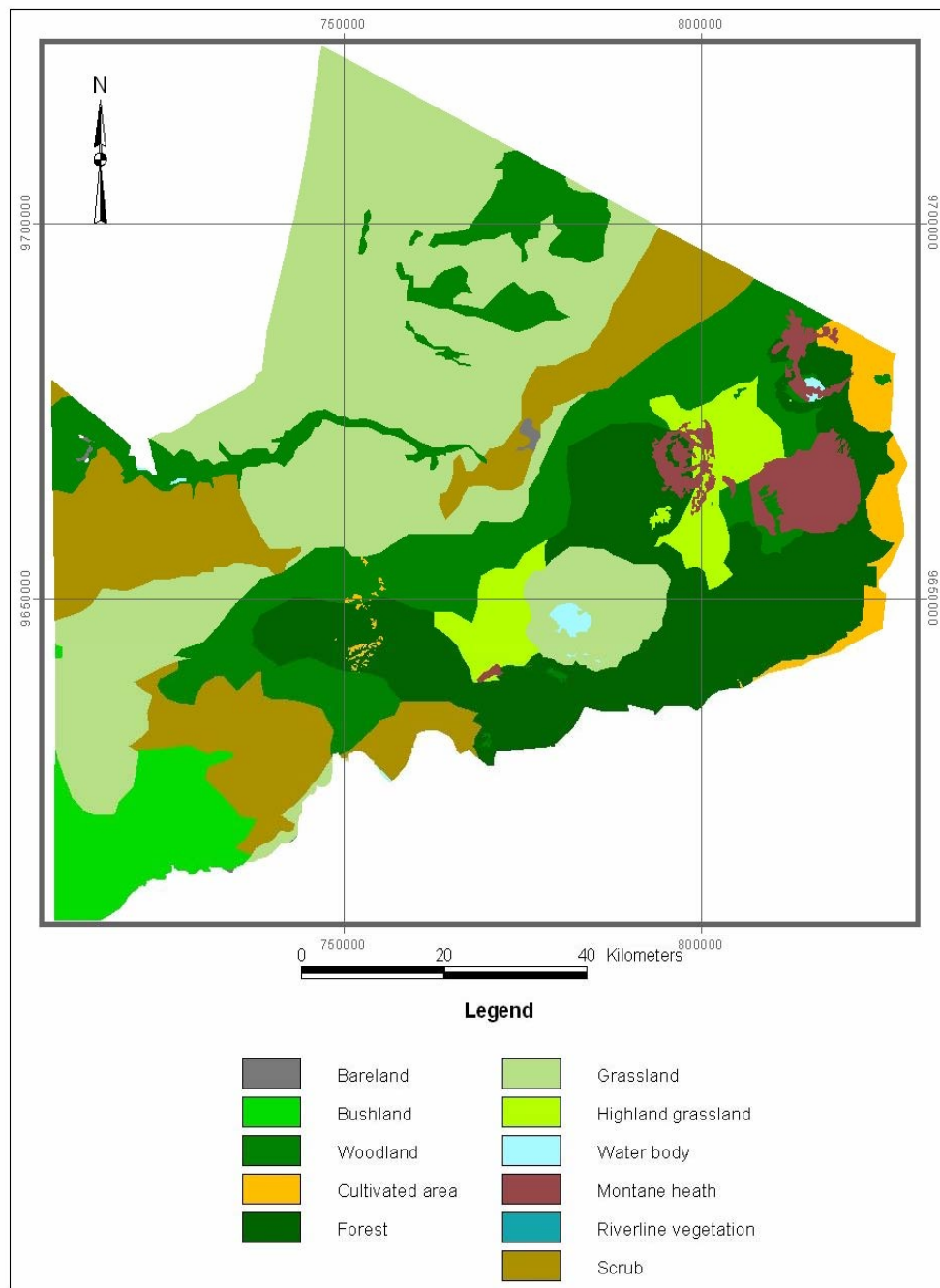




**Figure 21: Map of land cover types of Ngorongoro Conservation Area on  
January 1975**



**Figure 22: Map of land cover types of Ngorongoro Conservation Area on  
January 1991**



**Figure 23: Map of land cover types of Ngorongoro Conservation Area on  
January 2000**

Table 12 show net area cover changes from 1975 to 1991, and 1991 to 2000, with 1975 as base year for computing the net area and percentage cover changes. Land cover types that experienced substantial changes include forests, woodlands, bush lands and grasslands. The results show that from 1975 to 1991 the forest cover increased by +52.4% followed by a decrease of – (3.8%) between 1991 and 2000. The increase of forest cover can be attributed to a ban on cultivation imposed from 1975 to 1991.

The woodlands increased substantially between 1975 and 1991 with an 11.9 fold increase followed by a decrease of -6.2% between 1991 to 2000. The slight decrease in wood lands by - (6.2%) between 1991 and 2000 might be due to relaxation of a ban on cultivation starting from 1992 as well as increased settlement and high concentration of livestock in mid-altitude woodland areas.

**Table 12: Net area and percentage land cover changes for 1975 to 1991 and 1991 to 2000 in Ngorongoro Conservation Area**

| Land cover type    | Net area   |        | Net area  | %      | Overall    | Overall |
|--------------------|------------|--------|-----------|--------|------------|---------|
|                    | change     | %      | change    | Cover  | area       | %       |
|                    | (Ha)       | Cover  | (Ha)      | change | change     | Cover   |
|                    | 1975-1991  | change | 1991-2000 |        | (Ha)       |         |
|                    | 1975 -2000 |        |           |        |            |         |
| Forest             | +48 812.0  | +52.4  | -3 503.0  | -3.8   | +45 308.4  | +48.7%  |
| Montane health     | 0.0        | 0.0    | 0.0       | 0.0    | 0.0        | 0.0     |
| Woodland           | +132 351.3 | 1195%  | -6818.0   | -6.2   | +181 651.5 | 11 89.8 |
| Scrub land         | -48 152.8  | -29.13 | +1 234.4  | +0.75% | 0.0        |         |
| Bushland           | +11 973.7  | +42.7  | 0.0       | 0.0    | +11 963.7  | +42.7   |
| Grassland          | -166 898.1 | -37.1  | +330.1    | +0.1   | -16 656.8  | -37.0   |
| Highland grassland | +7 014.4   | +27.6  | +1 733.9  | +6.8   | +8 748.3   | +34.4   |
| Cultivated area    | +6 10.1    | +56.02 | +786.8    | 72.0   | +17 587.0  | +161.5  |
| Bare ground        | +7 75.8    | +2486  | +214.0    | +685.8 | +9 90.0    | +31746  |

A high decrease in grasslands amounting to – (30.1%) occurred between 1975 and 1991 this was followed by a slight increase of + 0.04 between 1991 and 2000. This decrease might be attributed to conversion of grasslands into other woody vegetation formation. A slight increase in grassland area that occurred between 1991 and 2000 might be attributed to increase in cultivation area.

In overall, the scrubland had decreased by – (26.38 %), whereby between 1975 and 1991 the scrubland decreased by – (29.13 %) followed by a slight increase of +0.75 percent between 1991 and 2000. This implies that a scrub land is probably a transitory stage of plant succession process toward a climax vegetation type for lowland plains in NCA.

The increase in woodlands and forests could be attributed to implementation of conservation policies of NCAA, as well as by the introduction of agro-forestry in areas bordering the NHFR as alternative source of energy. The decrease in forest area during 1991 to 2000 can be due to increased cultivation in high land areas, particularly in the North East areas, where the NHFR borders farming communities in Karatu and Monduli districts. During the period under discussion, the highland grasslands increased by + 34.4 %. This increase can be attributed to a progressive invasion of highland areas by an invasive grass species *Eleusine jaegeria* (manyatta grass) (Figure, 24). According to Makacha and Frame (1986) *Eleusine jaegeria* is unpalatable grass species with relatively low nutritive value to cattle and wildlife. Therefore, an increase in this species is an indication of retrogressive process taking place in NCA highlands. Although the area under cultivation is relatively small in size, but between 1975 and 1991 it experienced a substantial increase of + 56.02% followed by an increase of 72.0% between 1991 and 2000. This increase occurred notwithstanding a ban on cultivation imposed between 1975 and 1992. This implies that

cultivation has become an integral part of household livelihood coping strategies among NCA Maasai, which is undertaken in order to improve household food security.



**Figure 24: Tussock “manyata” grass *Elyusine jaegaria* envading Ngorongoro high lands**

The observed increase in cultivation between 1991 and 2000 is related to a partial lift on a ban to cultivate when gardening farming of 0.5 ha per housewife and her children was allowed. The results further refute claims by some NCA officials that high influx of immigrants in the area is the main cause of expansion of cultivation.

#### **4.1.2.2 Land cover change detection matrix for 1975 to 1991 and 1991 to 2000 in Ngorongoro Conservation Area**

The land cover detection matrix was used to determine the actual direction of land cover changes. Tables 13 and 14 and Figure 25 shows the direction of change and net vegetation

cover changes in terms of absolute area and percentages. Both retrogressive and successional vegetation changes have taken place in NCA during the period under consideration. Table 13 shows that extensive vegetation changes involving 29.8% of NCA total area have occurred between 1975 and 1991.

**Table 13: Land cover change detection matrix map for Ngorongoro Conservation Area between 1975 and 1991**

| Land cover type                       | Area changes (Ha) | % change     |
|---------------------------------------|-------------------|--------------|
| Bushland to Cultivated area           | 2 556.1           | -0.32        |
| Bushland to Woodland                  | 11 229.0          | +1.4         |
| Forest to Cultivated area             | 18 715.9          | -2.33        |
| Grassland to Bareland                 | 467.4             | -0.06        |
| Grassland to Bushland                 | 7 507.9           | +0.93        |
| Grassland to Cultivated area          | 15.8              | -0.002       |
| Grassland to Highland grassland       | 16 502.7          | -2.1         |
| Grassland to Scrub                    | 151 530.9         | +18.87       |
| Highland grassland to Cultivated area | 147.3             | -0.018       |
| Scrub land to Bareland                | 297.2             | -0.04        |
| Scrub land to Woodland                | 45 951.9          | +5.72        |
| Woodland to Scrub land                | 692.6             | -0.09        |
| Unchanged land units                  | 547 284.6         | 68.12        |
| <b>Total</b>                          | <b>802899.3</b>   | <b>100.0</b> |

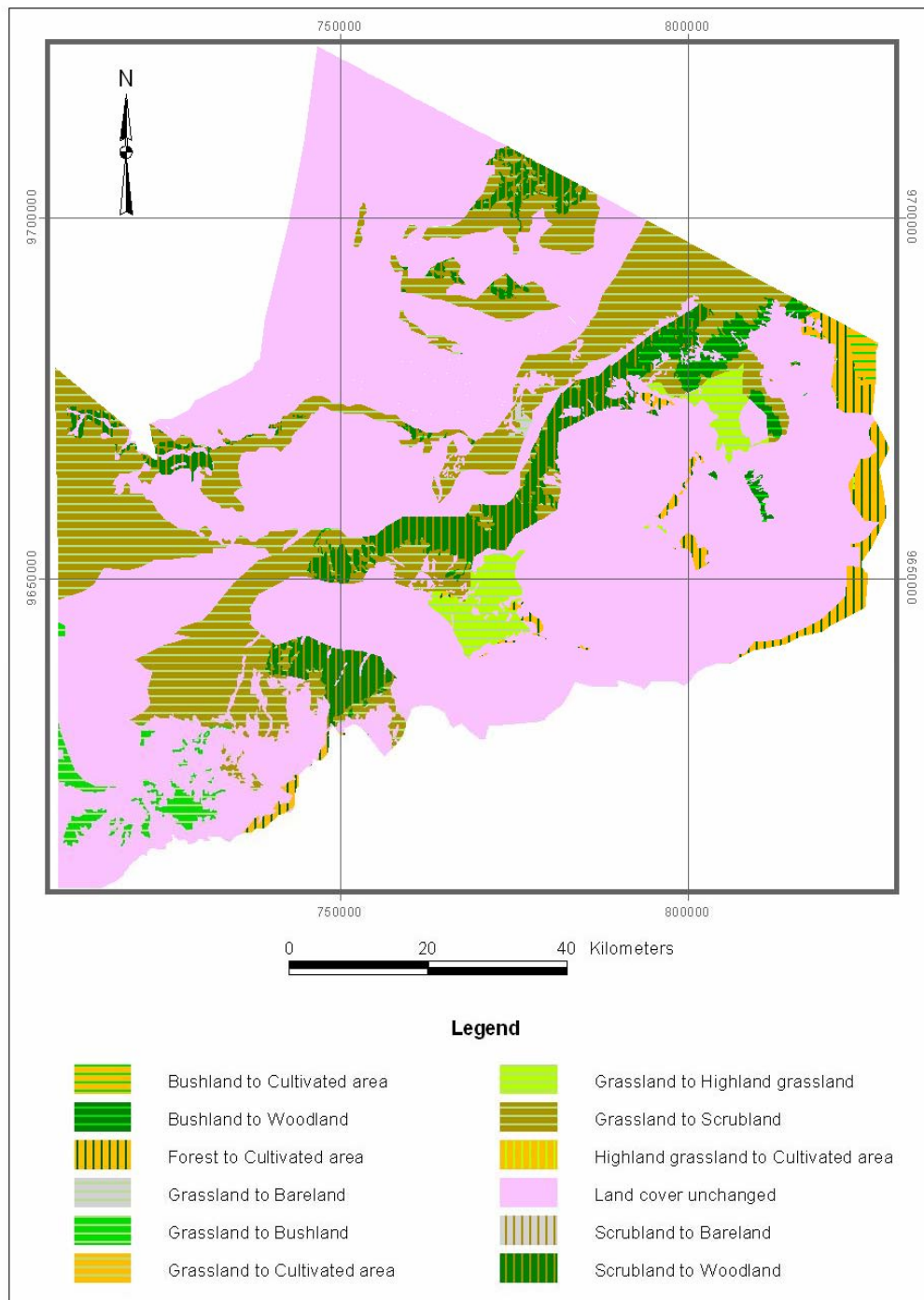
The results indicate that most changes involved conversion into cultivation area, whereby the high level of conversion - (2.33%) occurred in forest areas. This probably is due to high

rainfall levels in forested areas in both highland and mid-altitude areas that have attracted a lot of farmers. Furthermore, the Northern Highland Forest Reserve is on the north - east and north-south bordering farming communities - in Karatu, Mbulumbulu and Odean areas - which were reported to encroach on forest reserve.

Other cover types that were converted to cultivated areas include grasslands - (0.002 percent), highland grassland -(0.018 percent) and bush land -(0.32 percent). A low level of conversion of grasslands to cropland can be attributed to the strong institutions governing use of communal grazing lands, which prohibits illegal burning or unauthorized tilling of grasslands. It was observed during the study that farming is restricted to high sloping areas, and steep vallies which are not considered by local communities as prime grazing areas.

The changes that involved loss in forest and woodlands were most probably anthropogenically induced due to high livestock grazing pressure, land clearing for cultivation or forest damages. According to Misana (1989, 1997) and Perkin (1995) forest losses in NCA are due to burning in NHFR by pastoralists, encroachment by farming communities, cutting of building poles, and harvest of green wood for charcoal burning, as well as damages of forests and woodlands by elephants. Change detection analysis involves two time lines (1975 to 1991, and 1991 to 2000), which were associated with distinct institutional changes that took place in NCA. Between 1975 and 1991 more restrictive policies were implemented in the area including a ban on cultivation and prohibition of grazing in the crater areas and the NHFR.





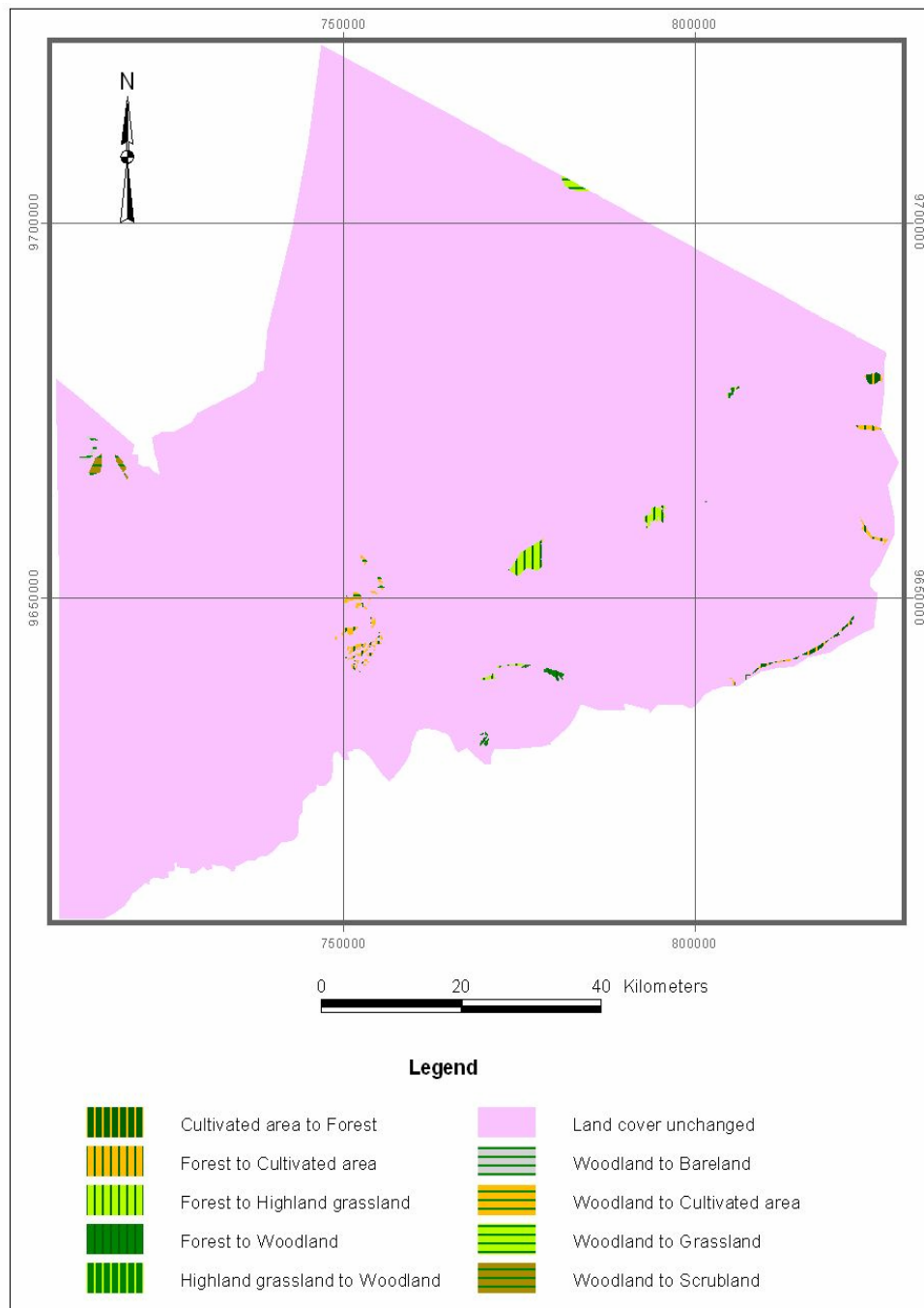
**Figure 25: Map of vegetation cover changes in Ngorongoro Conservation Area between 1975 and 1991**

The restrictions resulted in disruptions on traditional Maasai pastoralists grazing cycles, leading to prolonged grazing periods in pastoral villages. This increased grazing intensities which triggered of ecological changes that eventually culminated into reduction in forage yield.

**Table 14: Land cover change detection matrix map for Ngorongoro Conservation Area 1991 - 2000**

| Land cover type                | Area changes (Ha) | % change     |
|--------------------------------|-------------------|--------------|
| Cultivated area to Forest      | 713.2             | +0.09        |
| Forest to Cultivated area      | 1170.2            | -0.15        |
| Forest to Highland grassland   | 1830.9            | -0.23        |
| Forest to Woodland             | 355.2             | -0.04        |
| Highland grassland to Woodland | 99.8              | +0.01        |
| Woodland to Bareland           | 214.1             | -0.02        |
| Woodland to Cultivated area    | 329.7             | -0.04        |
| Woodland to Grassland          | 330.1             | -0.04        |
| Woodland to Scrub              | 487.4             | -0.08        |
| Unchanged land units           | 797367.4          | 99.3         |
| <b>Total</b>                   | <b>802898.0</b>   | <b>100.0</b> |

The period starting from 1991 to 2000 was associated with lifting of the ban on cultivation and allowing controlled access to prohibited grazing areas. This period was not associated with any dramatic changes in vegetation cover types or wide scale conversion to cultivation.



**Figure 26: Map of vegetation cover changes of Ngorongoro Conservation Area between 1991 to 2000**

This implies that pastoral local institutions in the area, preserves common grazing lands and that pastoralists resort to cultivation as a measure to cope with increasing household food insecurity caused by a decline in per capita livestock owned in pastoral households.

These results emphasise a fact that extensive pastoral land use is an important component for maintaining of the savanna ecosystems of East African and that disruptions on traditional pastoral systems may lead to ecological changes detrimental to both wildlife conservation as well as pastoral livelihoods.

This study establishes a linkage on loss of grasslands and disruption on traditional pastoral land use system. The study gives a general indication that the ecosystem in Ngorongoro area is undergoing changes, which favours dominance of woody species at the expense of grass species.

These changes implies a threat to the wellbeing of grazers both domesticated and wild game which are dependent on grass for grazing. As a result the livelihoods of pastoralists who are dependent on livestock herd productivity are being threatened. In turn the pastoralists are resorting to cultivation, which in the long run may be detrimental to sustainability of both the pastoralists and the ecosystem in general.

#### **4.1.2.3 Range condition and trends in Ngorongoro Conservation Area**

The species composition and vegetation cover in the study villages in NCA are shown in Table 15. The results indicate that the dominant grass species at Kakesion village were the **increasers** *Eragrostis* spp, and *Hyperthermia* spp. but the **decreaser** species including *Themeda triandra* were also well represented.

**Table 15: Species composition, vegetation cover and forage yield in the study village in Ngorongoro Conservation Area**

| Village  | Species composition           | Species composition % | Vegetation cover (%) | Forage Yield Kg/DM/Ha |
|----------|-------------------------------|-----------------------|----------------------|-----------------------|
| Kakesio  | <i>Eragrostis congesta</i>    | 47.0                  | 65.0                 | 4,700.0               |
|          | <i>Hyperrhenia spp</i>        | 23.0                  |                      |                       |
|          | <i>Themeda triandra</i>       | 13.0                  |                      |                       |
|          | <i>Aristida spp</i>           | 4.0                   |                      |                       |
|          | <i>Chloris pynothrix</i>      | 6.0                   |                      |                       |
|          | <i>Setaria spp</i>            | 6.0                   |                      |                       |
|          | <i>Cynodon species</i>        | 1.0                   |                      |                       |
| Enduleni | <i>Themeda triandra</i>       | 40.0                  | 60.0                 | 4,400.0               |
|          | <i>Hyparrhenia variabilis</i> | 21.0                  |                      |                       |
|          | <i>Heteropogan contortus</i>  | 5.0                   |                      |                       |
|          | <i>Dicanthium spp</i>         | 4.0                   |                      |                       |
|          | <i>Setaria pallidefusca</i>   | 6.0                   |                      |                       |
|          | <i>Pannisetum spp</i>         | 4.0                   |                      |                       |
|          | <i>Ocimum spp</i>             | 8.0                   |                      |                       |
|          | <i>Forbs</i>                  | 2.0                   |                      |                       |
|          | <i>Acacia seedling</i>        | 4.0                   |                      |                       |
|          | <i>Salanum spp.</i>           | 4.0                   |                      |                       |
|          | <i>Unknown weed spp1</i>      | 1.9                   |                      |                       |
|          | <i>Unknown weed spp 2</i>     | 0.1                   |                      |                       |
| Irkeepus | <i>Eleusine jacgeri</i>       | 62.0                  | 40.0                 | 4,652.0               |
|          | <i>Pennisetum schinferi</i>   | 9.0                   |                      |                       |
|          | <i>Hyperrhenia sp</i>         | 24.0                  |                      |                       |
|          | <i>Dicanthium spp.</i>        | 1.0                   |                      |                       |
|          | <i>Themeda spp.</i>           | 2.0                   |                      |                       |
|          | <i>Accacia seedlings</i>      | 2.0                   |                      |                       |
| Naiyobi  | <i>Eleusine jaegeri</i>       | 85.0                  | 40.0                 | 2,400.0               |
|          | <i>Pannisetum schimpheri</i>  | 14.0                  |                      |                       |
|          | <i>Unknown weed spp 1</i>     | 1.0                   |                      |                       |

The range trend at Kakesio was rated as stable. In case of Enduleni village the **increaser** species *Themeda triandra* and *Pennisetum spp* were present. The **increaser** *Dicanthium spp* was also present, as well as the woody species. The grass species composition present at Kakesio indicates retrogression. The vegetation cover in the study villages was 65% at Kakesio, 60% at Enduleni, 40% at Irkeepus and 40% at Naiyobi. The results indicate that low land cover at Irkeepus and Naiyobi poses high erosion risks. The results generally

indicate that range condition trend in the two villages was declining. Studies by Maskini (2001) and MNRT (1998) in the area arrived to similar conclusions.

The estimated forage yield in the study villages was: 4,700 kg DM/Ha at Kakesio; 4,400 kg DM/Ha at Enduleni; 4,652 kg at DM/Ha Irkeepus; and 2,400 kg DM/Ha at Naiyobi. The results indicate that rangeland at Kakesio was the most productive. This is most probably due to low grazing pressure by cattle in the village. Most of the livestock herds are usually moved to mid altitude and high altitude areas. The apparently high forage yield in the highland villages at Irkeepus and Naiyobi does not imply that the rangelands in these areas are potentially productive to livestock. This is because the dominant and most abundant grass species *Eleusin jaegeri* is least nutritive to cattle.

The range condition and trends in the villages under the study are shown in Table 16. The results indicates that range condition at the study villages were rated to be in good condition at Kakesio (71% condition score), fair condition at Enduleni (55% condition score); and poor condition in both Irkeepus (25% condition score) and Naiyobi (20% condition score) villages. The range trend was determined from the vegetation composition and vegetation cover. The range condition trend in the study villages in the NCA is probably related to trends in the land use patterns in the area. The observed declining range condition in the midland and high land areas (Enduleni, Irkeepus and Naiyobi) is attributed to the changed grazing patterns by Maasai pastoralists. Whereby, livestock are grazed for prolonged periods on mid and highland grazing areas.

**Table 16: Range condition and trend ratings in the study villages in Ngorongoro Conservation Area**

| Area            | Village  | Condition<br>score (%) | Class | Trend     |
|-----------------|----------|------------------------|-------|-----------|
| Ngorongoro area | Kakesio  | 71                     | Good  | Stable    |
|                 | Enduleni | 55                     | Fair  | Declining |
|                 | IrKeepus | 25                     | Poor  | Declining |
|                 | Naiyobi  | 20                     | Poor  | Declining |

Therefore, causing high grazing intensities in these areas Runyoro (2001) estimate of the livestock population in the study villages in 2000 amounts to 42,795 LUE.

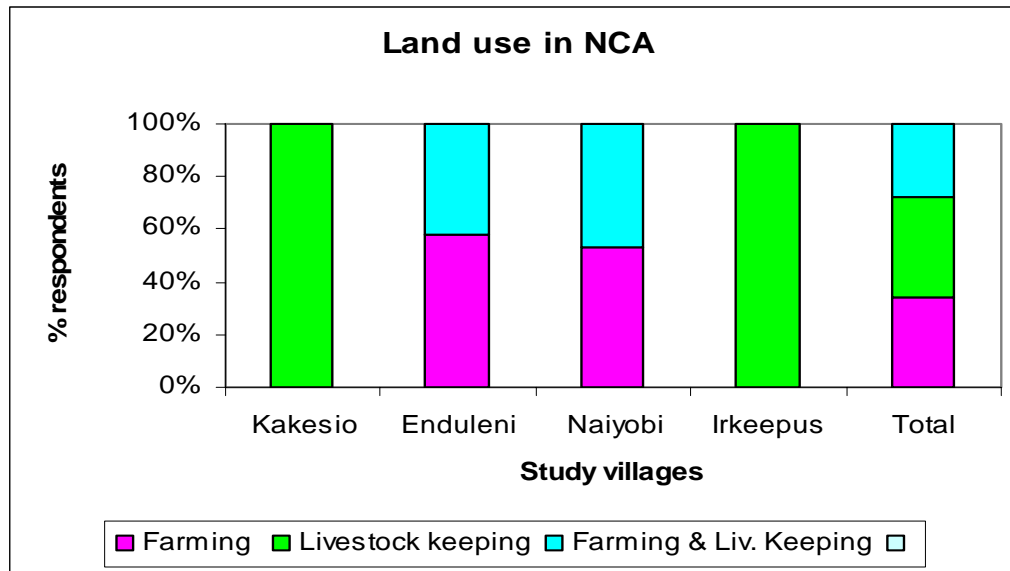
The recent increase in wildebeest populations that transmit Catarrh Malignant Fever (CMF) - a fatal disease to cattle - had prevented the pastoralists from using of wet season short grass plains in the lowland areas during wet season (Runyoro *et al.*, 1995). This has in turn led to retaining the livestock in the dry season grazing areas in the highland areas. Continuous grazing in the highland areas has brought about some ecological changes, and set on the process of range degradation. These processes had partly been compounded by the conservation policies. These, include imposing a ban on using fire as range management tool, and restricting access to key grazing areas by pastoralists in the crater and in the forest reserves. The conservation policies and the natural population increase of the wildebeest population have led to changes on the traditional pastoralists land use, by limiting the livestock mobility, which in turn increase grazing intensities in highland areas thus inducing range degradation.

#### **4.1.2.4 Trends in land – use in Ngorongoro Conservation Area**

Ngorongoro Conservation Area is a multiple land use system, which combines both human development and wildlife conservation. The area was gazetted in 1959 and has 47 years of experience of combining conservation and economic development. It is a unique conservation unit in Africa, and serves as a model of multiple land - use system in Tanzania. Principal land-uses, currently allowed within the Ngorongoro Conservation Area include conservation of natural resources, extensive livestock keeping, agro-pastoralism and tourism.

Figure 27 and Appendix 9 presents main land use activities of respondents in the NCA. The results indicates that about one third (35.3%) of respondents practise pure pastoralism, while 64.7% of the respondents combine agriculture in their livelihood support systems. Among these, 39.2% of respondents are solely dependent on agriculture for subsistence and 25.5% of respondents are practising agro-pastoralism. These results indicate that Maasai pastoralists in Ngorongoro area are increasingly dependent on agriculture for their subsistence. Increased dependence on agriculture is an indication of destitution among Ngorongoro Maasai, which is mainly due to loss of livestock and declining productivity of a pastoral herd. The study further reveals that there is a differential adoption of agriculture in the study villages.





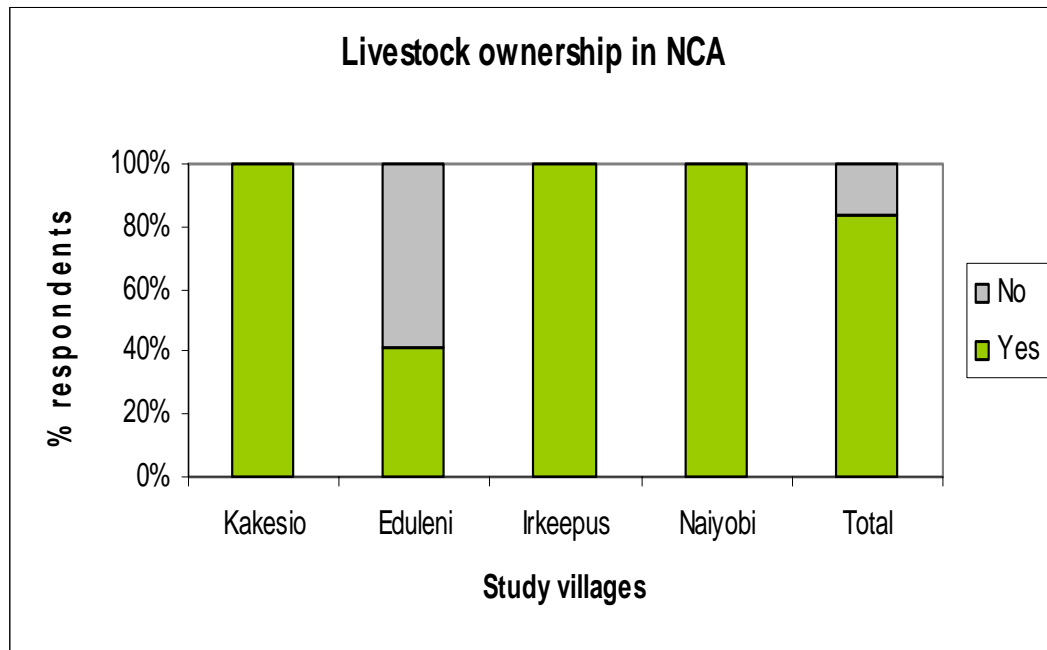
**Figure 27: Main land - use practises by respondents in Ngorongoro Conservation Area**

Extensive cultivation was observed in Naiyobi village where all respondents reported to carry out cultivation and only 46.7% respondents are engaged in agro-pastoralism. Whereas, more than half of respondents (58.3%) in Enduleni village subsist on agriculture, and only 32.4% of respondents practise pure pastoralism. This can be explained by the fact that Enduleni village is located in a mid-slope zone with relatively high rainfall, where extensive cultivation is possible. This might have attracted some immigrants from other villages who tend to come to practice agriculture. As such this could be the reason for large proportion of respondents not owning cattle. Another plausible explanation derives from a fact that Enduleni is a growing shopping and an expanding local cattle market centre. These economic developments are providing reliable market for both livestock and agricultural products. The growing market could have provided incentives for some form of specialisation in agricultural production, whereby livestock owning households specialise on pastoralism, and others specialise in crop production. Hence, increasing specialisation might explain absence of households that practise agro-pastoralism in this village. All respondents in Kakesio village, which is located in more arid plains, reported to practise

pure pastoralism. Most probably the harsh arid climatic condition in this village restricts cultivation. Galvin *et al.* (2000) reported high out migration of pastoralists from a drought prone Kakesio village to other areas. This is most probably in search of suitable land for cultivation in midland and highland areas.

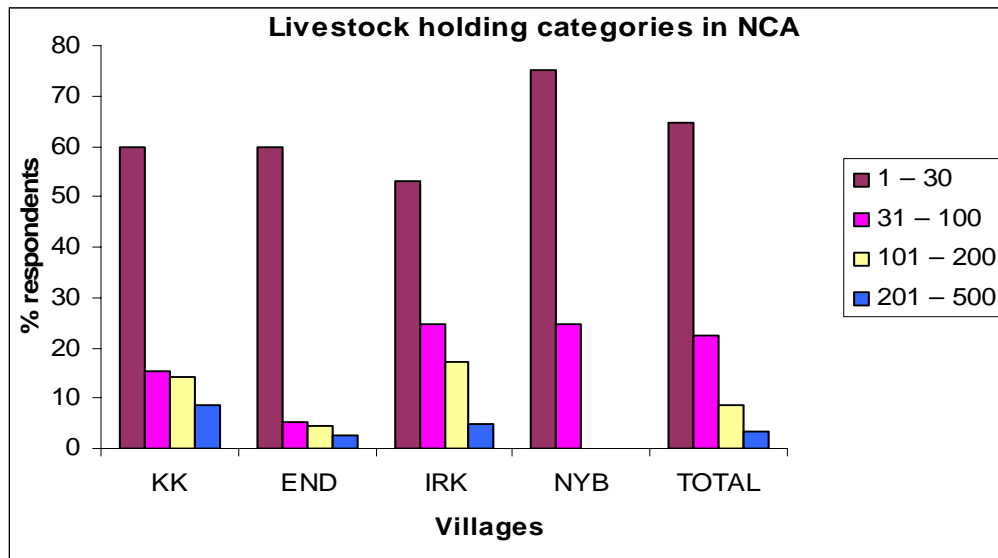
The main land use practice reported in Irkeepus village, which is located in highland zone, is pure pastoralism. Despite of favourable climatic conditions for crop production no cultivation was reported in the village. This may be due to village location in close proximity to NCA headquarters and areas accorded high conservation status including Ngorongoro Crater and Northern Highlands Reserve Forest (NHRF), thus high monitoring level by NCA wardens. Absence of cultivation could also be due to local restrictions imposed by local institutions. The highland areas have permanent water sources, therefore are utilised for permanent settlement and as dry season grazing reserves. However, the key informants as well as senior NCA Officials informed that illegal cultivation has been carried out in distant sloping areas, which are not easily accessible by NCA officials. Younger families, having limited number of cattle, and who are energetic, are said to undertake illegal cultivation.

Livestock ownership by respondents in NCA is presented in Figure 28 and Appendix 10. The results show that 83.9% of respondents own livestock. Whereby, respondents in all study villages, with the exception of Enduleni, own cattle. In Enduleni, only 35 households (32.1%) own livestock. This indicates that most of the households in Enduleni were dependent on cultivation for subsistence.



**Figure 28: Livestock ownership by respondents in Ngorongoro Conservation Area**

Figure 29 show a distribution of livestock holding categories among respondents in NCA. The majority of respondents (64.8%) own below 30 heads of cattle and 22.5% own between 31 – 100 heads of cattle. Only a minority of respondents (8.6 percent) owns between 101 – 200 cattle and 3.2 percent of respondents own between 201 to 250 cattle. The results on cattle ownership and distribution in Ngorongoro area, indicates that the household per capita number of cattle is very low. As such most of NCA Maasai pastoralists can no longer meet their food requirements from livestock. According to Pratt and Gywene (1977), a pure pastoral diet basing on milk and blood as the main staple, requires a per capita of 6 livestock units per household.

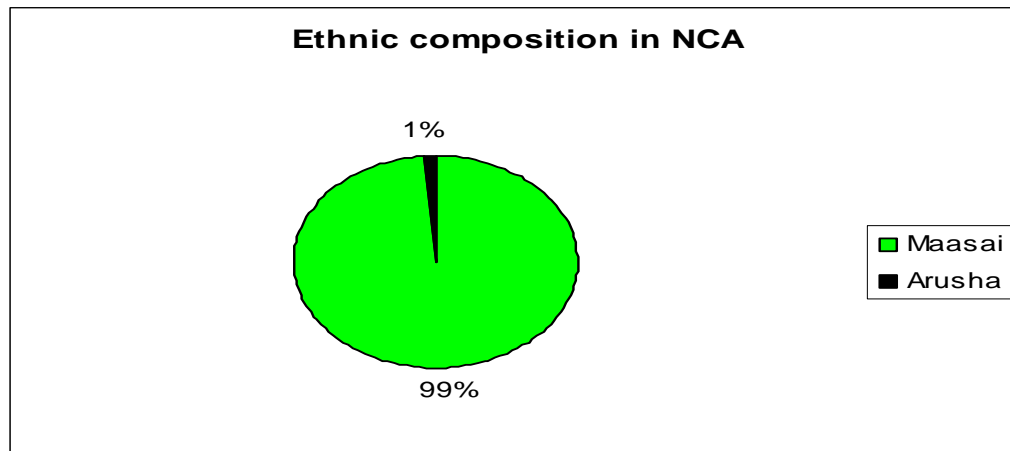


**Figure 29: Livestock holdings categories in Ngorongoro Conservation Area**

Key: KK- Kakesio, END – Enduleni, IRK – Irkeepus, NYB - Naiyobi

During Focused group discussion in Ngorongoro area, it was said that a household is considered poor if it owns 30 heads of cattle and below. Based on this information, 64.8% of respondents interviewed in NCA are poor. A decline in per capita livestock ownership is most probably attributed to restrictions imposed on access to key resources (dry season grazing areas and water) and high cattle mortality due to high disease incidences. As such the pastoralists food security has been threatened and they need to improve the security through cultivation. Similar conclusions on increased impoverishment of Ngorongoro Maasai have been drawn by a number of studies. For example, Homewood and Rogers (1991) had reported a substantial decline of per capita number of cattle in the NCA.

The land-uses practised by local people are partly related to their culture and therefore their ethnic background. Figure 30 and Appendix 11 shows the ethnic composition of respondents in Ngorongoro Conservation Area.

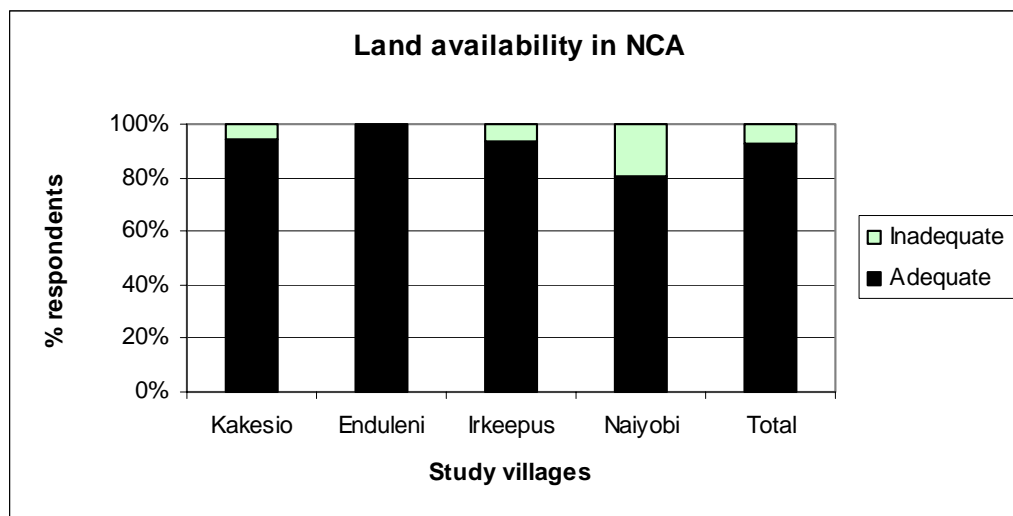


**Figure 30: Ethnic composition of respondents by study villages in Ngorongoro Conservation Area**

The results show that Maasai are the majority ethnic group accounting for 99% of respondents interviewed; another ethnic group is the Arusha who account for only 1 percent. The Arusha are a Maasai sub-ethnic group residing in a neighbouring Monduli district, whose customary territory is contiguous with NCA in the eastern border. Most of the Ngorongoro Maasai belongs to a Kisongo clan, which is allied to the Arusha – they share same rituals and have traditional reciprocal relationship involving sharing of resources. This cultural alliance has significant implication on land use and demographic dynamics in NCA. The Kisongo-Maasai, tend to accommodate Arusha kinfolds who move into the NCA for the purpose of cultivation in Ngorongoro highlands. However, under NCA rules the Arusha are illegitimate residents in the area, but they are considered by local Maasai to have customary right in NCA. During in-depth interviews with ANC Officials they informed that a free movement of Arusha into Ngorongoro area was one of main reasons for expansion of agriculture, in particular in areas bordering Monduli district including Naiyobi village. Respondents' opinions regarding land availability in Ngorongoro conservation Area are presented in Figure 31 and Appendix 12. Responding on land availability in the NCA, 75.5% of respondents considered land to be adequate and only

6.6% said that land is inadequate, while 17.9% of respondents had no opinion. These responses reflect a general pastoral perspective with regards to ownership of land, whereby the Maasai communities have devised institutions through which grazing land is used communally by a defined group of users, which are determined by traditions. Furthermore, traditionally the Maasai in Ngorongoro cultivate small farm plots only to meet their household subsistence requirements, where in most cases crops are grown on abandoned cattle “bomas”. For this reason under normal practices, Maasai pastoralists have no demand for large plots of land.

In this study, land shortages were reported in Enduleni and Naiyobi villages (Figure, 31), where a high number of respondents depend on farming as a sole means for subsistence. In these villages extensive cultivation was also observed. This may be probably due to loss of cattle by pastoralists who were in turn forced to cultivate. A small number of respondents (5.7%) reported land scarcity in Kakesio village.



**Figure 31: Response distribution on land availability in study villages in Ngorongoro Conservation Area**

This is most likely due to the fact the village is located in most arid lowland areas, therefore residents are facing serious shortages of land to cultivate supplementary cereal crops. In case of Naiyobi village, where extensive cultivation is practised, the reported land scarcity reflects the incentives of villagers to expand cultivation. It is believed that immigrant Arusha from Monduli district are the ones responsible for intensive cultivation. During the time of this study there was mounting tension between NCAA and villagers at Naiyobi due to expansion of cultivation. The NCA officials have initiated a concerted monitoring campaign aimed at limiting the expansion of cultivation.

There is increasing concern over the scale and potential impact of cultivation carried out by both resident Maasai and the immigrants moving into the NCA. From the inception of NCA in 1959 cultivation was allowed throughout the entire area. In early 1970s when the area was under jurisdiction of the Ministry of Agriculture, it was proposed to de-gazettement about 70 percent of the area in order to allow for agricultural expansion. This proposal was in line with the then government policies that aimed at attaining food sufficiency through agricultural intensification. A ban on cultivation was imposed as from 1975, when the mandate of the area was transferred to the Ministry of Lands, Natural Resources and Tourism. Studies by McCabe *et al.* (1992) and Galvin (1992) concluded that the ban on agriculture had severely impaired household food security in the area. It has also exacerbated tensions between local residents and the conservation authority. Resident Maasai, had in turn, resorted to illegal cultivation, which has led to serious conflicts with the conservation authority. The ban on agriculture was partially lifted in 1992 by the Prime Minister's decree. From then on, cultivation of small gardens - ranging from 0.5 to 1 ha per wife in the polygamous households using hand hoes was allowed. However, commercial cultivation using ploughs is prohibited. According to the NCA officials, cultivation is an

interim measure awaiting a permanent solution for the resident Maasai food security problems.

A need for conserving wildlife seems to conflict with an urgency of sustaining the livelihoods of NCA Maasai. Conservation policies are believed to have undermined the pastoral economy. As a result the pastoralists are forced to cultivate in order to sustain household food security. Cultivation, therefore, seems to be a powerful force which, if not managed carefully, may jeopardize the traditional co-existence of pastoralism and wildlife conservation in Ngorongoro. This will be detriment to both wildlife conservation and pastoralism.

Another development that is causing an alarm to wildlife conservation is increasing economic diversification of NCA Masaai. During in-depth interviews with NCAA officials, there was expressed concern over growing trading centres at Nainokanoka, Kimba and Enduleni settlements. Despite prohibitions under NCA regulations, growth of these settlements has been associated with an increase in building permanent houses, which are believed to alter landscapes and wildlife habitats. The authority has also served a demolition notice to traders operating small scale business at a number of trading centres, including Kimba settlement. Instead this has radicalised the tension between conservation authorities and local entrepreneurs. Such social and economic changes taking place among pastoral modes of production were never envisaged during the establishment of NCA in 1959. There are now needed institutional rearrangements that will accommodate the on going social and economic changes of pastoral population living in the Ngorongoro area.

Ngorongoro Conservation Area has also been experiencing steady increase in land-use pressures due to increasing human, livestock and wildlife populations. It is now thought that



veterinary control of rinderpest, has led to a dramatic expansion of wildlife population (Runyoro *et al*, 1995; Campbell and Borner, 1995). The most noticeable change with serious environmental and social consequences in NCA is the increase in numbers of wildebeest, which rose from some 250,000 to a peak of some 1.7 million in the 1980s, returning to a figure of about 1 million animals in the early 1990s (Campbell and Borner, 1995). The expansion of wildebeest population has effectively decreased the area available for grazing and placed increasing pastoral pressure on the highlands (particularly the Northern Highland Forest Reserve). This situation has arisen because wildebeest calves are asymptomatic carriers of “malignant catarrh fever”, a viral disease that is fatal to cattle. When the calving wildebeest herds occupy the short grass plains of the NCA during the rainy season, pastoralists are forced to abandon prime grazing areas and to retreat to safety at the highlands. This is a reversal of the traditional grazing pattern, which in the past revolved around the alternating rest and use of different pastures. The plains were used during the wet season, whilst the highlands, with their better rainfall and permanent water supplies, were used during the dry season. Portions of the highlands are now used throughout the year, and deprived of a resting cycle altogether (Machange, 1997).

The restriction on available grazing lands for pastoralists in NCA has been compounded by increasing human population. Between 1966 and 1978, the pastoral population of the Ngorongoro area grew from an estimated 8,700 to nearly 18,000 people. The following decade witnessed a steady rise, and in 1994 the human population was estimated to be 42,000 (Runyoro, 2001). This high rate of growth appears to have been the combined result of natural increase, estimated at 2.3% per annum (Homewood and Rodgers, 1991), and immigration. In particular, it appears that the Ngorongoro highlands became an important focal point of immigration during the drought years of the 1970s, when pastoralists from the

surrounding lowlands moved to the higher rainfall areas of the NCA in search of pasture and water.

In addition to the simple numerical increase in the size of the pastoral population, it is evident that the change within Maasai society itself is leading to a new set of land-use pressures. In particular, an increased reliance on cultivation has necessitated a move from transhumance to a more sedentary way of life. Increasing sedentarisation concentrates human resource-use pressure onto small areas, whereas traditional transhumance patterns tended to spread such pressure over much wider areas, in line with the seasonal availability of fodder and water. Cultivation is occurring in the higher potential agricultural areas, which are also the most productive areas for livestock production. With the uptake of cultivation, large wild herbivores, which formerly co-existed with pastoralism, are increasingly becoming a pest to crops, and farmers are forced to take protective measure e.g. scaring away wild game, fencing cultivated plots or spearing them. On the other hand increasing of cultivated land also blocks wildlife migratory routes.

All of these land use changes have implications on resource use conflicts. Although the Maasai were allowed to reside within the NCA area, they were subjected to a series of policy changes that had imposed restriction on their traditional land use systems, and this led to significant impact on their pastoral livelihoods. Some areas were closed to pastoralists, in others areas such as the Ngorongoro and Empakaai Craters, cattle could be grazed but no settlement was allowed.

However the most important restriction is the prohibition of all cultivation within the area. Since the Maasai living within Ngorongoro area had traditionally depended upon local cultivators for getting grain this was perceived as a great set back with reference to

livelihood. The Prime Minister temporarily lifted the ban on cultivation in 1992. This was followed in 1998 by the Presidential decree allowing cultivation in the NCA. However, some conservationists have recently advocated that the World Heritage Designation for the NCA be rescinded because of the cultivation.

The experimentation with a multiple land use system in Ngorongoro area, has led to impoverishment of the indigenous Maasai pastoralists. Contrary to the idealized pastoralists when the system was conceived, the Maasai pastoralists are now subject to both social and economic changes and they want to change the mode of production and life styles, through diversifying their economic activities, in response to more or less sedentary life styles. Thus conservation policies and regulations are causing high costs to the resident Maasai pastoralists. This is one of the main reasons underlying resource- use conflicts in the area. Moreover, socio-economic system of the pastoralists is changing; they have now been forced to lead a more sedentary life. This has also disrupted the traditional land use system, which was based on elaborate seasonal transhumant livestock mobility. The change in the land use patterns by pastoralists pose risks to the environment. In order to avert the potential conflicts, the development plans must therefore address these social changes.

As a benefit sharing measure between the Ngorongoro Conservation Area Authority (NCAA) and the local communities, as from 1998 the authority has been disbursing TSh 500 millions per year for the purpose of community economic development through the Ngorongoro Pastoral Council - a local organization which has been established under provisions of the NCAA rules. The money is used for education, veterinary services and food security. Under the food security protocol, the resident pastoralists are provided with grains at the market prices. Whereby, the NCAA pays for the transport costs. Thus, conservation policies and regulations are causing high costs to the local Maasai pastoralists.

This is one of main reasons underlying resource-use conflicts in NCA. Moreover, socio-economic system of pastoralists is changing; they have now adopted a sedentary life style. This has also disrupted the traditional land use system, which was based on elaborate seasonal transhumant livestock mobility. The change in the land use patterns by pastoralists is posing risks to environment sustainability. In order to avert the potential conflicts, the development plans must therefore address these social changes.

### **4.1.3 Resource Tenure Changes in the Study Areas**

#### **4.1.3.1 Resource tenure changes in Mkata plains**

The key resources needed for supporting livelihoods in Mkata plains - land for cultivating, water, grazing land, wetlands, woodlands and forests – are mainly used as common pool resources (CPR). Access to these resources is mostly determined through land tenure regime operating in specific villages or locations. Table 17 shows the tenure regimes existing in the study area. The main tenure systems are customary tenure system in traditional villages, individual land held under customary tenure system; village lands including lands falling under village jurisdiction and general lands which are state lands under the Commissioner of Lands. The village land encompasses all lands falling under village jurisdiction. These are claimed by individuals, families or owned communally without any formal title.

**Table 17: Land tenure regimes existing in Mkata plains**

| <b>Title holder</b>             | <b>Tenure regime</b>                            | <b>Access</b>                          |
|---------------------------------|---|--|
| Private commercial estate farms | Formal Leasehold                                | Restricted and free access             |
| Private ranches                 | Formal leasehold                                | Restricted                             |
| Pastoral villages               | Group title deeds                               | Communal by pastoralists               |
| State ranch (NARCO)             | Formal leasehold                                | Restricted                             |
| Game reserve (TANAPA)           | Reserved land                                   | Restricted                             |
| State - General lands           | State lands (Un allocated)                      | Free access                            |
| Individuals                     | Customary rights, de facto individual ownership | Restricted, family members             |
| Registered village council      | Deemed rights of occupancy                      | Restricted, Free access, communal use. |

These land hold categories are now governed by Village land Act No. 5 of 1999 (URT, 1999b). Under this Act the village government is issued with a group title to village land based on existing village boundaries.

Then each village is authorised to issue land titles to individuals. These land hold titles are accorded similar standing in law as statutory title hold. However, conversion of title holds is yet to be accomplished. Most of landholders in the study area fall under village land categories. There is differential access and claim of land resources between the agro-pastoral and pastoral villages. A multiplicity of land tenure regimes operating in the study area reflects the historical past of the study area as a centre of colonial plantation economy. It also reflects about evolutionary process of land tenure institutions in Tanzania. However, such multiplicity has created multiple claims and in some cases it has been an underlying cause of resource-use conflicts in the study area.

Access to land in agro-pastoral villages is governed by a combination of customary institutions and administrative decisions through village government, or through the district

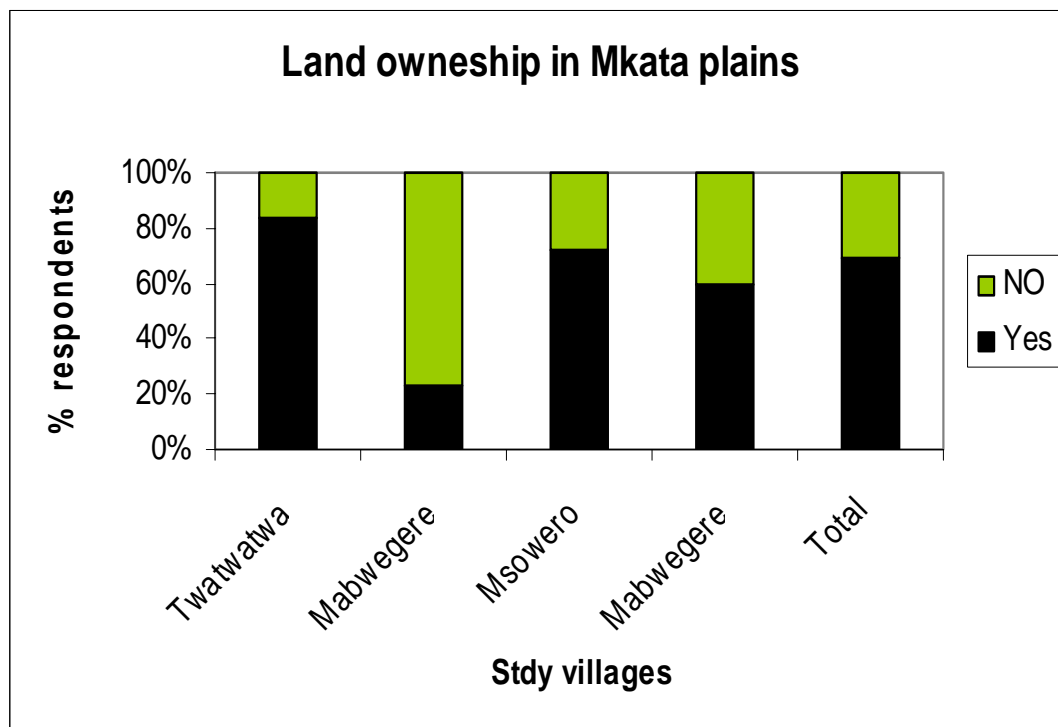
government. Individuals own farming plots privately, these could be obtained through inheritance or allocation by village government, while access to grazing land and water is communal. However, there are some variations on this general pattern. Kilosa district government determines settlements for pastoralists', but the control of grazing lands is vested in respective villages. The area designated for settling pastoralists at Msowero village, was originally a state ranch, which had been devolved to village government. The area is therefore under a direct control of the village government, which has since set a limit to a number of cattle and pastoralists who can be settled there, and resisted the district government to settle more pastoralists in the village. In addition the village government has demarcated stock routes and specific areas along Msowero river where pastoralists can water their animals.

In the case of Mbwade village, the pastoralists were recently settled on a neighbouring abandoned ranch (Madoto I ranch) which is bound by a long term leasehold. Where as, pastoralists are administratively answerable to the village government, but governance of their grazing lands does not fall under village government jurisdiction. Grazing land in the ranch is now governed through pastoralists' customary system. Nonetheless, the pastoralists share water wells with farmers. As a result, there are complaints on part of farmers over increased demand of water by livestock.

In 2004, the pastoralists' customary leader – a former Baptist Church Minister – had been elected a village chairman at Mbwade village. The election was initially challenged by some farmers on allegations of corruption practices during elections, but it was upheld by the Kilosa District Government

In case of pastoral villages – Twatwatwa and Mabwegere - have formal group land-titles for livestock production. However, at local level access to grazing land and water is communal. All pastoral villages were excised from original farmer villages initially shared by both pastoralists and farmer. Nonetheless, after partitioning both farmers and pastoralists continued to share some resources including rivers and wetlands. Therefore, the pastoralists to some extent have secondary access right to crop residues in farmer villages after crop harvest.

Land ownership by respondents in Mkata plains is shown in Figure 32 and Appendix 13. About two thirds of respondents (66.1%) said they own land.



**Figure 32: Land ownership by respondents in study villages in Mkata plains**

However, more than one third of respondents (33.9%) said that they do not own any land. At village levels there are variations on respondents' perception with regards to land ownership. In Twatwatwa village, a pastoral village, 81.1% of respondents reported that they own land. Whereas, in Mabwegere, a neighbouring pastoral village, only 23.3% reported to own land. The two villages hold group title deed, for their respective villages, but access to grazing land is communal. The varied responses could be attributed to high level of commoditization and market integration of the pastoralists at Twatwatwa village.

During in-depth interviews with key informants at Twatwatwa village, it was revealed that there is a move being spearheaded by the local elites to partition the village land. This group was partly motivated by group ranch experience in Kenya as well as the economic gains implied in private land ownership. This is in line with the evolving land market in Tanzania.

Table 18 shows methods of land acquisition and tenure security in Mkata plains. The results indicate that the majority of respondents (37.1%) had acquired land through inheritance. Other important method for acquiring land is by buying which was reported by 26.1% of the respondents. Village governments are also playing a significant role in allocating lands reported by 10.2 respondents, this is particularly important in pastoral villages, which holds formal group titles vested in respective village governments.



**Table 18: Methods of land acquisition by respondents in Mkata plains**

| Method of acquisition           | Number of respondents |                     |                    |                  |                  |
|---------------------------------|-----------------------|---------------------|--------------------|------------------|------------------|
|                                 | Twatwatwa<br>(n =37)  | Mabwegere<br>(n=30) | Msowero<br>(n=170) | Mbwade<br>(n=30) | Total<br>(n=267) |
| Bought                          | NA                    | NA                  | 50(29.4)           | 20(66.7)         | 70(26.1)         |
| Rented                          | NA                    | NA                  | 21(12.4)           | 1(0.3)           | 22(8.2)          |
| Inherited                       | NA                    | NA                  | 90 (52.9)          | 9(30.0)          | 99(37.1)         |
| Allocated by village government | 6(16.2)               | 2(6.7)              | 9(5.3)             | NA               | 18(10.2)         |

- Data in some columns does not total up to 100 because of missing data
- Numbers in brackets are percentages

Key: NA = Not applicable-

The study indicates that the informal systems that are guaranteed by existing local institutions are the main methods for land acquisition in Mkata plains. The results also, suggests that local land market is well established, whereby land transactions are conducted through local institutions, which is formalised by local government officials who legitimize the agreements made locally by recording the transfer.

Table 19 show sources of tenurial security in Mkata plains. The results indicate that the village government is a main guarantor of land tenure security, reported by 33.7% of respondents. Customary institutions were also identified by 31.5% of respondents as a source of land tenure security. This study results generally reveals that local institutions and a mixture of both local institutions and local government are the main institutions providing tenurial security of land resources at local level in Makata plains.

**Table 19: Sources of land tenurial security of respondents in Mkata plains**

| Land security      | Number of respondents |                     |                    |                  |                  |
|--------------------|-----------------------|---------------------|--------------------|------------------|------------------|
|                    | Twatwatwa<br>(n =37)  | Mabwegere<br>(n=30) | Msowero<br>(n=170) | Mbwade<br>(n=30) | Total<br>(n=267) |
| Title deed         | 1(2.7)                | NA                  | NA                 | NA               | 1(0.4)           |
| Customary rights   | NA                    | 3(10.0)             | 72(42.4)           | 9(30.3)          | 84(31.5)         |
| Village government | 32(86.5)              | 1(3.3)              | 44(25.9)           | 13(13.3)         | 90(33.7)         |
| No rights          | 4(10.8)               | 9(30.0)             | 20(11.8)           | NA               | 33(12.4)         |
| Don't known        | NA                    | 12(40.0)            | 1(0.6)             | 1(3.3)           | 14(5.2)          |

- Numbers in brackets are percentages
- Data in some columns does not total up to 100 because of missing data

The results reflect the historical past of the study area. During the pre-colonial period, access to land by smallholder cultivators was governed by customary system. Under customary system, access to land was through kinship and lineage rights. Historical information from scholars like Koponen (1994) posit that, internal relations within Africa societies are dominated by kinship in the sense of descent. Land tenure was characterised by clan relationship, either matrilineal or patrilineal. Chiefs also controlled and distributed land over which people had the right to use. Land tenure studies in Tanzania indicate that land tenure mainly seemed to co-exist with land holding by lineage and individuals. It is reported that land tenure underwent changes from collective and usufruct rights to a system that combined ownership by families with individual land holding.

As such, pre-colonial land tenure generally was shaped by struggles between chiefs and subjects who wished to defend heritable land rights (Shivji, 1995). The often cited example of superiority of chiefs over control of land during pre-colonial period in Kilosa, is a treaty signed over a century ago - between Mangungu Chief of Msowero and Dr. Karl Peters from Germany. Nonetheless, the traditional customs over land have remained the same for many

generations. Therefore, the customary land tenure has remained the only legitimate system in the eyes of most of smallholder farmers at village level.

The colonial land tenure policies, which aimed at establishing the settler colony (Germans, 1885 – 1917), and plantation/small hold cash crop economy (British 1918 – 1962) brought about substantial changes on the customary land tenure systems in Mkata plains. Large tracts of land were expropriated from customary holders to none natives. The Germany colonialists first converted these into freehold sisal estates. The freehold titles were retained under the British regime, and were later on converted to government lease hold in 1963 by the post-colonial state government.

The land policies followed by the post-colonial state government bear some similarities to colonial land policies, in that they tended to alienate lands to the state. In particular there are no comprehensive policies that aimed at redistribution of lands to customary holders. The most important post-independence policy interventions that brought about significant impacts on customary land tenure in the area include; the nationalization and establishment of agricultural parastatals, villagisation programme, structural adjustment, and economic liberalization. During nationalisation policies of mid 1960s, the leasehold sisal estates were nationalised, transferring the ownership and management of the estates to a parastatal organization, the Tanzania Sisal Authority (TSA) now the holding has been transferred to a private company KATANI Ltd.

However, the transfer of private estates to a parastatal organization was effected without any formal repeal of the previous lease holds. To day, this has proved to be a big huddle in attempts to distribute lands to smallholder producers in the villages. Since, under current liberalization policies, Tanzania is obliged to demonstrate her commitment to market

economy, otherwise the country may loose trust from would be external investors. Given this fact, large tracts of land in Mkata plain are tied up by long leasehold tenure. Parallel to nationalization, more customary lands, in the area, were alienated by the state to expand the state ranches, under the National Ranching Company. The state ranches in the study area include Mkata and Madoto II.

During the village settlement schemes of mid 1960s, the nomadic pastoralists were allocated villages in Mkata plains. At that time these areas were unoccupied bush, but under customary landholding systems these were considered as land reserves to be allocated to new family members. These were however, legally considered as un-allocated public lands under the government. The measure to designate pastoral villages was prompted by, escalations of resource use conflicts in the villages shared by both pastoralists and farmers. When village titling was introduced under the Village and Ujamaa village (Registration, Designation and Titling) Act No. 21 of 1975, some of the pastoral villages carried out formal surveys and were issued with group title holds for the purpose of livestock production. The study villages with title deeds include Twatwatwa and Mabwegere. This land had in effect been removed from customary domains of farmers land use system. Different indigenous ethnic groups, as well as immigrant farming tribes resent this fact.

Most of indigenous customary land users, challenges the legitimacy of pastoralists owning land within their tribal territories. The herders were, by custom, supposed to have a secondary user right, but not owning land. Moreover, the procedure used by the pastoralists to obtain leaseholds was not transparent. Apparently, the neighbouring cultivators did not fully participate in the entire process. Thus, initially the pastoral villages had no political autonomy, therefore registration and titling of these villages were supposed to be processed through the parent villages. This procedure was reported to be flawed. As a result at the

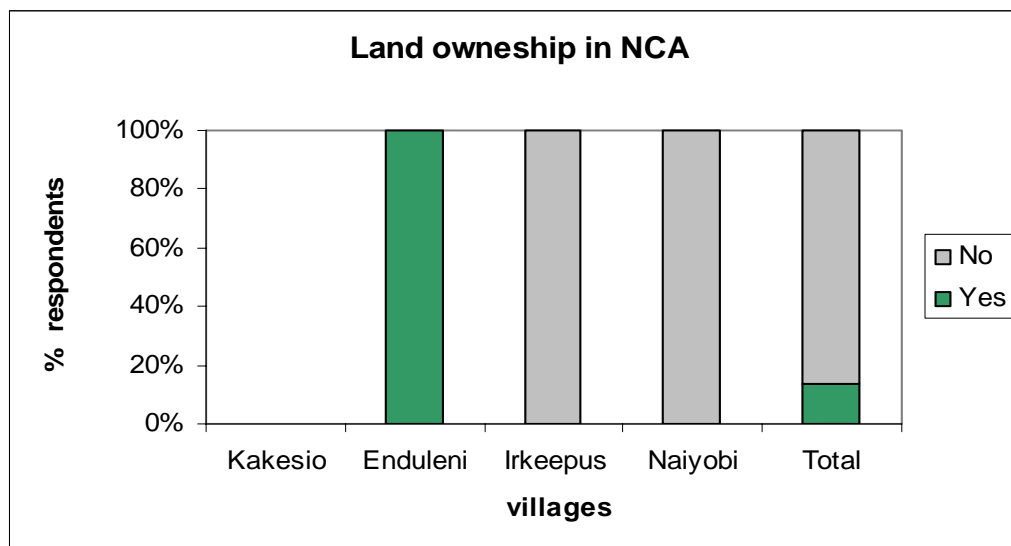
present there are intractable boundary disputes between the pastoral villages and neighbouring farmer villages, particularly in Mabwegere and Twatwatwa villages.

Furthermore, during the time of this study there erupted another border dispute, involving Twatwatwa village and Mkata (NARCO) ranch. It was claimed that most village land, indicated on the title deed issued to the village was part of Mkata state ranch. The ranch then was sub-leasing to private investors parts of the ranch which were not of immediate use including the disputed area in Twatwatwa village. Privatized ranch areas include Ngaiti/Luhoza wetland, which in mid 1960s was also allocated by the district government to pastoral settlement schemes. The wetland has since been utilised as the dry season grazing areas for most of pastoralists' herd in Mkata plains. The findings in this study demonstrate that land titling had not guaranteed the security of tenure to the pastoralists' villages in the study area.

During the Focused Group Discussions in pastoral villages, it was revealed that the main concern of the pastoralists was to obtain security to land that could enable them to lead a settled life. The pastoralists in the study area have now sedentarized. Only few members of the family move with a part or an entire herd to graze in distant grazing areas. The villages, through co-operative actions have built schools, dams, deep wells and piped water systems. The individual pastoralists have built permanent houses and invested in shops and milling machines. The main priority of most pastoralists, in particular at Twatwatwa village, is to educate their children as a way of preparing them to lead settled life. They have now established an "education trust fund", which is managed through a traditional leadership, whereby each villager is obliged to make annual contributions in the form of cattle as school fees for his children. Also each family is obliged to register all the school going age children.

#### 4.1.3.2 Resource tenure changes in Ngorongoro Conservation Area

The entire land area falling under jurisdiction of Ngorongoro Conservation Area has a reserved area status, which overlaps with customary rights of resident Maasai pastoralists. Such dual claim of resource has been a source of contradictions and resource - use conflicts in the area. The recent attempt by NCAA to obtain a lease hold for the area was rejected by the government. This has in effect strengthened tenurial security of local Masaai pastoralists as well as reaffirming the government commitment to a multiple use approach to wildlife conservation. The land ownership and landholding distribution among respondents in Ngorongoro Conservation Area is presented in Figure 33 and Appendix 14. The majority of respondents (94.2%) interviewed in Ngorongoro area said that they do not own land. This response reflects a fact that the concept of individual land ownership is not comprehensible amongst the Maasai pastoralists. In their customary territories land resources are owned collectively through elaborate local institutions.



**Figure 33: Response distribution on land ownership in the study villages in Ngorongoro Conservation Area**

Furthermore, the responses reflect a general apprehension among the Ngorongoro pastoralists, that their land was appropriated by the government and that NCAA has only a managerial role.

Table 20 presents distribution of land holdings by respondents in NCA. Only the respondents from Kakesio and Enduleni villages mentioned the size of land they own. The majority of respondents from the two villages said they own between 0.5 and 1.0 ha of land. This is a limit allowed by the NCAA for gardening purposes. The respondents in Irkeepus did not indicate their landholding size; this is probably due to the fact that the highlands are crucial dry season grazing areas, whereby cultivation is prohibited by custom.

**Table 20: Landholding by respondents from study villages in Ngorongoro Conservation Area**

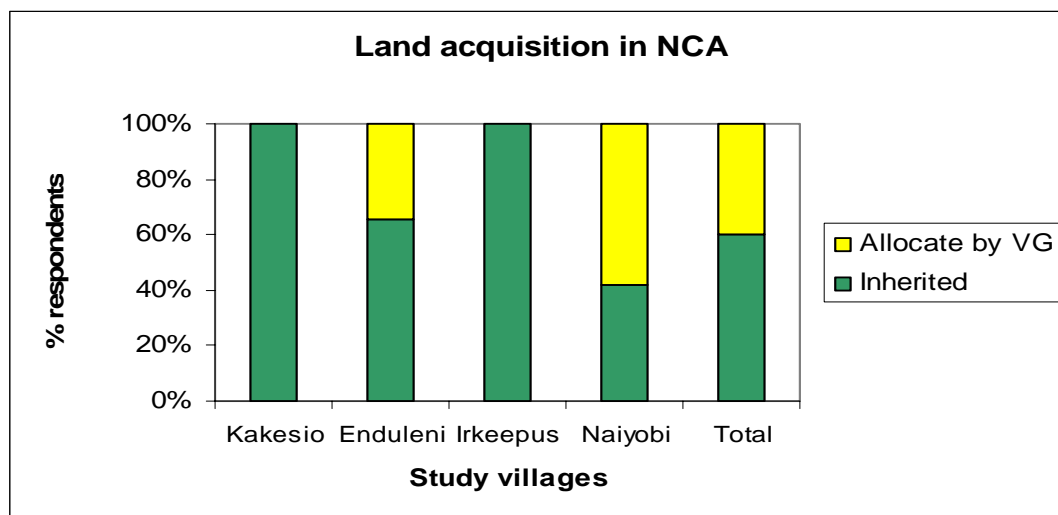
| Land holding<br>Category | Number of respondents |                    |                     |                    |                    |
|--------------------------|-----------------------|--------------------|---------------------|--------------------|--------------------|
|                          | Kakesio<br>(n=35)     | Enduleni<br>(n=84) | Irkeepus<br>(n= 81) | Naiyobi<br>(n=109) | Total<br>(n = 305) |
| 0.5 – 1.0 ha             | 34 (97.1)             | 59(77.1)           | NA                  | NA                 | 93 (32.1)          |
| 1.1 – 2.0 ha             | 1(2.9)                | 25(22.9)           | NA                  | NA                 | 26 (14.4)          |
| 2.1 – 5.0 ha             | NA                    | NA                 | NA                  | NA                 | NA                 |

- Numbers in brackets are percentages

Key - NA = No answer provided

The absence of answers on landholdings in Naiyobi village probably was due to mounting tensions between village residents and NCAA over expanding cultivation. For this reason, respondents were reluctant to disclose the size of their farm handholds.

Figure 34 and Appendix 15 show methods of land acquisition by respondents in NCA. Main methods for acquiring land in NCA include inheritance mentioned by 54.2% of the respondents and allocation by village government reported by 36.4% of the respondents. Maasai pastoralists consider encampment sites as private property, while the rest of the land is communally owned in accordance to customary institutions. Rights to land for the purpose of encampment or cultivation vary depending on residential status of an individual.

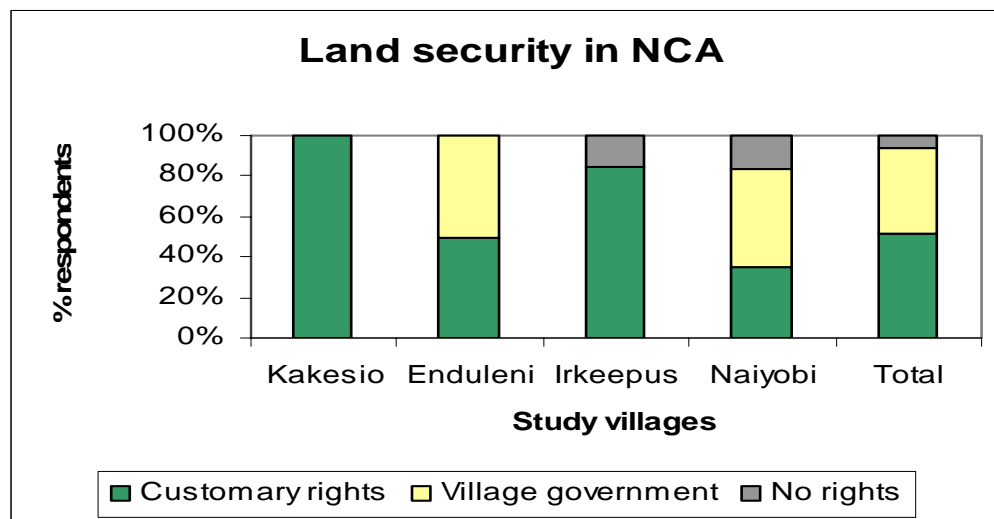


**Figure 34: Methods of land acquisition in Ngorongoro Conservation Area**

Original residents of a particular village have customary rights to land resources in their locality, while new immigrants are allocated land by traditional leaders or village government. The majority of respondents (91.4%) in Irkeepus and Kakesio (94.3%) reported to have acquired land through inheritance. This is probably due to a fact that, these villages have a relatively low number of immigrants and most residents have traditional claim to land resources. According to NCA regulations, all new immigrants are required to seek permission from the conservation authority before they settle in the village. However, in most cases this procedure is ignored and traditional leaders authorize settling.



Figure 35 show sources of land tenurial security by respondents in NCA. The results indicate that the majority of respondents (65.2%) believe to have customary rights to land resources in NCA, while 47 % of respondents said their tenurial security of land resources is vested in the village government. However, a small proportion of respondents (7.3 percent) reported that they do not possess any land rights in NCA.



**Figure 35: Sources of land tenurial security by respondents in Ngorongoro Conservation Area**

This reflects a growing apprehension and discontent among Ngorongoro Maasai about expropriation of their lands by conservation authorities in collaboration with international conservation lobby groups. During Focused Group Discussions most participants were worried about eventual eviction. Such discontents have serious implication on sustainability of the NCA ecosystem, because the local people may resort to unsustainable use of resources (i.e. placing a high discount rate on resources) for the future. Such eventuality may lead to serious consequences to natural resources and viability of the multiple land-use system. Multiple land use policies in NCA have created a dualism of land tenure, whereby the area has a conserved land status but retaining customary claims of local pastoralists.

This is most probably due to acknowledgement, by policy designers, of compatibility of pastoralism and wildlife conservation. The dualism in tenure regimes has come to characterize modes of access to resources in NCA. Based on this background of land tenure regimes it can be concluded that these land regimes are complementary, therefore there is a need for institutional framework that enables increased collaboration between local actors and conservation authorities.

The history of wildlife protection in the Serengeti-Ngorongoro ecosystem dates back to 1929, when a Game Reserve was established in the central Serengeti. This reserve was subsequently expanded with the creation of the Serengeti National Park in 1951. At that time, both pastoralism and cultivation were allowed. In 1954, however, cultivation was prohibited in the whole of the park area. Both pastoralists and cultivators reacted strongly against these new restrictions, and a severe conflict arose. In an effort to resolve the conflict, the colonial Government in 1956 published a white paper, which recommended that the park be partitioned. The Western Serengeti, Ngorongoro Crater, the Northern Highlands Forest Reserve and Empakaai Crater were to be set aside exclusively for the conservation of wildlife and forests, while the rest of the park would be opened up for unrestricted cultivation and pastoralism. The proposal caused international concern and was contested by conservationists in North America and Europe. In 1956, a Committee of Enquiry was appointed by the government to propose a new solution. The recommendations of this committee formed the basis for the Ngorongoro Conservation Ordinance No. 14 of 1959, which splinted the original Serengeti National Park into two separate units.

In the Ngorongoro Conservation Area, pastoralists retained their rights of habitation, cultivation and socio-economic development. The administration commitment to safe guard interests of local Maasai were outlined by the then Governor of Tanganyika in a speech

before the Maasai Federal Council in 1959, in which he stated that “*should there be any conflict between the interests of the game and the human inhabitants, those of the latter must take precedence*” (Shivji and Kapinga, 1998). This commitment by the government has come to influence the legislature that established the Ngorongoro multiple land-use system.

Ngorongoro Conservation Area (NCA) was formally established in 1959 to provide for the dual goals of natural resource conservation and habitation and development of its resident Maasai people. By the terms of its establishing legislation - Ngorongoro Conservation Ordinance, 1959 - the NCA represents a land-use premised on European model of a protected landscape, in which human habitation has been permitted throughout an entire protected area. However, in practice the NCA has demonstrated two distinct approaches to multiple land-use management since its establishment in 1959. From 1959 to approximately 1974, human habitation was combined with natural resource conservation throughout the area. However, the need for zonation of the NCA prohibiting human habitation in some areas of the NCA was identified in the area’s draft management plan in 1968. Management of the area has in practice followed a zonation since this time, in which the Ngorongoro Crater and Northern Highland Forest Reserve have been afforded a higher degree of conservation status. This zonation came in effect in 1974, when permanent habitation in the Ngorongoro Crater was prohibited. This coincided with restrictions on resource use in the wider NCA, with the total ban of cultivation in the Area in 1975 (under the Game Park Laws Act No. 14 of 1975). Since 1974, therefore, the Ngorongoro Conservation Area has effectively been managed as a core protected area (conforming to IUCN criteria) being managed as a buffer zone to both the Ngorongoro Crater and the adjacent Serengeti National Park (IUCN, 1994).

Since its inception, the Ngorongoro area has come under jurisdiction of different authorities and policies. It has also been contested between the conservationist and the social welfare lobbies. During the late 1960s, the Ministry of Agriculture proposed that the size of the Conservation Area be reduced by about 65%, and that the de-gazetted lands be used for intensive cultivation and ranching. By 1972, however, the pendulum had swung in the opposite direction, and international conservationists were seeking amendment of the Ngorongoro Conservation Ordinance to make the NCA an exclusive wildlife area. In 1975, a compromise was reached and the Ngorongoro Ordinance was revised (Game Parks Laws Act No. 14 of 1975) (URT, 1975b). Under the amended ordinance, the government commitment to the multiple-use philosophy was retained with the creation of the Ngorongoro Conservation Area Authority which was given the mandate to conserve and develop the natural resources of the area and safeguard and promote the interests of the resident Maasai.

The management and administration of the NCA is vested in the Ngorongoro Conservation Area Authority, a parastatal organization established under the Game Parks Laws (Miscellaneous Amendments) Act No. 14 of 1975 (URT, 1975b). The main functions of the Authority include:

- to conserve and develop the natural resources of the Ngorongoro Conservation Area;
- to promote tourism within the Conservation area and to provide and encourage the provision of facilities necessary or expedient for the promotion of tourism; and
- to safeguard and promote the interests of Maasai citizens of the United Republic of Tanzania engaged in cattle ranching and dairy industry within the Conservation Area.

The Authority has been encountering difficulties in formulating clear management objectives and development policies for the NCA; that could meet the conflicting demands. For over three decades the area does not have approved management plan. Three draft plans had so far been proposed for the area. The following are summaries of previous proposed management plan drafts.

**i) Ngorongoro Conservation Authority Management Plan (1960) (the Fosbrooke Plan)**

At the time of writing this plan, the Conservation Area was in its infancy, and there was considerable confusion and uncertainty over the structure and objectives of the Authority. As a result, the plan suffered from a lack of prescriptions. There were few guidelines on the ways in which different parts of the NCA were to be managed, and there was a lack of a clear policy on multiple land-uses. A more serious shortcoming was the plan paternalistic attitude to the local communities, and its emphasis on the use of compulsion to achieve management goals. It is evident that the Maasai neither contributed to the plan, nor where there any mechanisms envisioned for incorporating them into the management of the area. The plan viewed the NCA as one component of a larger ecosystem; therefore emphasized the need to establish liaison and cooperation between the NCA and Serengeti National Park, particularly in the light of the movements of migratory herds of wildebeest, zebra and gazelles across the wider Serengeti ecosystem (MLNRT, 1990).

**ii) Ngorongoro Conservation Authority, Revised Management Plan (1962) (Dirschl and Foosbroke Plan)**

The 1962 Plan suffered essentially the same weaknesses as the 1960 version. However, the plan included policy guidelines for the management of the NCA as a whole, as well as at the

sectoral level (for example, for water development). The plan emphasized the need for a stable environment in which the NCA's human and animal could prosper, and stressed the importance of meeting the diverse requirements of the area as whole.

Although these policy initiatives were a significant step forward, it is now evident that savannah ecosystems such as Ngorongoro are typically cyclical in nature, making it unrealistic to aim for a uniformly stable environment. Similarly, it is unrealistic to attempt to meet all management objectives fully in the whole area (MLNRT, 1990).

### **iii) Ngorongoro Management Plan (1966) (Dirschl plan)**

The plan drew attention to the need for three levels of policy and objectives: a government level directive giving the overall goals and purpose of the area; a set of area wide objectives; and finally, management objectives specific to individual zones in the area. The plan recommended establishment of a permanent forum for routine meetings with the resident population of the area. The plan proposed a comprehensive land-use zoning scheme, in which areas would be used for cultivation, wildlife conservation, forest protection and relatively intensive pastoral development. Unfortunately, the land-use zoning system proposed the establishment of 17 different land-use zones, each with its own objectives and land-use plan, and was too complex to be implemented. Although a number of individual recommendations were eventually put into effect, the plan as a whole was overtaken by the controversy surrounding the Ministry of Agriculture's proposal to reduce the size of the area, and was never adopted as government policy (MLNRT, 1990). This was in line with the national policies of 1970s that emphasized on expanding agriculture production.

As part of the new measures, a ban was placed on cultivation throughout the NCA. No permanent residence or livestock grazing was allowed within the crater, although the Maasai were permitted to continue to bring livestock into the crater to access salt licks. The ban on cultivation in the Ngorongoro area remained in effect until 1992, when it was partially lifted by the Prime Minister. This step was taken to improve the food security situation in the area as a temporary measure during which time alternative ways of providing for the needs of the NCA residents would be established (NCAA, 1992). However, the Ngorongoro pastoralists successively lobbied at high political levels which led the President to issue a Presidential decree lifting a ban on cultivation in the area. This decision has sparked off some opposition from conservationists and an international lobby is organising to challenge the decision. Restriction on cultivation remains one of the main sources of increasing sentiments between the pastoral community and conservation authorities in Ngorongoro area.

**(iv) *Ad hoc* Ministerial Commission Report - 1992**

The Minister for Natural Resources in 1988 appointed the *ad hoc* ministerial commission to evaluate and advise the government on formulation of a lasting conservation and development strategy for Ngorongoro area. The final report endorsed multiple-land use in the area. It also identified lack of an agreed plan to guide the NCAA as a main weakness. The main contributions of the reported include (a) a draft policy statement providing more details on multiple land-use management objectives (b) detailed technical recommendations for actions to implement the policy objectives, and it contains a draft policy statement. The report was endorsed and adopted as working document by NCAA board of directors in 1992.

Some of the recommendations have been implemented including established the Ngorongoro Pastoral Council (PC) as a consultative body to discussing local community issues with the NCAA board, appointing the PC chairperson to the board of directors and initiated a benefit sharing program with local communities. However, the PC as well as representation of local Maasai in the board of directors is not provided for in the main NCA legislature. Therefore are not mandatory (Thompson, 1997).

**(v) Ngorongoro Conservation Area Draft Policy 1992 (Ngorongoro Charter)**

The NCA draft policy statement (the Ngorongoro Charter) principal elements include (a) commitment to multiple land-use management in the area (b) support to traditional community management systems. The draft policy has provided guidance for management of the NCA starting from 1992; it has also provided bases for developing the general management plan guiding conservation and management of the area. However, the policy has yet to be endorsed by the Minister, because it is not adequately addressing the issue of community participation. It is therefore vulnerable to ministerial level decisions or above.

Moreover, the thorny issues recommended in the commission's report were yet to be acted upon. These include a recommendation to survey and demarcate the village boundaries and providing secure land tenure to NCA residents as provided for in Ujamaa village Act of 1975. Yet, this inertia has to change with enactment of the new village land Act, No. 5 of 1999. The law transfer control of land to communities. This has been effected (in law) through conferring the customary land right a same status with granted rights of occupancy: The granted rights of occupancy are exempted in Ngorongoro ordinance (that is land hold under granted rights of occupancy is not subject to administrative powers and rules of the NCAA). For this reason, in law the local Maasai in Ngorongoro area now have a legal title to their land, therefore it is up to the NCAA to negotiate lease arrangements with the



villagers. Furthermore, the commission recommended adoption of controlled agriculture in the area, but this was rejected by board of directors on grounds that it is counter to the legislature establishing the NCA (Thompson, 1997).

#### **(vi) Ngorongoro Conservation Area New Management Plan 1996**

For the first in 30 years; the NCAA, the Ngorongoro area local community and other stakeholders came together to participate into formulation of the new management plan, supported by IUCN consultant. A draft management plan was presented for public comment in November 1995, and the text indicates “intensive participatory process” leading up to the plan. The new management plan attempts to provide for community participation through the Pastoral Council (PC). However, the PC has only an advisory role to the NCAA board. Otherwise, the residents could statutorily relate to the NCAA through the Ward Development Committees, but these relates with community development projects and not the management of NCAA as the whole. Therefore, the management plan does not adequately provide for community involvement in decisions on natural resource management.

## **4.2 Types, Roles and Strengths of Existing Local Institutions in Mkata Plains and Ngorongoro Conservation Area**

### **4.2.1 Types of local institutions**

Two main types of local institutions – formal and informal institutions - have been identified to regulate use of communal land resources and resolving resource - use conflicts in the study areas. According to Kajembe and Kessy (2000) the formal institutions are referred to as externally sponsored, originating outside the community and are established through written procedures. While informal institutions referred to as internally sponsored - these originates within the community. Depending on the functions and roles local

institutions can further be differentiated into: structural, organizational, constraints (e.g. taboos) and magico – religious institutions (e.g. rituals and curse). Whereby, the organisational institutions bear the structures, while the remaining institutions are imbedded within cognitive entity of community members and they manifest as norms, values or practices of certain communities. The structural institutions determine the authority system in a community, which in turn assign roles to different social actors as well as social obligations.

#### **4.2.2 Roles of externally sponsored local institutions**

Table 21 shows externally sponsored institutions identified by respondents in the study areas. The externally sponsored local institutions operating in the study areas were mainly administrative and legal instruments of the sovereign state. These institutions provide for administrative and organisational structures at local level including the village government, law and order enforcement agencies, service delivery agencies, and a variety of non-governmental organisations. Externally sponsored local institutions identified in Mkata plains include the central government institutions associated with land allocation and access to natural resources. The majority of respondents (46.1%) interviewed in Makata plains mentioned the village government as an important institution. Another institution considered important was village water development committee mentioned by 30.5% of respondents. KATANI Ltd was mentioned by 19.1% of respondents as important externally sponsored institutions in the area.

**Table 21: Externally sponsored local institutions existing in the study areas in Mkata plains and Ngorongoro Conservation Area**

| Institution                                   | Number of respondents    |      |   |      |
|---|--------------------------|------|---|------|
|   | Mkata plains<br>n = 267) |      | Ngorongoro Conservation Area<br>(n = 305) |      |
|   | Frequency                | %    | Frequency                                 | %    |
| Village Government                            | 101                      | 46.1 | 138                                       | 46.7 |
| Village Water Development Committee           | 67                       | 30.5 | NA  | NA   |
| Conflict Resolution Committees                | 98                       | 44.7 | NA  | NA   |
| District Council                              | 21                       | 9.5  | NA  | NA   |
| Police Force                                  | 53                       | 24.2 | 95  | 32.2 |
| Ward Council Tribunal                         | 24                       | 10.9 | NA  | NA   |
| National Ranching Company                     | 33                       | 15.0 | NA  | NA   |
| Katani Limited                                | 42                       | 19.1 | NA  | NA   |
| Wildlife Department                           | 12                       | 5.4  | NA  | NA   |
| Ngorongoro Conservation Area Authority (NCAA) | NA                       | NA   | 116                                       | 39.3 |
| Ngorongoro Pastoral Council                   | NA                       | NA   | 140                                       | 47.5 |
| WWF- Save the Rhino Fund                      | NA                       | NA   | 55  | 18.6 |
| Frankfurt Wildlife Foundation                 | NA                       | NA   | 79  | 26.7 |
| NCAA Regulations                              | NA                       | NA   | 110                                       | 37.2 |
| IRETO (NGO)                                   | NA                       | NA   | 87  | 29.4 |
| CLIP  | 48                       | 21.9 |   |      |

- The percentages add to more than 100 because of multiple responses

Key: CLIP = Community Based Livestock Improvement Project, IRETO Maasai vernacular for Pastoral Livelihood Improvement Project, WWF World Wildlife Foundation, NA =Not applicabl

Others were “Conflict Resolution Committees” mentioned by 44.7 % of respondents, the National Ranching Company mentioned by 15.0% of respondents. The Police Force was mentioned by 24.2% respondents, Ward Council Tribunal was mentioned by 10.9% of respondents and a Community–based Livestock Improvement Project (CLIP) - a Kenya based NGO involved in pastoral development - was identified by 21.9% of respondents. The majority of respondents in Mkata plains were belonging to farming ethnic groups, leading sedentary mode of life and usually well integrated into the central government structure. This

might explain a tendency of most of respondents from the study villages to mention the village government, as an important externally sponsored institution. Most respondents identified the KATANI LTD, because the company is, *de jure*, owner of most of the abandoned sisal estates. The presence of many abandoned leasehold estates, had contributed to land scarcities experienced in the study area. Kilosa District Council established the “conflict resolution committees” in 2000 by - law No. 1 of 2000, which aimed at resolving resource-use conflicts between herders and cultivators at the local level. These committees had been particularly successful in resolving the conflicts in the Msowero and Mbwade villages, which are shared by farmers and pastoralists.

The pastoralists mainly reported the National Ranching Company because most of herders in Mkata plains utilize wetland areas located in the ranch as important dry season grazing areas. Nevertheless, during the time of the study, Mkata state ranch had been sub-leased to private investors, denying about 80% of the district cattle herd access to the crucial dry season key resource. The state ranch was also, claiming parts of Twatwatwa pastoral village land. However, both Twatwatwa village and the national ranch holds formal title deeds for the contested area, suggesting a possibility of double allocation of the same piece of land to two title holders by the Commissioner of Lands.

Most of the traditional pastoral territories in arid and semi-arid areas including Ngorongoro Conservation Area had, from the colonial times, been considered to be of least economic potential and were isolated from the main national economic infrastructures. Consequently only a minimum of central government structures was introduced. However, the realization of the tourism potentials in these areas, had spurred the introduction of new institutions that in many instances had dire impacts on the way of life of the indigenous people.

The externally sponsored local institutions identified in Ngorongoro Conservation Area (Table 21) include the Ngorongoro Pastoral Council (NPC) identified by 47.5% of respondents as the most important externally sponsored institution. The pastoral council was established under the NCA regulations, as a consultative body through which Ngorongoro Conservation Area Authority (NCAA) can discuss issues pertaining to the welfare of the resident Maasai pastoral communities. The composition of the NPC includes the NCA Conservator and the six Directors heading the NCA administrative sections including: Community Development, Tourism, Natural Resource Management, Research and Planning, Administration, and Auditing and Finance. Others were elected chairperson, and the secretary, six representative village chairpersons, six representative village secretaries, all councillors from the area, six representative traditional leaders, six youth representatives and 6 women representatives. The term of office for the committee members is three years. The chairperson of the NPC is by virtue of his position a member of the NCAA Board of Directors. The main functions of the council include administration of the funds provided by NCAA for the purpose of community development. It is also used as a platform through which the NCAA consult the residents on resource management decisions that may have impact on their livelihood and welfare.

However, the Conservator is not obliged by law to take on board the opinions of the pastoral council. During the interviews with the key informants from pastoral communities, they expressed appreciation to the NPC, and the decision by the NCAA to share the benefits accruing from conservation activities. The funds administered through the NPC were mainly used to support secondary education, water developing schemes and food security. As from year 2000, the NPC has been receiving about TSH 500,000,000 (500,000 USD) annually, from the NCAA (at exchange rate of 1000 TSh per USD).

Among other institutions identified by the respondents include NCAA which was mentioned by 39.3% of respondents, Police Force was mentioned by 32.2% of respondents, and IRETO (Maasai vernacular for a pastoral Livelihood Improvement Project) was mentioned by 29.4% of respondents (Table, 21). IRETO is a traditional Non - governmental Organisation, which was established by the NCAA and sponsored by the Danish Government, with the general objective of poverty eradication among the resident pastoralists in the NCA. The NGO operates a restocking program, to those households that had been forced into destitution after loosing all of their livestock. The redistribution of cattle is an age-old social institution of the Maasai pastoralists, known as “*Olowowo*”. This institution is no longer being practised by the pastoralists in Ngorongoro area mainly due to decline of per capita livestock ownership among the pastoralists. Although the village government was identified by a minority of respondents (6.7 %) (Table, 21), but it was observed to operates in parallel with traditional leadership. In most cases the traditional leadership was reported to be more powerful in decision-making.

Regulations of the Ngorongoro Conservation Authority were mentioned by about one third (37.2%) of respondents. The regulations known to most respondents include a ban on agriculture and restrictions on grazing in the craters and Northern Highlands Forest Reserve. The NCAA regulation are associated with the game wardens who when enforcing the regulations are usually coming into direct conflicts with resident pastoralists.

Frankfurt Zoological Society was identified by 26.7 % of respondents. The society has for a long-time been supporting conservation efforts in the area, and it is a very strong conservation lobby group at national and international levels. It has also, been very influential in the policies adopted or implemented by NCA. The society played a key role in the political process that in 1959 led to eviction of Maasai pastoralists from Serengeti

National Park. The society also supported the zonation program, which was implemented by the NCA starting from 1975. According to Shivji (1995) this program led to losing by the resident pastoralists the dry season grazing lands in Empakai and Ngorongoro craters and the “Northern Highland Forest Reserve” (NHFR). The residents had ever since been suspicious of the activities and the motives of Frankfurt Zoological Society, which represents the international conservationist lobby groups interested in the conservation of Ngorongoro area.

It is notable that 32.2% and 17.9% of the respondents respectively mentioned the Police force -a law enforcement agent, and Ward Council Tribunal a formal judicial institution at village level -. The moderate and low mention of the central government institutions, particularly the ward tribunal, can be attributed to the isolation of the pastoral communities from the formal government system. Hence, the traditional institutions assume an increasing role in local governance particularly in conflict resolution and local defence, which otherwise should have been provided by the central government organs.

#### **4.2.3 Roles of internally sponsored local institutions in the study areas**

The villages under the study are located in traditional Maasailand in Ngorongoro area and Sagara tribe territory in Mkata plains, which is shared by different immigrant ethnic groups including Maasai pastoralists who settled in the area for about five decades. The Maasai are the main ethnic group in Ngorongoro area and they form a second largest ethnic group in the study villages in Mkata plains. For these reasons, the internally sponsored institutions examined were those drawing from Maasai as well as Sagara traditional institutions in the case of Mkata plains.

The internally sponsored institutions identified in the two study areas are shown in Table 22. These could be differentiated into structural, organisational and constraining

**Table 22: Internally sponsored local institutions existing in Mkata plains and Ngorongoro Conservation Area**

| Institution type                             | Institution category | Number of respondents     |      |   |      |
|--|----------------------|---------------------------|------|---|------|
|  |                      | Mkata plains<br>(n = 267) |      | Ngorongoro<br>Conservation<br>Area<br>(n = 305) |      |
|  |                      | Frequency                 | %    | Frequency                                       | %    |
| Traditional diviner<br>(Olo Laibon - Maasai) | Structural           | 78                        | 35.6 | 98  | 33.2 |
| Traditional healers<br>(Jenga-Kaguru)        | Structural           | 50                        | 22.8 | NA  | NA   |
| Curse Institutions                           | Structural           | 87                        | 39.7 | 230   | 77.9 |
| Sacred forests                               | Structural           | NA                        | NA   | 69  | 23.4 |
| Council of village<br>elders                 | Organisational       | 78                        | 35.6 | 210   | 71.1 |
| Ekingwana                                    |                      | 62                        | 28.3 | 270   | 91.5 |
| Laigwanani (Maasai))                         | Organisational       | 90                        | 41.1 | 284   | 96.3 |
| Age- sets system                             | Organisational       | 35                        | 15.9 | 119   | 40.3 |
| Warrior age-set<br>(Morran)                  | Organisational       | 126                       | 57.5 | 230   | 77.9 |
| Traditional guards                           | Organisational       | 98                        | 44.7 | NA  | NA   |
| Enkutoto                                     | Constraint           | NA                        | NA   | 200   | 67.7 |
| Ollalili                                     | Constraint           | 23                        | 10.5 | 186   | 63.1 |
| Enkopi                                       | Constraint           | 21                        | 9.5  | 150   | 50.8 |

- The percentages are adding to more than 100 because of multiple responses

Key: NA = Not applicable

institutions. The structural institutions are those, which determine the social fabric and serves as sources of authority for institutional supply. These are equivalent to Ostrom's



(1990) constitutional-choice institutions. They are deeply embedded in the cognitive structures of individuals that determine the social values, norms and customs.

The organizational institutions are those, which determine the social interactions and are associated with powers of decision-making structures. They play key roles in defining roles and obligations of individuals in a society and in community mobilisation. At local level these are in most cases embodied in the persona of implementing agents. Ostrom (1990) refers to this type of institutions as operational choice institutions. The constraining institutions reinforces the cognitive structure of individuals and shapes individual behaviour in relation to one's physical and social - cultural environment.

The traditional diviners/healers embody the magico-religious institutions and serves as spiritual leaders widely believed to possessing supernatural powers. The magico-religious institutions, like many other local institutions, are not codified into formal records and their operation remains a guarded secret by their custodians.

Nonetheless, they are accorded high legitimacy by communities they were crafted to serve. The Sagara spiritual leader, a *Jenga*, was identified by 22.8% of respondents in Mkata plains (Table, 22). The *Jenga* is traditionally responsible with organising the Sagara and Kaguru fighters and providing them with magic believed to protect them against the Maasai warriors. These social narrations surrounding the *Jenga* are necessary in order to establish legitimacy and authority of the institution. In order to sustain its legitimacy, the institution designers have invoked magico – religious narratives as a source of incentives for its acceptance and powers. Similar strategies have been observed in a number of traditional institutions, especially those, which evolved in areas associated with high environmental risks and uncertainties like pastoral areas. Other functions of the *Jenga* include traditional healing and fortune telling.

The *Jenga* institution was revived in Mkata plains during the 2000 clashes between farmers and Maasai pastoralists. Interviews with key informants revealed that during the clashes, different farming ethnic groups organized as *Ujaki* under the *Jenga* to defend themselves against most powerful Maasai. This implies that the local institutions are deeply imbedded in beliefs of community members. The results also suggest that in case of failures of formal institutions to resolving social conflicts, local communities may opt to informal local institutions. A similar institution in Maasai tribe is embodied in the *Olo Laibon*, who serves as spiritual leader, medicine man, a visionary, fortuneteller, ritual leader and main advisor on cultural matters. . The *Olo Laibon* was identified by 35.6% and 33.2% of respondents in Mkata plains and Ngorongoro area respectively. The *Olo Laibon* officiate all rituals that provide an identity to an individual in the “Maasai” culture.

There are similarities between the roles of *Jenga* and *Olo Laibon* institutions with regards to resolution of resource - use conflicts. This is based on the fact that traditionally the *Kaguru* / *Sagara* territory borders with Maasai. Thus, long time interactions between the two ethnic groups resulted into institutional learning as a means of co-existing and interaction in resource use. This implies that these local institutions have a potential role to play in conflict management process in the new orbit of interactions like is the case of Mkata plains.

The *Olo Laibon* main role during pre-colonial times was to authorise Maasai warriors raiding parties, as well as providing charms believed to protect warriors during raiding. However, there are conflicting views on the role played by *Olo Laibon* in regards to inter-tribal fights, in modern state. In the case of pastoralists’ – farmers’ conflicts in Mkata plain, some informants said that the *Olo Laibon* could have authorised warriors to attack farmers. Yet, the *Olo Laibon* was reported by district officials to have played a key role in

preventing escalation of the December, 2000 conflicts in Mkata plains, by ordering the Maasai warriors to stop the fight. In addition to this, he was also reported to collaborate with local government officials in Kilosa district to mediate in numerous farmers - herders' conflicts. This implies that the *Olo Laibon* institution has high legitimacy among Maasai, thus the institution has authority to mediate in conflicts involving Maasai pastoralists in Mkata plains.

During interviews with district officials it was revealed that there exist traditional rivalry between the *Jenga* and *Olo Laibon* competing for superiority and power. The official claimed that this rivalry contributed in exacerbating resource - use conflicts among the Maasai and farmers, as each spiritual leader incited his followers to fight. These beliefs demonstrate ignorance on part of government officials on the roles of local institutions in community mobilisation. Moreover, most of government officials originate from farming ethnic groups, which had lost most of the customary practices through schooling and religion. In this pretext most of customary institutions are considered to be backward and earthly. This led to imposing an official ban on *Ujaki* and *Jenga*. By arriving to this decision the government officials were unknowingly being manipulated by the Maasai. A ban on farmers' local institutions was in effect weakening their bargaining power to the advantage of pastoralists. As a result, the local institutions of pastoralists have been incorporated into the district conflict resolution mechanism. Most probably it was assumed that formal government institutions might cater for the farmers.

Ritual institutions were reported by 38.3% respondents in Mkata plains and 65.6% respondents in Ngorongoro area. The rituals represent deeply embedded social practices that provide a cultural background of the society. The Maasai traditional rituals also define other social institutions like marriage, inter-ethnic relationship, leadership as well as access to

family cattle wealth. For instance, the key informants in Mkata plains informed that each wife married to a Maasai is supposed at marriage time to be given cattle to start her own herd that will in future be inherited by her sons. This pre-requisite apparently limit inter-marriages between Maasai women and men from farmers ethnic groups. Furthermore, the identity of Maasai tribesmen and their access rights to resources is associated with the age-set rituals. Members belonging to particular age-set tend to mature together and get promoted together to the next stage of seniority during “olonotu” ritual. At this stage the senior warriors get promoted to elder hood and allowed to own cattle and marry, but are prohibited to carry fatal weapons. The ritual invigorates junior elders to develop wisdom and they start to participate in the council of elders. The ritual determines the roles and rights of individuals to access clan cattle wealth, therefore ensuring institutionalised redistribution of family cattle herd.

Most of social institutions in the study areas are reinforced by a curse institution, whereby powers to cast a curse are vested in the *Olo Laibon* as well as the *Ole Laigwanani*. A particular age-age can also cast a curse to a junior age-grade. The curse was mentioned as important institution by 39.9% of respondents in Mkata plains and 94.9% of respondents in Ngorongoro (Table, 22). A curse spells upon an individual implies exclusion from community social networks that involves sharing of resources and other reciprocal arrangements. Cleansing of a curse involve fines in a form of cattle, goats or sheep which are contributed by the family or all clan members, depending on the offence. Moreover, a curse cast upon an individual is believed pass from one generation to another until the entire fine is paid. This ensures a high level of conformances to social sanctions and collective monitoring. In addition, the institution provides a mechanism for enhancing conformance to social norms; it is also minimises the transaction costs for supply and functioning of local

institutions. The effectiveness of curse institution in community- forest management has been reported among the barbaig communities by Kajembe and Monela (2000).

The important structural institutions mentioned in the study areas include the council of elders (*ekingwana*), *Ole Laigwanani* (Maasai traditional leadership), enkutoto (home territory), age-set system, warrior age set, traditional guards (*Ujaki* in *Sagara* tribe),. The structural institutions are involved in the actual operation of the institutions; therefore most of them are embodied in their implementing agencies or the locality where they operates (Table 22).

The council of elders was mentioned as an important institution in both study areas. Important decisions in Maasai society are taken collectively on the open village meeting the *Ekingwana*. The results in Table 22 show that *Ekingwana* institution was mentioned as important institution by 28.3% of respondents in Mkata plains and 96.9% of respondents in Ngorongoro. The *Ekingwana* institution allows every body a right to speak and be heard. The *Ekingwana* system is widely practised in Ngorongoro area. During this study it was observed that even the formal administrative structures, both the local government and the conservation authority make use of the traditional system when communicating with the local communities. This implies the local institutions are the more effective in mobilising local communities.

This differential rating of the importance of the council of elders in the two study areas could be explained by differences in ethnic composition and cultural values held by communities in the two study areas. In the case of Mkata plains the council of elders was identified as important local institutions in villages dominated by Maasai pastoralists. Key informants from the pastoral villages in Mkata plains said that the council of elders handles

most important decisions in their villages. However, the importance of this institution has been eroded in those villages dominated by farming ethnic groups. A plausible explanation for this is that farmers in Mkata plains are multi-ethnic in their composition and most of them are immigrants. Removed from their areas of origin the legitimacy of their institutions were weakened, they also lack a coherent critical mass to practice their culture.

Moreover, the immigrant farmers are more integrated into formal market system, for this reason a need for developing elaborate local institutions and social networks is to some extent weakened. Furthermore, the farmers lead more sedentary life and had been fully integrated into the state administrative structures, where most of administrative decisions are by village government. For instance, most of the respected elders are members to the village government. In this case the roles that would have been assumed by a council of elders are integrated into a formal government system. On the other hand in the case of Ngorongoro area, which is a typical pastoral area and remotely located with minimal central government infrastructures; people have a high reliance on the council of elders as a local institution for making important decisions. These results suggest that the level of articulation into central government structures by communities in the two areas, influence on role of local institution in decision-making. Nonetheless, a high recourse to central government structures was reported in villages shared by both pastoralists and cultivators in Mkata plains. Whereas, in the villages occupied by pastoralists the local institutions appear to dominate in decision-making.

The day to day administration in Maasai society is undertaken by the age-set tribal leader the *Ole Laigwanani*. The *Ole Laigwanani* is an age-set spokesman, who is nominated when the age-set is established. Each age-set has its own spokesman. The *Ole Laigwanani* institution was reported by 41.0% of respondents in Mkata plains and 96.2% of in

Ngorongoro area. The results indicate that a relatively low proportion of respondents in Mkata plains identified the *Ole Lwaigwanani* but was mentioned by a high proportion of respondents in Ngorongoro area. The discrepancy could be attributed to the fact that in Maasai traditional areas, the tribal territories are contiguous and intricately integrated with the local institutions for governing local resources. The *Ole Laigwanani* in this case is associated with the local territory resources the *enkutoto*. For this reason the roles of the traditional leaders are well known by all resource users. In case of Mkata plains the pastoral villages were relatively recently designated by the district authority. Most of these villages get registered as “Ujamaa” pastoral villages or were issued with formal title deeds. Control of the village land resources in this case rests on local elites, who had spearheaded the registration or obtaining the title deeds to the respective villages. Moreover, the villages occupied by pastoralists are widely dispersed and the current overall traditional leaders are residing in Morogoro district outside the Mkata plains and Kilosa district. In this case the overall traditional leaders are not responsible with day to day management of village land resources.

In a traditional setting particular clan resides in particular territorial section referred to as the *Enkutoto* and have a council of elders. Each clan member has a primary access to resources in the home territory. The *enkutoto* was mentioned by 91.5% of respondents in Ngorongoro area, but there was no any mention in Mkata plains. The differential results are attributable to the fact that the respondents in Ngorongoro area were in their traditional home territory, where the social institutions for governing resource use had the opportunity to evolve. In case of Mkata plains the pastoralists are immigrants in the area, and they were allocated the land resources through formal titling system, which is unfamiliar tenure system to Maasai. As such, social institutions for governing communal resources are adapting to new political and economic settings existing in Mkata plains.

Yet, despite the fact that they do not have direct control over matters pertaining to management of local resources in Mkata plains, the traditional leaders continue to play a key function in the collective decision making process. Key informants revealed that the Ole Laigwanan in Mkata plain chairs important council of elders meetings the *ekingwana*. The proceedings of the “council of elders” meetings are relatively democratic. The role of the *Ole Lwaigwanani* among others is to convene the council, meetings, moderate the proceedings, clarify issues and announce the final decision arrived at by the council members. The *Ole Lwaigwanani* verdict is final and binding to all community members. Furthermore, the traditional leader decisions are sanctioned by a curse institution, if contravened the offender or his kinsfolk are liable to a fine. During this study it was revealed by the key informants that the traditional leader in Mkata plains play a key role in election of village government leaders. The researcher was also informed about the existence of inter-generational competition for the village government leadership in Twatwatwa village. These competitions indicate the institutional changes which are taking place within the Maasai community in Mkata plains. In case of Ngorongoro a traditional pastoral leader, the *Ole Lwagwanani* plays a key role in the management of local resources. The traditional leaders were also reported to making decisions on day to day administrative issues in their communities.

The Maasai tribe is hierarchically organized in the age-set system. The age - set comprise cohorts spanning for 15 years. This system defines roles to different age categories. The age-set institution was reported by 57.5% and 77.9% of respondents in Mkata plains and Ngorongoro area respectively (Table, 22). The age-set system has been reported in most of the pastoral societies in East Africa (Spear, 1993). Traditionally members of the age-set are supposed to share resources, help each other and cooperate in defence of their territory or in



cattle raids in neighbouring territories. The age-set ensures peer monitoring, and promotes the culture of reciprocity that is prevalent amongst the pastoral societies. The predominant age-set is the warrior (*morrans*), which comprise of bachelor youth at their prime age between 20-30 years. The warriors (*morrans*) are supposed to perform public services to the society and defend the territory. Their main duty is to drive herds of cattle to distant grazing areas during dry seasons. The in-built social network within the fabric of the Maasai, allow tribal members to share strategic resources (dry season grazing lands and water), which are usually widely dispersed over space and time in different territories.

Furthermore, each age-set has a collective curse power over the junior age-set. In this way the curse institution ensures peer pressure, collective enforcement and high level of conformance to norms and social conventions. However, this curse institution is regulated by both complementary and rivalry relationships between alternating and successive age-sets. Whereby, members of each senior age - set are nominal fathers to alternate junior age – set, with which they share reciprocal relationship. The reciprocity among alternate age sets is prescribed by the *olpiron* institution. The nominal fathers are supportive to the junior age-set and serve as their guardians, and the two age sets tend to collaborate when decisions on social issues are made. At the same time adjacent age-sets are characterised by rivalry, competition and at some stage bullying. This relationship is prescribed by the *watani* institution. The institution is also prevalent among other ethnic groups of Tanzania. The *watani* relationship among different ethnic groups provide for reciprocal support among ethnic group members. It also provides a platform for dialogue and in resolving social tensions amicably. In effect, this is an institutionalised low cost arena for conflict resolution and expanding the social nets. Such institutional framework is particularly important in Maasai society through maintaining harmony among the rival warrior age-sets who are prone to violent clashes.

The controlled institutionalised violence embodied within Maasai social institutions, can explain the violence and wary behaviour of the “warriors” to other ethnic groups. The most prestigious event in the aging process is when the junior “warriors” assume a senior “warrior” status. Yet, the juniors have to demonstrate their worthiness for promotion. The transition stage has in most cases been associated with cattle raiding in neighbouring tribes or violent fights with farming tribes. Such institutionalised traditions have an implication in inter.-tribal conflicts involving the Maasai and the farmers’ ethnic groups, like is the case in Mkata plains. Thus, it is important to understand the dynamics of age-set organisation when recommending an intervention in the Maasai society. During a decision making process a consensus of all age-sets must be sought before any binding agreement is made. This implies that any intervention must be agreeable upon by all social groups.

A traditional guards’ institution *Ujaki* was mentioned as an important institution by 44.7% of respondents in Mkata plains (Table, 22). The institution is a traditional defence group practised by Sagara and Kaguru tribes, which are indigenous tribes in Mkata plains. *Ujaki* institution evolved during the pre-colonial times, aimed at repulsing tribal raiding by the neighbouring Maasai. In its original form the institution was employed in mobilising and providing command structures of the defence groups against invading Maasai warriors. In its present form *Ujaki* is a revival of the indigenous institution, and it was employed to unifying all farming ethnic groups to defend their land and other natural resources against much powerful Maasai. Traditionally *Ujaki* organises around a spiritual leader a *Jenga*.

A number of social constraints moderate the social behaviour of individuals. These are in the form of taboos and conventions were reported to shape the social order of the Maasai. The important social constraints mentioned by respondents include the *ollalili*, *enkopi* and

*ndobito* institutions. The *Ollalili* institution was identified by 8.6% of respondents in Mkata plains and 63% of respondents in Ngorongoro. The *Ollalili* is a “pasture reserved” for an individual or a community. The reserved pastures are used for grazing calves or sick cows during the dry season. The *Ollalili* is regarded as a private property belonging to an individual or common property belonging to a specific group, and any trespass is punished by a fine of a bull. The bull is supposed to be slaughtered and be feasted by all community members including a person who has paid the fine. In Maasai culture, private property is sacrosanct enforced by curse institutions. Encampment sites as well as the cultivated plots are considered as private properties and sanctioned by *Ollalili*. During the study it was observed that the *Ollalili* institution is widely practised in Ngorongoro area for setting aside pasture reserves. However, the existence of the institution in Mkata plains was only acknowledged, but the key informants said that it was never practised. This can be attributed to the fact that the Maasai are immigrants in Mkata plains and they hold formal group titles to their villages. In this situation an individual lacks the legitimacy of declaring exclusive rights to any part of the village land, with exception of the premises of his house. Moreover, the Kilosa Maasai have about a century long isolation from their traditional Maasailand, while they have retained the general Maasai culture, a number of institutions have been evolving and adapting to their new social settings.

Homicide cases involving Maasai tribesman is sanctioned by *Enkopi* institution. The *Enkopi* institution involves repayment of “blood money”, to the bereaved, by the clan members of the killer. The male victim is repaid for by 49 cattle, while the woman victim is repaid 48 cattle. The fine is believed to cleanse the clan out of the curse, and it has to be paid even if there is a formal prosecution by the court of law. The *enkopi* was identified as important institution by 9.5% and 50.8 % respondents in Mkata plains and Ngorongoro area respectively (Table, 22).

During the Focused Group Discussions in Mkata plains participants reported that the institution is not practised in the area. It is generally felt that every body must be responsible to his acts, and they prefer homicide cases to be tried by court of law. Moreover, the *enkopi* institution does not apply to none Maasai. Neither does it apply to all Maasai - tribal clans, which are allied to different ritual leaders the *Olo Laibon*. The Key informants in Ngorongro area informed that Kisongo Maasai do not share *enkopi* institution with Parakuyo Maasai of Kilosa. This was one of the main reasons for resource - use conflicts between the two Maasai sections during the last century, which led to displacement of Parakuyo from main Maasailand.

Fatal wounding of a clansman is sanctioned by the *ndobito* institution. The institution obliges offender's family to pay a sheep for cleansing the blood curse. The offender is also supposed to meet the medication costs of the wounded man. The *ndobito* was identified as important institution by 22.8% of respondents in Mkata plains and 49.8% of respondents in Ngorongoro area (Table, 22).

The interplay of the different social institutions have an implication on the management of communal grazing lands and the preponderance of resource-use conflicts and tribal wars characterising pastoral areas. The structural social institutions prescribe roles for monitoring and enforcement of rules governing use of common grazing lands, to warrior age group. The institutions also provides for peer control of behaviour amongst community members. The organisational social institutions ensure collective decision making in the community. On the other hand the Maasai culture promotes self assertiveness of the *morrans* while constraining the behaviour of the adults. The culture also tolerates *morrans* stealing cattle from other tribes. This is partly attributed to implicit economic rationale as the youth may

use stolen cattle to build their own cattle herd. In this way they reduce the necessity of redistributing the family herd.

Such institutionalised behaviour has implications on resource-use conflicts in particular where the Maasai co-exist with farming tribes. For example, during this study it was informed by key informants from Mkata plains that most progressive farmers were discouraged to keep grade cows due to risk of being stolen by the Maasai warriors. One key informant from Msowero lamented that the Maasai have stolen from him two improved dairy cows. There is a general feeling that the Maasai had conspired to discourage the farmers from keeping cattle as a measure to prevent competition for grazing lands. Key informants at Twatwatwa village reported some instances of warriors deliberately graze on crops, such fermenting conflicts with farmers. Baidleman (1960) reported instances in Mkata plains where Masaai warriors disdain the farmers to the extent of forcibly grazing cattle on crops even in the presence of farm owners. During this study a case of forcibly grazing on crops was reported at Twatwatwa- Rudewa village boundary.

It is worth mentioning that the importance of local institutions in governing the use of common pool resources, including the communal grazing lands, has come to the attention of a number of scholars. Since 1970s writers like Ciriary-wantrup and Bishop (1975) have emphasized about the importance of considering institutional aspect in resource management. The role of institutions in natural resource management have also, been made a subject by Pretty (1995) and an important feature in Ostrom's work (1996, 1992,). All these writers emphasize on the importance of understanding the local environment and in particular the relevant institutions for proper design of natural resource management. Institutions are critical at all levels of human interaction. This owes to their role in guiding

political decision-making along just and fair procedures, and for re-assuring people on predictions of future decisions.

#### **4.2.4 Strengths of local institutions governing the use of communal grazing lands in Mkata plains and Ngorongoro Conservation Area**

Both pastoralists and agro-pastoralists in the study areas have settled in permanent villages, where they practise extensive livestock production system. The system involves seasonal movement of entire or part of household herd between dry and wet season grazing areas. This being an adaptation to variability in supply of pastures and water which is characteristic to arid environments. In the course of seasonal mobility, herders have to access various resources, which might be under jurisdiction of different groups of users or authorities.

Therefore a strategy practised by a particular group of pastoralists or individuals may differ depending on the type or resources needed, characteristics of resource users and institutional arrangement governing access to the resources. In order to minimize resource-use conflicts among resource users, there is a need of devising elaborate institutional frameworks to co-ordinate livestock mobility among different resource niches and the multiple users.

Tables 23 and 24 present livestock mobility practises and terms of access to various grazing areas in Mkata plains and Ngorongoro area, respectively. Results in Table 23 shows that a majority of respondents (94.8%) in Mkata plains said that they usually move their livestock to dry season grazing areas. A grazing cycle starts at the beginning of short rains towards the end of January when animals return to permanent villages and continue to graze on

village land throughout the rain season. As dry season sets - in mid May animals are moved progressively towards pasture reserves on river banks.

**Table 23: Response distribution on livestock mobility in study villages in Mkata plains**

| <b>Herd mobility</b>                     | <b>Twatwatwa<br/>(n= 37)</b> | <b>Mabwegere<br/>(n= 30)</b> | <b>Msowero<br/>(n= 170)</b> | <b>Mbwade<br/>(n= 30)</b> | <b>Total<br/>(N= 267)</b> |
|--|------------------------------|------------------------------|-----------------------------|---------------------------|---------------------------|
| Yes                                      | 23(76.7)                     | 30 (100.0)                   | 60(35.3)                    | 21(70.0)                  | 253(94.8 )                |
| No                                       | 6(20.0)                      | NA                           | NA                          | 8(26.7)                   | 14(5.2)                   |
| <b>Time herd moved</b>                   |                              |                              |                             |                           |                           |
| Dry period                               | 13(43.3)                     | 30 (100.0)                   | 90(52.9)                    | 21(70.0)                  | 154(57.7)                 |
| Rain period                              | 2(6.7)                       | NA                           | NA                          | NA                        | 3(1.1)                    |
| Beginning of rains                       | NA                           | NA                           | 12(7.1)                     | NA                        | NA                        |
| Droughts                                 | 11(36.7)                     | NA                           |                             | NA                        | 23(8.6)                   |
| <b>Terms of access to other areas</b>    |                              |                              |                             |                           |                           |
| Free communal grazing                    | 3(10.0)                      | 30(100.0)                    | 13(7.6)                     | 6(20.0)                   | 52(19.5)                  |
| Open access on state ranch               | 5(16.7)                      | 15 (50.0)                    | 15(8.8)                     | 6(20.0)                   | 41(15.4)                  |
| Negotiate access with local leaders      | 15(40.5)                     | NA                           | 6(3.5)                      | 1(3.3)                    | 22(8.2)                   |
| Permission by village government leaders | 18(60.0)                     | NA                           | 5 (3.0)                     | 27(15.9)                  | 41(15.4)                  |
| Reside with relatives and kinfolds       | 21(56.8)                     | 16(53.3)                     | NA                          | 28(16.5)                  | 65(25.0)                  |

- Percentages in some columns are not totalling to 100 because of missing data
- Data in parentheses are percentages

Key - NA = Not applicable

As dry season progress, towards the end of June, most herders cross into farmer villages to feed on crop residues or graze on wetland patches found on river valleys within these

villages. Different institutional arrangements are employed by herders to access resources outside their residential villages. Most of respondents depend on long established social nets by moving to kinfolks and/ or friends' residing in other villages with ample supply of pasture, this strategy was mentioned by 25.0% of respondents. Other methods used include negotiating access with local leaders mentioned by 8.2% of respondents; seeking permission from village government leaders mentioned by 15.4% of respondents. Traditionally most tribes in Tanzania recognise secondary rights to grazing livestock in most of uncultivated village lands. Most Maasai pastoralists base on this general norm to graze their cattle on communal lands in farmer villages, as free access resources. 19.5% of respondents in Makata plains said they use communal grazing areas in other villages as free access resource. While 15.4% graze in state ranch area without searching for any formal permission, therefore they use the public land as an open access resource.

Table 24 presents livestock mobility in Ngorongoro area. Herd mobility has for centuries been an important feature of extensive pastoral system practised by Ngorongoro Maasai. More than two thirds of respondents (73.5%) said they practise seasonal mobility. An elaborate transhumant movement, involving alternating between highland and lowland areas had been practised by the pastoralists in the area for centuries. The highland areas endowed with permanent water supply are used for permanent settlements and dry season pasture reserves grazed during the dry seasons. While the low lands, which lack permanent water sources are utilised during rain season. Timing and extent of mobility differs depending on location of permanent settlement in the landscape. Most of the respondents (90.2%) said that they move their livestock at beginning of rain season. Such high responses is because the majority of pastoralists move their animals to feed on highly nutritious green rush grass growing on short grass plains in low land at on set of rain season. The results in this study also indicate a growing deviation from the long established transhumant movement,



**Table 24: Response distribution on livestock mobility in Ngorongoro conservation Area**

| Herd mobility                            | Number of respondents |                    |                    |                    |                  |
|--|-----------------------|--------------------|--------------------|--------------------|------------------|
|  | Kakesio<br>(n=35)     | Enduleni<br>(n=84) | Irkeepus<br>(n=81) | Naiyobi<br>(n=105) | Total<br>(n=305) |
| <b>Moving herd to other areas</b>        |                       |                    |                    |                    |                  |
| Yes                                      | 33(94.3)              | 86(98.2)           | 81(100.0)          | 71(67.6)           | 255(73.8)        |
| No                                       | 0.0                   | 0.0                | 0.0                | 0.0                | 0.0              |
| <b>Time herd moved</b>                   |                       |                    |                    |                    |                  |
| Dry period                               | NA                    | NA                 | 43 (53.1)          | NA                 | 43(14.1)         |
| Rain period                              | NA                    | NA                 | NA                 | NA                 | NA               |
| Beginning of rains                       | 33(94.3)              | 35(41.7)           | 81(100.0)          | 91(86.7)           | 275(90.2)        |
| Droughts                                 | 35(100.0)             | 0.0                | 38(46.9)           | 0.0                | 73(24.1)         |
| <b>Terms of access to other areas</b>    |                       |                    |                    |                    |                  |
| Co-ordinated access in lowland areas     | 25(71.4)              | 35(41.7)           | 81(100.0)          | 76(72.4)           | 175(57.4)        |
| Negotiate access with local leaders      | 4(11.4)               | 4(4.7)             | 79(97.5)           | 15(14.3)           | 102(33.4)        |
| Reside with relatives                    | 30(85.7)              | NA                 | 56(69.2)           | 91(86.7)           | 177(58.0)        |
| Permission from NCA                      | NA                    | NA                 | 75(92.6)           | 21(20.0)           | 96(31.5)         |
| Permission by village government leaders | NA                    | NA                 | NA                 | NA                 | NA               |

- Numbers in parentheses are percentages
- Percentages in some columns are totalling to over 100 because of multiple responses

Key :NA = Not applicable

whereby some pastoralists from Irkeepus (14.1%) reported to move their animals during the dry season. This can be attributed to the fact that Irkeepus, like other villages located in highland land areas, is experiencing increasing scarcity of dry season pastures, and the pastoralists are compelled to move towards reserved crater areas and forest reserves. The increasing shortages of dry season pastures have been attributed to increasing invasion of

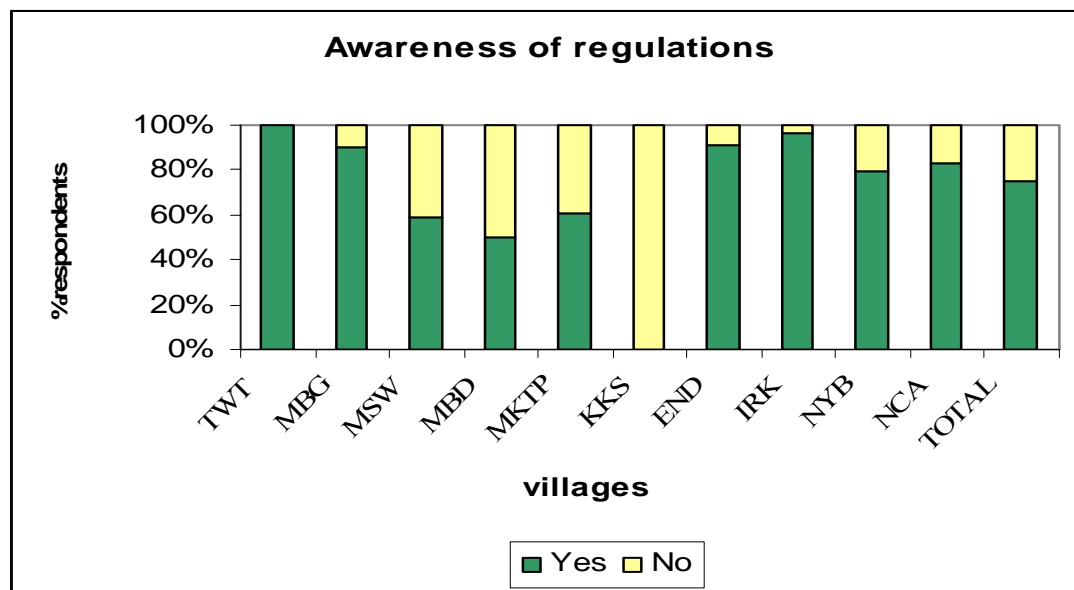
highlands by an evasive grass *Eleusine jaggeria*, which has relatively low nutritive value to grazing cattle.

Other movements were in response to drought, which was reported by all respondents (100%) in Kakesio and 46.9% of respondents in Irkeepus village. The elaborate pastoral transhumant movements in Ngorongoro area has for centuries been mediated through a constellation of enduring local institutions. These include user group institutions governing co-ordinated access of grazing areas in lowland plains. Institutions for co-ordinated access were mentioned by 57.4% of respondents. The institution ensures equitable access to rush pastures and water which are limiting resources at the beginning of rain season. This is attained through imposing of institutionalised closing season to access resources, prescribed camping sites, and grazing zone. The institution prohibits any pastoralist to camp on permanent water sources.

Furthermore, moving of animals to other villages in Ngorongoro area can be achieved through negotiation with a local traditional leader, who grants access right to resources and assign camping sites. Negotiated access was reported by 33.4% of respondents (Table, 24). Another enduring institutionalised system for accessing resources is through reciprocity, whereby pastoralists may move their animals to their relatives or friends residing in other villages. Sharing arrangements are highly institutionalised in pastoral systems, and has been mentioned by 58.0% of respondents in Ngorongoro area. This study further establishes that, the local government plays no role in governing livestock movements or management of communal grazing lands. Most of respondents (97.5%) in Irkeepus and 20.0% from Naiyobi, located in highland areas, informed to seek permission from the NCAA to access restricted grazing areas.

However, these restricted areas have been traditional grazing lands of communities from the two villages, and most of community members question the legitimacy of the restrictions. As results violent clashes have been erupting between NCA wardens and pastoralists over illegal grazing into restricted areas. Key informants revealed that, the local leaders had been instrumental in mediating these conflicts. Study findings in Ngorongoro area is a testimony to a contention that local institutions governing communal grazing lands in the area are effective in co-ordinating access to resources and they have endured a number of political, policies and economic changes.

Figure 36 and Appendix 16 show respondents' awareness, on regulations governing access to communal grazing lands. The majority of respondents (83.2%) in Ngorongoro area and about a third of respondents (33.0%) in Mkata plains, said that they were aware of regulations governing use of communal grazing lands.



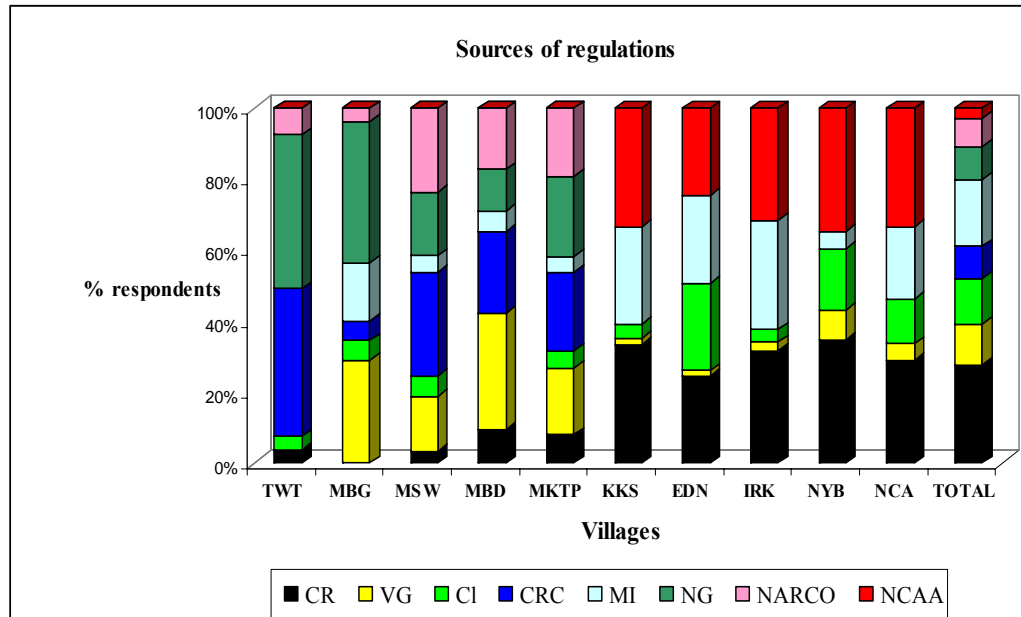
**Figure 36: Respondents awareness of regulations governing use of communal grazinglands in Mkata plains and Ngorongoro Conservation Area**

Key: TWT= Twatwatwa, MBG= Mabwegere, MSW= Msowero, MBD= Mbwade TMKP= Total Mkata plains, KK= Kakesio, EDN= Enduleni, IRK= Irkeepus, TNCA=Total Ngorongoro Conservation area

When examined by villages in Mkata plains, high level of awareness on regulations was recorded in agro-pastoral villages. Whereby, 78.9% and 45.6% of respondents in Mbwade and Msowero village respectively reported to be aware of the regulations.

This is probably due to the fact that, the two villages that are shared by both pastoralists and farmers had formed full functional “Conflict Resolution committees” (CRC). These are the institutions sponsored by the Kilosa district council, aimed at resolving herder - farmer resource-use conflicts. The Focused Group Discussion in Msowero village indicated that the village CRC has set rules designating the livestock watering sites and stock routes to watering points along Msowero river. The pastoralists were reported to abide to the rules. The Focused Group Discussion in Mbwade also showed active participation of pastoralists in village conflict resolution committee, which has reduced incidences of resource-use conflicts.

Figure 37 present sources of regulations for the management of communal grazing lands in Mkata plains and Ngorongoro area. A number of local organisations and agencies were identified as sources of regulations governing the use communal grazing lands. Most of respondents (84.0%) in Mkata plains identified the conflict resolution committee, and 36.5% of respondents identified the village government as main sources of regulations. Furthermore, a substantial proportion of respondents (41.1%) considered the informal neighbourhood discussions as the most effective means of regulating the use of communal grazing lands, possibly through negotiated access. Where as, only 4.5 percent of respondents considered customary rules as important sources of regulations governing use of grazing lands. These results indicate that both informal and formal local institutions are the major source of regulations governing common grazing lands in Mkata plains



**Figure 37: Response distribution on sources of regulations governing use of communal rangelands in Mkata plains and NCA**

Key: TWT= Twatwatwa, MBG= Mabwegere, MSW= Msowero, MBD= Mbware TMKP= Total Mkata plains, KK= Kakesio, EDN= Enduleni, IRK= Upkeeps, NCA=Total Ngorongoro Conservation Area, CR= Customary rules, VG= Village government, CL = Customary ruler, CRC= Conflict resolution committees, MI= Mixed institutions and NG = Neighbour hood groups.

The study established that whereas the government holds, *de jure*, claims over Ngorongoro Conservation Area, still most of the communal rangelands used by local communities in the area are actually under, *de facto*, ownership of local communities. The majority of respondents (82.8%) interviewed in Ngorongoro area reported that customary rules are the main institutions governing use of communal grazing lands in the area. Other respondents (36.3%) reported collaborations of local leadership and conservation authorities in making decisions regarding access to grazing resources and supervising controlled burning of rangelands, which has recently been adopted by NCAA as one of rangelands management tool.

Similar to other areas in Maasailand, the traditional system for management of common pool resources had persisted in Ngorongoro area. During Focused Group discussions in the study villages, it was established that the traditional administration system operates in parallel to village government. In some villages it was observed that the traditional leadership is the most powerful in mobilising people and in decision making. Access to water and grazing lands is secured through an elaborate institutional arrangement based on geographical territories, socio-political age -set system and kinship. Such institutional framework forms a hierarchy of resource management organization, which determines both primary and secondary rights holders to specific resources. According to Spencer (1993), the Maasai society constitutes a large ideological unit, with shared language and culture with a limited access to non-Maasai except through trade.

However, the society never had a unified political authority; instead the political authority is devolved to the smaller sections of decision making the *Oloshoni*. These are more or less self-contained ecological units. The “Oloshoni” comprises the largest units of grazing management. Each unit has its own political, social and cultural identity. Members of a unit have a ‘*de jure*’ access to grazing resources in the entire “*Oloshoni*”. Within each “*Oloshoni*” there is a secondary tier of organization based on the localities the “*enkutoto*”. Each “*enkutoto*” has its own council of elders (*ekingwana*) and forms a socio-political organization that serves as the most important tier of local governance. The *enkutoto* also represents a distinct ecological and economic unit encompassing permanent water sources and defined areas of wet and dry-season grazing areas. Historically, individual families secure rights to the communal resources through common residence within the same locality over long periods of time and by regular participation, involving specific obligations in local age-set activities as well as rituals (Jacobs, 1975). At a more local scale, natural resource management is organized on a residential basis. The Maasai reside in

encampments, the *enkang*, or “boma” (in Kiswahili), the elders in each encampment make decisions on where to graze and water the livestock. Resource-use decisions vary depending on seasons and availability of most limiting resources - pasture and water. Thus movement of livestock, which is a necessary survival strategy in extensive livestock production systems practised in the study areas, necessitates an elaborate institutional framework to co-ordinate access to resources and resolving resource-use conflicts.

Table 25 shows strength of local institutions governing the use of common grazing lands in Mkata plains and Ngorongoro Conservation Area; computed as co-operative index. The results show that the mean co-operative index in Ngorongoro area is 3.52 ( $\pm 0.52$ ) while in Mkata plains the index is 1.95 ( $\pm 0.85$ ). The institutional strength measures the performance of local institution to influence human-environment interactions. The institution performance presented here encompasses the attributes of institutional effectiveness, efficiency and sustainability. Institutional efficiency is a capacity of local communities to mobilise and set rules for governing common pool resources: while efficiency is measured in terms of resources needed for institutional operation.

**Table 25: Co-operative index in Mkata plains and Ngorongoro Conservation Area**

| Parameter              | Mkata plains | Ngorongoro conservation Area |
|------------------------|--------------|------------------------------|
| Mean cooperative index | 1.95 (0.85)  | 3.52 (0.52)                  |
| Minimum                | 0            | 1                            |
| Maximum                | 3.0          | 5                            |

- Numbers in brackets are standard errors

Institutional sustainability refers to the “robustness” or continuity of rules governing use of common pool resources. The results suggesting that local institutions in Ngorongoro area are more robust compared to those in Mkata plains. This can be attributed to the heterogeneity of respondents in the two study areas. Whereby, the sampled population in Mkata plains was multiple ethnic and operating different land-use systems. As a result they might be ascribing different use values to common rangelands. Furthermore, Mkata plains are highly integrated in market as well as formal structures of central government.

Therefore functioning of local institutions has to adjust to formal institutions as well as the local institutions of other ethnic groups. This is apposition to Ngorongoro area where the sampled population was more or less homogeneous, isolated from market forces and operating similar land-use system. For these reasons the local institutions in Ngorongoro area are free of external perturbations, thus apparently might be adapting to new land-use settings. Agrawal (2001) argues that sustainable resource management can never be independent of sustainability of social institutions that provides framework for governance of common pool resource.

#### **4.2.4.1 Factors determining strength of local institutions in the management of communal grazing lands in the study areas**

##### **(i) Mkata Plains**

A logistic model was used to determine factors influencing the likelihood of cooperation in the management of communal grazing lands in the study areas. Table 26 summarises results of logistic regression analysis, for Mkata plains. The model predicted correctly the relationship at 88.4% and significantly at  $p < 0.05$ . The model– 2 Log Likelihood = 118.331 indicating that there is a high fit between the model and the data. The Nagelkerke R squared = 0.743, suggests that about 74.0 % variation in cooperative management of



grazing land is due to independent variables in the model. Factors with likely positive effects on cooperative management of grazing lands are integration in market economy, perceived degradation of rangeland, family size, migration level, livestock ownership and strong local leadership. The results show that increasing household integration in market economy significantly ( $P < 0.05$ ) increase the likelihood of cooperation in management of common grazing land in Mkata plains by a factor of 4.157. This is best demonstrated in those villages designated for Maasai pastoralists, they had organised themselves to obtained formal group land leasehold.

**Table 26: Factors influencing strength of local institutions for management of communal grazing lands in Mkata plains**

| Variables in the Equation           | Estimates |       |        |    |        |                |
|-------------------------------------|-----------|-------|--------|----|--------|----------------|
|                                     | $\beta$   | S.E.  | Wald   | df | Sig.   | Exp( $\beta$ ) |
| Integration in market               | +1.425    | .499  | 8.162  | 1  | 0.004* | 4.157          |
| Perceived degradation of rangelands | +2.398    | 1.154 | 4.314  | 1  | 0.038* | 10.999         |
| Strength of local leadership        | +3.343    | .832  | 16.121 | 1  | 0.000* | 28.292         |
| Family size                         | +0.510    | .710  | .517   | 1  | 0.472  | 1.666          |
| Migration level                     | +1.091    | .820  | 1.769  | 1  | 0.183  | 2.976          |
| Livestock ownership                 | +0.013    | .009  | 2.413  | 1  | 0.120  | 1.014          |
| Wealth differentiation              | -1.222    | .394  | 9.631  | 1  | 0.002* | .295           |
| Constant                            | -9.078    | 3.585 | 6.412  | 1  | 0.011  | .000           |

#### **Model summary**

- Overall percentage = 86.95 %
- Model Chi-square = 104.324, at ( $p < 0.05$ )
- 2 Log Likelihood = 118.331
- Nagelkerke R squared = 0.743

\* = Indicates significance at  $P < 0.05$

Formal titling was aimed at attaining security of tenure to their villages. This is particularly crucial with recently introduced market economy in the country, which has led to increasing grabbing of village lands by elites. In their new villages, pastoralists practise communal monitoring of their village land against outsiders and they have a local system for making decisions on the uses of that land. However, at present they have yet to introduce regulations to govern internal uses of village communal grazing land. In particular, setting a limit to a number of livestock that could be grazed in the land. Cousin (1996) when discussing on the issue observed that most pastoralists tend to set rules limiting external users, but they refrain from setting rules limiting internal uses. This is related to attempts to balance conflicting demands of sustaining resource stock, while ensuring equitable access to resources by community members.

Nevertheless, obtaining title deeds to the village land has developed a sense of ownership among the pastoralists, creating incentives for monitoring against outsiders. For example, pastoralists from other areas can only graze in a village grazing land upon negotiation with village leadership and they are required to contribute to village development projects (like school and water development projects).

Strong local leadership also significantly ( $p < 0.05$ ) increases the likelihood of cooperation in management of village grazing land by a factor of 28.292. Local leadership among the pastoralists in Mkata plains tend to combine both formal village government structures and customary systems of governance. Local leaders belong to local elites, who are also large herd owners. They make most of the decisions in the village based on Maasai traditional system. The local elite have close link with customary leaders and are well connected to district council. In a addition to this, they occupies positions in the formal village

government structure like being village chairmen, or members of important committees like water development projects, school committees or land allocation committees.

Similarly, in agro-pastoral villages the local elites, who belong to land owning indigenous ethnic group, are influential in decision making process in their villages. Most of the elites are much wealthier, and some of them had previous employment experiences in formal sectors. For example the local elites at Msowero village have been influential in implementation of zonation of village land resources. This led to allocating a site along Msowero river where pastoralists could water their livestock and assigning a specific corridor through which livestock can access watering point. In addition to that they have registered resident pastoralists in a village register. These measures have led to increased co-operation between farmers and pastoralists and ending competition for wetland along the river. The role of local leadership in self-governance resource regimes has been reported by a number of institutional analysts including Ostrom *et al.*, (2002) and McKean, (2000).

Perceived deterioration of grazing land, significantly ( $p < 0.05$ ) increase the likelihood of cooperation in management of village communal grazing land by a factor of 10.999. The perceived deterioration of rangelands was used as proxy to expected economic flow from rangelands. Most of pastoralists consider the village communal grazing lands to be in good condition, and are committed to sustaining productivity of their land. This could be one of the reasons for the pastoralists in Mkata plains to engage into seasonal movement of their herds to alternative grazing lands in neighbouring farmers' villages and to open access state lands, in order to ease grazing pressure in their villages. Some pastoralists are proposing to limit a number of livestock per household that can be grazed on village communal grazing land, while most of large herd owners are diversifying their cattle wealth to permanent assets and other business. Ostrom (1999) advocated conditions for emergency of self-

organisations among users to include feasible improvement of the resources and predictability of benefit flow from the resources. Livestock ownership in Mkata plains has a positive influence on cooperative management of communal range lands with a positive regression coefficient ( $\beta = 0.013$ ) and a Wald ratio of 2.413. This suggests that although the relationship is not significant at ( $p < 0.05$ ) but the increase in number of households owning livestock is likely to increase the likelihood of cooperation in the management of village communal grazing lands. The explanation for this is that, since most pastoralists in Mkata plains depend on livestock for their livelihood, therefore they have incentives to sustaining the productivity of village grazing lands. This incentive is likely to increase among the community members as more of them start raising livestock. On the other hand, livestock owners form the social - nets aimed at mitigating risks of losing their livestock due to draughts or diseases. Once one joins into the social nets he has duties to provisioning to management of communal grazing lands, short of that he/she is likely to lose access to the social net work. The majority of small herd owners lacking alternative sources of livelihood are most likely to cooperate in group management of resources in order to guarantee access to social net and the reciprocal sharing arrangements.

Migration level also have a strong positive relationship ( $\beta = 1.091$ ) with cooperation in the management of communal grazing lands with a Wald ratio of 1.769. The results suggest that as migration increase there are improvements in self-governance of communal grazing lands. These results reflect on practices of pastoralists to move their livestock to other areas as a measure of minimizing overgrazing and environmental degradation in their villages. The large herd owners were reported to engage in long range migration extending to other districts or regions. It is well documented in the literature that the wealthier individuals in a community are likely to extracting a large share of resources from communal resource base leading to undermining of local institutions governing use of resources (Agrawal, 2002).

Thus by practising seasonal movements the large herd owners averts the likelihood of escalation of resource – use conflicts within their villages.

Furthermore, immigration into pastoral villages in Mkata plains is moderated through customary institutions, whereby the immigrant pastoralists have to negotiate with local leaders. Usually immigrations involve reciprocal movements based on kinship relationship or stock friendship located in different villages. In this way, immigration by other pastoralists is part of established social nets. For that matter the immigrant pastoralists are more likely to participate in existing communal management of rangelands. However, similar institutional arrangements do not exist between pastoralists and farmer villages, whereby pastoralists consider grazing resources in farmers' villages as open access resources. Thus, there is no negotiated arrangement between farmers and pastoralists with regard to coordinated access to grazing resources in farmers' villages. The exception is at Msowero village, where the local elites have identified and registered resident pastoralists who are allowed to use the village communal grazing lands.

Family size in Mkata plains is also positively related to co-operation in management of communal grazing lands ( $\beta = 0.510$ ) with a Wald ratio of 0.517. A plausible explanation is that pastoralists in Mkata plains particularly the youth do not engage in urban area migration. This owe to the fact that because Mkata plains are well connected to market system, this offers opportunities to generating incomes through trading cattle in nearby urban centres. Therefore the youth have incentives to remain in the area were they engage in herding and transhumant livestock movements. In this case the youth who play a key role in the monitoring and enforcement of rules for management of communal grazing lands are available to contribute in local governance of village lands. Increase in family size in this study was used as a proxy to population increase.

Different scholars hold different views on the role of population increase on management of natural resources. For example Boserup (1981) asserts that population growth can stimulate innovative uses of resources. This view relates to the management practices of village communal grazing land in the area. The sustainability of communal grazing land in Mkata is highly dependent on ability to monitor the resource uses and capacity to engage in frequent and long range livestock mobility in order to ease pressure on resources. These activities have high demand for the work force at household level. Therefore, a demand for a large family size.

The study results also show that increase in wealth differentiation significantly ( $P < 0.05$ ) decrease the likelihood of cooperation in management of common grazing lands by a factor of 0.295. With increasing wealth differentiation, there is increased likelihood of forming different sub-groups with different interests. Key informants at Twatwatwa village; informed on suggestions by local elites to partition the village grazing land, which is now used communally. A motive behind this suggestion has led to suspicions on part of young generation, who fear losing out if partitioning is implemented. In the literature, similar cases of benefits being captured by local elites have been reported by McKean (2000). It was further demonstrated by attempts of wealthy pastoralists to purchasing areas of Mkata national ranch offered for sale by National Ranching Company (NARCO). The pastoralists bidding as individuals lost, but those who organised into a pastoral association, succeeded to buy a ranching block.

At present the pastoral system in Mkata plains is highly commercialized, whereby individual pastoralists have ultimate objective of accumulating cattle for sale in cattle markets in nearby urban centres. This study established that most pastoral youths are engaged in cattle marketing. Whereas, some of the wealthier pastoralists have diversified to

other urban based economic activities, but they are still attached to their communal rangelands where they are accumulating large herds of cattle for commercial purposes. Shem (2004) referred to this class of pastoralists as absentee large herd owners. This group is well connected in governmental circles and has been able to influence governmental decisions on their favour, raising discontents among fellow pastoralists. Agrawal (2002) asserts that by specializing in different occupations individuals form alternative arenas for exchange and generation of prestige thus undermining the importance of local institutions.

## **(ii) Ngorongoro Conservation Area**

Table 27 show factors influencing strength of the local institutions governing use of communal grazing lands in Ngorongoro area. The model predicted correctly at 90.4% and significantly at ( $p < 0.05$ ). The -2 Log Likelihood = 115.10, suggest that there is high fit between the model and data. The Nagelkerke R squared = 0.754 implying that 75.0% of observed variation in the institutional strength is explained by independent variables in the model.

Results in Table 27 show that five out of eight factors examined have significant influence on likelihood of local institutions to bring about collective management of rangelands in NCA. Furthermore, out of eight factors four have positive effects. While other four factors has negative influence on the likelihood of cooperating in management of common grazing land.

**Table 27: Factors influencing strength of local institutions for management of communal grazing lands in Ngorongoro Conservation Area**

| Variables in the equation            | Estimates |       |        |    |       |                |
|--------------------------------------|-----------|-------|--------|----|-------|----------------|
|                                      | $\beta$   | S.E.  | Wald   | df | Sig.  | Exp( $\beta$ ) |
| Distance to market                   | +3.044    | .498  | 37.359 | 1  | .000* | 20.992         |
| Family size                          | -1.123    | .627  | 3.207  | 1  | .073  | .325           |
| Wealth differentiation               | -1.055    | .267  | 15.578 | 1  | .000* | .348           |
| Migration level                      | -0.999    | .718  | 1.939  | 1  | .164  | .368           |
| Livestock ownership                  | +1.111    | .451  | 6.063  | 1  | .014* | 3.036          |
| Autonomy in decision making          | +1.718    | .667  | 6.644  | 1  | .010  | 5.575          |
| Perceived degradation of grazingland | +3.083    | .761  | 16.430 | 1  | .000* | 21.826         |
| Restrictive policies                 | -0.268    | .865  | .096   | 1  | .757  | .765           |
| Constant                             | -18.229   | 4.193 | 18.905 | 1  | .000  | .000           |

**Model summary**

- Overall percentage = 90.4%
- Model Chi. Square = 190.392,  $p(0 < 0.05)$
- -2 Log Likelihood = 115.10
- Nagelkerke R squared = 0.754

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\* = Significant at  $p < 0.05$

Factors with positive influence include perceived degradation of rangelands, livestock ownership, autonomy in decision making and distance to market; while factors with negative influence are household wealth heterogeneity, migration level, family size and restrictive policies. The highly significant positive relationship ( $P < 0.05$ ) between perceived rangeland degradation and cooperation in the management of common grazing lands can be



explained by the fact that supply of key pastoral resources in arid areas (water and pastures) is unpredictable in space and time.

In order to survive under such conditions the pastoralists in dry areas develop institutions that govern sharing of resources and co-ordinate mobility between different resource niches. A number of studies have reported emergence of local institutions developed by pastoralists for cooperative management of common rangelands, for example Scoones (1996) and McCarthy *et al.* (1999). In this study an increase in perceived environment risk expressed as perceived range degradation was estimated to increase the likelihood of co-operation in the management of common rangelands in Ngorongoro area by a factor of 21.8 times. Suggesting that the pastoralists in Ngorongoro area are subjected to high environmental risks.

Increase in number of people owning cattle can significantly ( $P < 0.05$ ) increase the likelihood of cooperation in management commons rangelands by a factor of times 3.036. The explanation for these results is the fact that the pastoral system in Ngorongoro area is under stress, where most of pastoralists have run into destitution through loss of livestock. In the context of Ngorongoro area the increase in number of people owning cattle for most pastoralists means restocking and shift from destitution to returning to pastoral economy. This also, has implication on enhanced livelihoods and increase in household food security. On the other hand, as the household restock, it is able to regain lost social nets, which in most cases are based on cattle exchange systems. An increase in household herd size will therefore motivate more livestock owners to cooperate in sustainable management of communal grazing land. For example rejoining the social networks system will provide incentives to individual pastoralists to adhere to local institutions for the management of communal grazing lands. On the other hand because pastoralists in Ngorongoro are living in

an ecologically fragile area with high environmental variability and limited opportunities to exit from the area, they have high incentives to cooperate for sustainable management of their ephemeral resource stock. Dietz *et al*, (2002) reported on the importance of incentives in realization of cooperative action and overcoming free-rider syndrome.

The autonomy of local community setting own rules significantly ( $P < 0.05$ ) increase the strength of local institutions for management of communal grazing land in NCA by a factor of times 5.575. This implies that sustainability of local institutions in Ngorongoro area is contingent to its isolation, firstly by its remote location and secondly by conservation policies which to some extent limits the freedom of association. In this way the local communities have been left on their own to craft their own local institutions. This observation is very pertinent in the context of institutional structures operating in Ngorongoro, for example Shivji and Kapinga (1998) observed an overlap of responsibilities between Ngorongoro Conservation Area and Ngorongoro District Council, the two agencies have jurisdictions over Ngorongoro area but their mandates are not clearly defined. In particular, the mandate of these agencies at local community level is not well understood. Whereas NCAA has been vested with overarching powers on administrative matters and resource management in the area, but has no political mandates in the area. Under such institutional clash local communities have resorted to local institutions for political mobilization and management of local resources.

There is a general agreement among researchers and practitioners for local communities to craft their own institutions for the management of natural resources for example McKean (2000) and Ascher (2001). According to Ostrom (1993) this is likely to provide incentives for sustainable management of resources, because local institutions are better at providing

rules relating to access, harvest and management forum. Similarly she asserts that local institutions can respond quickly and cheaply to change on resource condition.

The results in Ngorongoro suggests that when left on their own local communities are able to set collective rules that govern the use of local resources, in this case common grazing lands. This is because whenever resources are scarce under increasing demand, resources users will organize for collective management. In Ngorongoro area Maasai pastoralists face high seasonality in availability of pasture; on the other hand they are subjected to restrictive policies imposed by the conservation authority. In isolation, local communities in NCA were able to craft strong local institutions for governing the use of communal grazing lands. In the literature a number of workers has reported the ability of local communities when left on their own, to craft institutions to govern local commons for example Ostrom (1990, 1992), McKean (1995).

Increasing distance to the market significantly ( $p < 0.05$ ) increase the strength of local institutions for management of communal grazing land by a factor of 20.99. In this case distance to market is used as a proxy of local community articulation on market NCA in general is remotely located from market infrastructures. A plausible explanation for this result is the fact that Ngorongoro area is a typical pastoral area lacking most of economic infrastructures with very poor roads. For this reason the local communities are isolated from main economic systems. Therefore the only viable economic activity for local communities is the livestock based pastoral economy, which aims at attaining household subsistence level food requirements. The local population has no any readily available alternative for provisioning to their livelihoods. This situation has created the incentives to device the institutions for sustainable management of their resources including communal grazing lands. The observation in Ngorongoro is supported by Young (1999), who assert that

integrating with markets may lead to adverse impact on the management of common-pool resources.

Increase in family size has a strong negative effect ( $\beta = -1.123$ ) on the strength of local institutions governing use of communal grazing land in Ngorongoro area. This is probably due to the fact that as family members increase, some members particularly the youth migrate to urban areas. This in turn leads to weakening of local institutions for the management of common grazing lands, because the youth plays a key role in monitoring and enforcing rules for using grazing lands. In the literature, it is enounced that excessively high populations exert high pressure on definite resource stocks, shared among users. This may ultimately lead to breakdown of local institutions (McKean, 1995).

The rationale of this finding is that as family size in Ngorongoro area increase, may lead to a reduction of per capital livestock units available to family members, and forcing the household to start cultivation. In this way local institutions, which manage grazing land have to be re-arranged to allow community members to engage in agro-pastoralism. On the other hand some immigrants in Ngorongoro area get assimilated in pastoral families. These immigrants contribute substantially on increase in family size as well as population growth. These factors leads to transforming the pastoral to agro-pastoral land use systems.

The heterogeneity in household wealth levels has a significant negative influence ( $P < 0.05$ ) on strength of institutions for management of common grazing lands. This suggests that as the household income level increases, the households are able to diversify to other income generating activities. In this way the richer households have alternative sources of income other than the commons to obtaining their livelihoods. Furthermore, some wealthier households in Ngorongoro area are engaged in commercial cattle marketing. As a result

they have high demand for resources from common grazing lands. In the process the wealthier pastoralists are likely to undermine the local institutions for the management of communal grazing lands, and leading to weakening of these institutions. A number of researchers reported similar results, for example Varughese and Ostrom (1998) who reported mixed influence of household wealth heterogeneities on local institutions. Dietz *et al.* (2002) reported the importance of homogeneity in goals in overcoming free-riding effects. In this study increase in household wealth differentiation in Ngorongoro area increase the likelihood of weakening the local institution for management of common grazing lands by a factor of 0.348.

Restrictive conservation policies also have a strong negative effect ( $\beta = - 0.268$ ) on the strength of local institutions governing the use of communal grazing lands with a Wald value = 0.096. The restrictions are statutory provisions enforced through NCAA regulations, which prohibit cultivation all over the NCA area and restrict grazing in some areas. These restrictions were imposed without sufficient scientific basis and in total disregards of local practices and indigenous knowledge. A number of researchers have since proved that the restrictions were detrimental to the pastoral production system for example, Runyoro (1994); Runyoro and Velded (1996), Perkin (1995); Homewood and Rodgers (1993). A case in point is restriction on burning as range management tool and restrictions on traditional grazing system. These have led to the decline in rangeland health and productivity, thus a loss in sustainability of rangeland for livestock and wildlife grazing. Increasing number of scientists are of the view that restrictive policies in Ngorongoro area have led to decline in pastoral economy weakening the local institutions for the management of communal grazing lands, thus threatening future sustainability of the ecosystem, for example in MacCarthy *et al.* (1999) and Perkin (1993).

The regression model results for the two study areas show high significance of some factors and high correlation coefficients for all factors tested. This indicates that hypothesis 1 is supported by the empirical data.

### **4.3 Resources - use Conflicts in Mkata plains and Ngorongoro Conservation Area**

#### **4.3.1 Resource-use conflicts in Mkata plains**

Resource - use conflicts in Mkata plains are centred on interactions between immigrant pastoralists and other land users, in particular the interactions between pastoralists and smallholder farmers. Table 28 presents occurrence of resource-use conflicts in the study villages in Mkata plains.

The results indicate that resource-use conflicts are highly prevalent in all the study villages, whereby 72.3% of respondents acknowledged presence of resource-use conflicts. When examined at local level all study villages, with exception of Msowero, reported presence of resource-use conflicts. Whereas in Msowero village only 56.5% of respondents said that there is resource-use conflicts and 43.5% respondents reported no resource-use conflicts. Mixed results in Msowero village could be attributable to the fact that the village government had recently formed a conflict resolution committee to mediate resource-use conflicts between the farmers and the pastoralists. The committee has provided a forum for farmers to negotiate with herders; leading to negotiated agreements on how to utilize multiple-use resources in the village .In particular, the joint committee – comprising of herders and farmers, has allocated areas to be used by pastoralists and farmers along Msowero river, which in the past has been an underlying cause for intractable conflicts in the village.

**Table 28: Responses distribution on occurrence of resource-use conflicts by study villages in Mkata plains**

| <b>Presence of<br/>resource –use<br/>conflicts</b> | <b>Frequency of respondents</b> |                              |                             |                            | <b>Total<br/>(n = 267)</b> |
|--|---------------------------------|------------------------------|-----------------------------|----------------------------|----------------------------|
|  | <b>Twatwatwa<br/>(n= 37)</b>    | <b>Mabwegere<br/>(n= 30)</b> | <b>Msowero<br/>(n= 170)</b> | <b>Mbwade<br/>(n = 30)</b> |                            |
| Yes  | 37 (100.0)                      | 30 (100.0)                   | 96(56.5)                    | 30 (100.0)                 | 193 (72.3)                 |
| No   | NA                              | NA                           | 74(43.5)                    | NA                         | NA                         |

- Number in brackets are percentages

Key:- NA = No answer

All respondents (100%) in Mbwade village reported occurrence of resource-use conflicts. This is probably due to the high herd mobility practised by pastoralists, which sometimes leads to livestock trespassing into crop farms leading to conflicts with farmers. All pastoral villages - Twatwatwa and Mabwegere - reported existence of resource-use conflicts with farmers. This is mostly due to boundary disputes that arose following titling of pastoralists' villages, where farmers challenge the established formal village boundaries. Another reason for conflicts might be frequent trespass of livestock into crop farms.

Table 29 show Focused Discussion Groups' results on types and magnitude of resource-use conflicts existing in the study villages in Mkata plains.

**Table 29: Types and magnitudes of resource-use conflicts by study villages in Mkata plains**

| Conflict types                    | Score and ranking of conflict intensity |           |         |        |       | Rank |
|-----------------------------------|---|-----------|---------|--------|-------|------|
|                                   | Twatwatwa                               | Mabwegere | Msowero | Mbwade | Score |      |
| Inter-ethnic conflicts            | √√√                                     | √√√√      | NA      | √      | 8     | 1    |
| Village vs Village conflicts      | √√√                                     | √√√√      | NA      | NA     | 7     | 2    |
| Village vs state agents conflicts | √√√                                     | √√        | NA      | NA     | 5     | 3    |
| Intra-ethnic group conflict       |   | √         | NA      | NA     | 1     | 4    |

Key: - Scores, √√√√ - very high, √√√ - high, √√ - moderate, √ - low

-NA = Not applicable

The results indicate that resource-use conflicts occurring in the study area can be delineated into four main types including inter-ethnic conflicts, village versus village conflicts, village versus state agency conflicts and intra-ethnic conflicts. When ordered in terms of their importance; inter-ethnic resource use conflicts ranked highest, followed by village to village conflicts, then village versus state agency and lastly the intra-ethnic conflicts. High inter-ethnic conflicts were reported from the pastoral villages. This is because residents in pastoral villages are mainly Maasai pastoralists who are collectively blamed for incidences of crop damages by cattle in neighbouring farmers' villages, leading to conflicts between farmers and herders. The situation periodically flared up into violent clashes, and the most serious clashes occurred in December, 2000. This involved pastoralists from Twatwatwa village and neighbouring Rudewa, Peapea and Mbuyuni farming villages (Figure, 38).



Conflicts arising from crop damages by livestock, eventually assumes ethnic dimensions. This is partly due to competing land use systems, i.e. pastoralism and subsistence farming, whereby Maasai have largely specialized on pastoralism. In this way competitions for shrinking resource base get polarized to ethnic competitions, pitting Maasai pastoralists against other ethnic groups.

A relatively low magnitude and absence of resource-use conflicts were reported in Mbwade and Msowero villages, which are shared, by both pastoralists and farmers (Table, 29). The fact that in agro-pastoral villages both farmers and pastoralists are able to communicate; and device institutions to resolve their conflicts; could be a reason for low conflict level at Mbwade. Furthermore, in agro-pastoral villages the pastoralists are integrated in village's government administration, and they become more accountable to formal structures of governance, which are dominated by farmers.

The results further shows that no inter-ethnic conflicts reported in Msowero village, an agro-pastoral village which is multi-ethnic including Barabaig, Maasai pastoralists, Sukuma agro-pastoralists, and a number of farming ethnic groups. The Barabaig were reported to have first settled in the village in early 1950s. The key informants reported that the Barabaig pastoralists have cordial relationship with farmers and they tend to compensate crop damages caused by their cattle. This is opposite to aggressive behaviour expressed by Maasai herders who come to graze and water their cattle in Msowero from neighbouring pastoral villages. The reported differential behaviour among Maasai and Barabaig pastoralists is attributable to a number of factors. Firstly herding duties among the Maasai is carried out by youth (warrior age-set) who are not immediate owners of cattle they are herding.

Secondly, there is a general contempt of Maasai towards cultivators and worrisome behaviour among Maasai warriors. On the other hand adults, both women and men, carry out herding duties among the Barbaigs. Being the immediate owners of livestock, the adults bear the responsibility of crop damages inflicted by their livestock. A study by Mbwiroti (2002) in Usungu valley argued that Maasai pastoralists who were holding more secure tenurial rights to resources were reportedly more co-operative and peaceful, in opposition to recently arrived Sukuma agro - pastoralists. While a study by Brehony *et al.* (2001) reported that the Barbaig were least cooperative with farmers in Kilombero district.

Thirdly, low conflict levels in Msowero may be due to the fact that a full functional conflict resolution committee has been formed in the village, providing a forum for both pastoralists and crop cultivators to resolving resource-use conflicts. The key informants in the village reported that the conflict resolution committee comprise of elders from pastoral ethnic groups, women representatives and village government leaders. It was further revealed that the most influential local elites had endorsed formation of conflict resolution committee.

Low conflict intensities and a full functional conflict resolution committee were also reported in Mbwaide village, which also comprise of a multi-ethnic community. These findings conflict with the received narratives that tend to associate conflicts with ethnic heterogeneity. Implying that resource - use conflicts are mostly related to resource scarcity and access rights held by a respective group, rather than the ethnicity of groups involved in the conflicts. This implies that the conflict process and its outcomes are contextual, and depends on institutional constellation operating in a particular area. This fact suggests that successful resolution of resource-use conflicts can be best achieved through institutional innovations that combine both local and formal institutions.



**Figure 38: Part of farmers' village burnt down during 2000 farmers-herders' clashes  
at Rudewa- Mbuyuni village in Mkata plains**

Inter-village conflicts were reported in two pastoral villages (Twatwatwa and Mabwegere), which involve boundary disputes between the pastoral villages and the neighbouring farmers' villages (Table, 29). The pastoralists have formal group titles to their village lands, while farmers have customary claim on their communal village lands which appear to overlap with lands allocated to the pastoralists. The farmers are challenging the pastoral village formal boundaries indicated on the title deeds issued by the Commissioner of Lands. Furthermore, a process that led to titling of pastoral villages was claimed to be not transparent, which led farmers to challenge the legitimacy of the land title deeds issued to the pastoralists. The disputed border areas in most cases are the river valleys and wetlands, which are key resources to both pastoralists and farmers during dry seasons. These areas are utilised by farmers to produce irrigated crops during the dry season, while the pastoralists also depend on these valleys as dry season grazing areas.

Village versus state agencies resource-use conflicts were reported in Mabwegere and Twatwatwa villages (Table, 29). A land dispute was reported between Mkata state ranch (under the National Ranching Corporation - NARCO) which was claiming about 4000 ha which are legally occupied by Twatwatwa village, which holds a formal title deed for the disputed land. During the time of the study, NARCO announced to sub-leasing to private investors part of the ranch areas, including the disputed land in Twatwatwa village. This decision has raised a lot of questions, because it was not clear if NARCO is legally allowed to sub-lease land to private investors. Furthermore, the part of ranch offered for privatization included a wetland located in Tindiga/Luhoza area which has been utilized as an important dry season grazing area by more than 80% of the pastoral herd in Kilosa district. Moreover, when the wetland was annexed into a state ranch during early 1970s, it was already occupied by the pastoralists who continued to utilize these areas until when they were privatised. A decision to privatize them was made at NARCO head quarters,

without any participation of regional and district governments. As such local demands for land in the area were never taken into consideration.

Moreover, the main motive behind sub-leasing the portion of the ranch area was to enable bureaucratic elite' to access land, mainly for speculative purposes. It is important to note that during annexation by the government and the subsequent privatization of these areas no regard was accorded to the pastoralists residing there. At the time of the study, the pastoral community resident on the wetland area was on its second generation. These results demonstrate ignorance of pastoral production systems by state officials, who consider pastoralism to be wasteful and need to be transformed by sedentarisation. Privatisation of wetland areas in Mkata ranch has in effect removed an important dry season grazing areas for the entire pastoral communities residing in Mkata plain. This has an implication for escalation of resource-use conflicts between the pastoralists and farmers in the area.

Another conflict reported in Mabwegere village, involves the village and the District Land Planning Department. The latter does not have any records of the title deed issued to the village by the Land Commissioner. This discrepancy probably arose from the policy flaws that laden land administration and allocation in Tanzania during the 1980s. In the 1980s, the districts as well as regional development committees had mandates to allocate village lands. Hence, land titling in Mabwegere and Twatwatwa villages were processed through the regional development committees. Furthermore, the pastoral schemes in Kilosa district introduced during early 1960s through the District Livestock Development Department, which designated the present day pastoral villages. This program was implemented without considering other land uses in the area. Moreover, when the pastoral villages were first designated during 1960s, then grazing lands were abundant, human and livestock population was relatively low. Therefore the demand for land was not so intense. Ever since

there has been no comprehensive resource inventories that had been undertaken in pastoral villages in Mkata plains to ascertain the rangeland carrying capacities. Until the time of this study Kilosa district authorities were demanding all pastoralists to move to villages designated for pastoralists.

Similarly intra-ethnic group resource - use conflict was reported at Twatwatwa village. Discussions with key informants revealed that as a measure to arrest range degradation in the village, there is a general drive to partition the village lands into individual landholdings. The village elites, who are also large herd owners, advocate the idea. However, the proposal is being challenged by the young generation who are worried to lose if village grazing land is partitioned, the interests of village elites will most probably prevail. Then the land will be partitioned according livestock holdings in favour of large herd owners. Most apparently, the motives of those advocating partitioning of village common grazing land is for land speculation purposes and attaining immovable asset that can be used as collateral for bank transactions in line with the emerging land market in Tanzania.

This covert intra-ethnic group conflict has assumed more or less inter-generational dimensions. The worries of the younger generation in Mkata plains cannot be dismissed as baseless. Mwinihoke and Kajembe (2001) reported similar inter-generational resource-use conflicts in Handeni district, Tanga region. Ostrom *et al.* (2002) reported benefit capture by local elite's following changes in institutions governing use of common pool resources. Similar losses had been reported in Kenya following partitioning of communal grazing lands into group ranches (Galaty, 1993, 1994; Ruttan, 1995).

#### **4.3.2 Causes of resource - use conflicts in Mkata plains**

The causes of resource - use conflicts involving Maasai pastoralists and farmers identified by respondents in Mkata plains are presented in Table 30. The main cause of farmer-herder conflicts identified by a majority of respondents (70.4%) was crop damages by livestock. Crop damages occur when livestock trespass into crop fields in villages occupied by farmers. Trespassing in most cases occur accidentally owing to difficulties of controlling large herds of cattle, but in some instances the Maasai youth were reported to deliberately drive cattle in crop farms in contempt of farmers. This was associated to warring behaviour among Maasai youth which was reported by 34.5% of respondents.

Trespassing was also attributed to a general tendency of Maasai pastoralists to disregard village boundaries which was reported by 33.7% of respondents. This can partly be due to ignorance on the actual location of village boundaries, or due to patchyness of grazing resources whereby certain key resource such as water or dry season grazing areas may be located in farmer villages. Another important cause of conflicts mentioned by 67.0% respondents was reluctance of government officials to take action on time to diffuse tensions between farmers and herders. Ineptness of government officials could be attributed to lack of conflict resolution skills among government officials, but could also be associated with corrupt practices. Allegations of pastoralists corrupting government officials were mentioned by 44.9% of respondents. The study revealed that both farmers and herders hold different views on causes of conflicts and their escalations.

**Table 30: Causes of resource-use conflicts in study villages in Mkata plains**

| <b>Cause for resource-use conflict</b>  | <b>Number of respondents<br/>(n= 267)</b> |          |             |
|---|---|----------|-------------|
|   | <b>Number</b>                             | <b>%</b> | <b>Rank</b> |
| Crop damages by livestock   | 187                                       | 70.4     | 1           |
| Government officials reluctant to take action on time to diffuse the tensions | 179                                       | 67.0     | 2           |
| Excessively large herds of cattle   | 160                                       | 59.9     | 3           |
| Pastoralist corrupting government officials                                   | 120                                       | 44.9     | 4           |
| Farmers forcibly confiscating cattle  | 108                                       | 40.4     | 5           |
| Warring behaviour of herding warriors   | 92  | 34.5     | 6           |
| Herders violating boundaries  | 90  | 33.7     | 7           |
| Farmers disregarding village boundaries                                       | 49  | 24.7     | 9           |
| Hatred between pastoralists and farmers                                       | 64  | 23.9     | 10          |
| Heavy penalties demanded by farmers for crop damage                           | 51  | 19.1     | 11          |
| Government officials favouring farmers  | 70  | 26.2     | 8           |

- The percentage total up to more than 100 because of multiple responses

It is argued that pastoralists owning large herds of cattle frequently trespass in farmer's villages in search of pastures, crop residues and water. In the process they increase chances of crop damages and conflicts with farmers. On part of pastoralists they claimed that a tendency of farmers to confiscate cattle suspected to cause crop damages flare up resource - use conflicts. A fairly high number (40.4%) of respondents reported confiscation of cattle by farmers as main source of conflicts. This response indicates that the practice was accorded high importance by most pastoralists in Mkata plains. Confiscation of cattle was reported to trigger off violent clashes between farmers and herders in December, 2000. The Kilosa district administration has since banned confiscation of cattle, in the event of crop damages only cattle brands have to be recorded then reported to government authorities.



Furthermore, pastoralists claim that farmers tend to over charge when there are crop damages inflicted by livestock, compared to the real value of crop losses. Over charging was reported by 19.1% of respondents. While 26.2% respondents mentioned that government officials tend to favour farmers in delivering adjudication on farmer-herder conflicts.

During Focused Group Discussions in pastoral villages it was claimed that some farmers deliberately grow crops in the cattle routes and grazing areas in order to reap compensation money from the herders. In some instances cultivators charge fees to allow the herders to graze on crop residues, but there is no elaborate institutional mechanism to enforce these agreements. Kilosa district administration has since banned grazing on crop residues. Some pastoralists were of the opinion that crop damage is not, in most cases a deliberate action, but in practice when herding large herds of livestock some animals can accidentally stray into crop fields.

Again, herding activity especially near the settlements is carried out by young boys, who might not be attentive in controlling animals, which end up trespassing into the farms. Discussions with key informants at Twatwatwa village disclosed that some Maasai youth are deliberately grazing on crop fields in order to gain social prestige among their peers. Preponderance for delinquent behaviour embedded in the Maasai culture, condones youth aggression towards other ethnic groups. Such behaviour among youth directly or indirectly contributed to protracted conflicts in the area. Nonetheless, schooling which promotes cultural integration and changes in social values among Maasai, apparently will contribute to change such warring behaviour. During this study it was observed that young Maasai boys, who are attending school, have many age - met friends from farming ethnic

groups, with whom they share very cordial relationship. Such relationship was not apparent amongst young men, who had never attended school.

Furthermore, Maasai young men who have had opportunity to attend training seminars and other courses were more co-operative towards outsiders. This observation suggests that improved contacts and communications between Maasai and neighbouring farming communities will improve social integration among the two communities, thus providing avenues for peaceful resolution of resource-use conflicts. On the other hand farmers argue that arrogance of Maasai pastoralists and reluctance to compensate crop damage as a one of main cause of resource-use conflicts. Furthermore, they argued that government agents, particularly the police and the judiciary do not seem to take actions whenever cases of crop damages are reported to them. This tendency points a finger to corruption. The courts of law seem to take long time to settle cases, while fines and or compensations ruled are too low to deter the offenders. The events which led to December 2000 killings, have led to a general feeling that government agencies have failed on their duties to discharge justice. Thus the government bodies lost legitimacy on the eyes of the community who in turn decided to take self-action as a means of seeking justice. This was a triggering factor, which invoked the old sentiments between Maasai and Sagara/Kaguru. Ethnic identities and symbolism were used to draw the battle lines. Informants from police force blamed the politicians for politicizing the issue and exploiting the situation for political gains.

The causes of resource-use conflicts identified by respondents in this study have differential impacts on outcomes of conflict process. As such any measures taken to resolve these conflicts must also address the underlying causes to these conflicts. Whereby some causes have a causal effect relationship with conflict outcomes, these are referred to as proximate causes or determinant factors. While others factors have indirect effects.

#### 4.3.2.1 Determinants of resource-use conflicts in Mkata plains

Table 31 shows key factors contributing to resource-use conflicts in the study area in Mkata plains. Contribution of different variables to likelihood of resource-use conflict was analysed using a logistic model. The model parameters predicted correctly at 92.2% and significantly at  $p < 0.05$ . The -2 Log Likelihood = 26.405 indicating a high fit between the model data. Whereas the Nagelkerke R square = 0.846 suggesting that the variables in the model accounts to about 84.6 % of the observed variation in the variables under study.

The results show that the increasing herd size of individual pastoralists contributed significantly ( $P < 0.05$ ) on the likelihood of conflicts with farmers by a factor of 7.197. A plausible explanation of this is that when a household increase the number of livestock, demand for grazing land also increases.

**Table 31: Determinant factors of resources- use conflicts in Mkata plains**

| Variables in equation     | $\beta$       | S.E.         | Wald          | df       | Sig.        | Exp( $\beta$ ) |
|---------------------------|---------------|--------------|---------------|----------|-------------|----------------|
| Herd size                 | 4.276         | 1.201        | 12.673        | 1        | .000*       | 7.197          |
| Market integration        | .958          | .541         | 3.133         | 1        | .017*       | 2.607          |
| State intervention        | 1.465         | 1.187        | 1.522         | 1        | .217        | 4.326          |
| Wealth differentiation    | .812          | .532         | 2.330         | 1        | .127        | 2.253          |
| Local leadership strength | -1.401        | .762         | 3.379         | 1        | .046*       | .246           |
| Education level           | -1.215        | .619         | 3.852         | 1        | .050        | .297           |
| Migration                 | -1.734        | 1.261        | 1.891         | 1        | .169        | .176           |
| <b>Constant</b>           | <b>14.469</b> | <b>4.153</b> | <b>12.140</b> | <b>1</b> | <b>.000</b> | <b>.000</b>    |

#### Model summary

- Overall percentage = 92.20%
- Model Chi – Square = 61.098
- 2 log likelihood = 26.405
- Nagelkerke R squared = 0.846

\* = Significant at  $p < 0.05$  level

In turn this necessitate high herd mobility which increase the likelihood to trespass into farmers villages and causing crop damages which leads to conflicts with farmers. On the other hand increase in the herd size is associated with decrease in herding efficiency, where herders fail to control sufficiently the animals. This has an implication on institutionalised Maasai culture, which prescribes herding duties to young boys and youth who might not be careful in controlling livestock grazing in farmers' villages leading to crop damages. Moreover, trespass of livestock into a cultivated plot belonging to a fellow Maasai is prohibited by curse institution *Olallili*. But there is no similar institutional mechanism which applies to none Maasai. Baidelman (1960) reported disdainment of farmers' by Maasai youth who in some instances were reported to deliberately graze on crops. Similar incidences were reported during this study.

Increase in market integration can significantly ( $P < 0.05$ ) increase the likelihood of resource–use conflicts by a factor of 2.607. This can be explained by the observation that in responding to settled life and high land value the pastoralists in Mkata plains had mobilised to obtain formal lease holds to their village land as a measure of attaining tenure security. However, this measure has led into protracted boundary disputes with neighbouring farmers villages, who have customary claims to disputed areas. Furthermore, recent economic liberalisation policies implemented in the area have made possible for rich local Maasai to buy previously state owned sisal estates and ranches. This has triggered of resentments from farmers who were previous workers of these farms, now facing increasing land shortages. Furthermore, covert resentments were expressed by fellow pastoralists who used to graze on the recently privatized grazing areas. Furthermore, an increasing market for horticultural crops has led to a closure of wetland areas located in farmers' villages, which were previously utilized as open access dry season grazing areas by the pastoralists. This has in turn led to increased competition for shrinking wetland areas and escalation in resource-use

conflicts. Furthermore, pastoralists in Mkata plains previously had free access to crop residues in farms after harvest. However, increasing commoditization in the area has led to commercialization of crop residues. Pastoralists are required to pay for grazing rights in order to graze on crop residues. However, there is no elaborated institutional mechanism to control access to crop farms by pastoralists. The lack of controlling institutions resulted into cheating on grazing-right agreements, which in most cases have led to crop damages and violent clashes between farmers' and pastoralists. The Kilosa district local government has since imposed a ban on grazing rights transactions involving crop residues.

Intervention by state government is positively related to resource- use conflicts, with a positive regression coefficient ( $\beta = 1.465$ ) and a Wald ratio of 1.522. A plausible explanation for this is that government policies aimed at solving certain problems may generate other unintended negative externalities. A case in point in Mkata plains is that formal titling of pastoral villages, which was intended to providing security of tenure to pastoral villages, had led to protracted boundary disputes with neighbouring farmers' villages and Mkata state ranch. On the other hand when the pastoral settlements in Mkata plains were designated no mechanism put in place to limit the number of animals that could be grazed in these villages. This has led to varying levels of overgrazing and changes in species composition forcing pastoralists to graze in farmers' villages leading to conflicts with farmers. Bush and Opp (2000) assert that most interventions by state governments which lead to change in access to resources may lead to escalations in resource-use conflicts because in most cases the interventions are not community focused. This is best demonstrated by recent privatisation of state owned sisal estates and ranches in Mkata plains that did not take into consideration the serious land scarcity faced by both herders and smallholder farmers in the area. Increase in household wealth differentiation although is not significant (at  $p < 0.05$ ) has a strong relationship to resource-use conflicts with a

positive regression coefficient ( $\beta = 0.8129$ ) and a Wald ratio of 2.33. This implies that increasing household wealth differentiation is likely to increase resource-use conflicts in Mkata plains. This can be explained by recent appropriation by rich pastoralists, part of lands which have previously been shared by both pastoralists and farmers as common pool resources. Wealthier pastoralists at Twatwatwa village are also attempting to partition the village communal grazing, in an anticipation of obtaining a large share of land if this proposal gets community blessing. This measure has led to intra-ethnic discontents and is opposed by younger generation who fear to loose out to large herd owners if partitioning is carried out. Furthermore, most rich pastoralists own large herds of cattle that are more likely to trespassing into farms, but the blame of crop damage is shared collectively by all Maasai pastoralists. This is generating some resentments to rich herd owners by fellow pastoralists.

Table 31 shows that strong local leadership contributes significantly ( $P < 0.05$ ) on the likelihood of reducing resource-use conflicts by a factor of 0.246. Attributes of strong local leadership include making binding decisions at a local level and minimum recourse to higher authorities. It has long been realized that local resource users have the ability to make decisions on how to govern local resources and mitigate resource-use conflicts (McKean *and* Ostrom 1995). It was observed in this study that effective conflict resolution committees were formed in agro-pastoral villages - Msowero and Mbwade – this was partly attributed to strong leadership. At Msowero village the village chairperson belong to a group of influential highly respected elders who are indigenous to the area with customary claim to the land, who has customary mandates to conduct traditional rituals in the area. Whereas in Mbwade village, which is dominated by immigrant ethnic groups and former plantations and ranch workers they have formed an effective conflict resolution committee. This comprises of respected farmers and traditional leaders from Maasai community. The committee is making decisions that are respected by both farmers and herders.

Increase in education level is strongly related to reduction in resource-use conflicts with a regression coefficient of  $\beta = -1.215$ , and a Wald ratio of 3.852. This is attributable to a fact that by attending school, pastoral children get an opportunity to share culture with children from farmers' ethnic groups and change the value systems. The pastoralists in Mkata plains to some extent operate an isolated economic system; therefore children raised under this system who miss an opportunity to attend school will tend to be ignorant about social values of other ethnic groups. As such the cognitive as well as normative structures of such children will be framed along the traditional system which does not accommodate other cultures, and inculcate a sense of ethnic superiority. They may also fail to develop a civic culture expected in a modern state, and respect to formal structures of governance. This may exacerbate tendencies of conflicts based on symbolism and cultural identities. Maiese (2003) observes that conflicts over identity arises wherever group members feel that their sense of self esteem have been denied legitimacy and respect. The author further asserts that identity conflicts tend to be aggressive and tend to persist. This observation is particularly pertinent to East African pastoral groups including Maasai who have institutionalized violence behaviour and armed warrior age-grades. It was observed during this study that pastoral children who are attending schools develop cordial relationship with children from other ethnic groups.

Migration has a negative relationship to resource-use conflicts in Mkata plains, with a regression coefficient of  $\beta = -1.734$  and a Wald ration of 1.891. This suggests that increasing migration is likely to reduce resource use conflicts. This is based on the observation than large herd owners engage in long range out migration from the area. This practise tends to easy pressure on shrinking resources, as such minimising intra ethnic conflicts within pastoral communities. The practise is also likely to reduce the rates of crop damages by livestock in farmers' villages, which in most cases involve large herd owners.

Furthermore, large herd owners tend to split their cattle herd and keep their livestock at different localities. According to Herlocker (1999), the pastoralists have for generations practised herd mobility and herd splitting as a measure against environmental risks as well as resource-use conflicts. The regression model results for two study sites show high significance level of some factors and high correlation coefficient levels for all factors, this suggests that the empirical data supports hypothesis 2 of this study.

#### **4.3.2.2 Management of resource-use conflict in Mkata plains**

The Kilosa district local government had enacted Kilosa by-law No. 1 of 2002, which provides for the establishment of conflict resolution committees (CRC) at village level. The committees are intended to provide fora through which the pastoralists and farmers can meet and resolve resource-use conflicts. The committees were formed in all study villages with exception of Mabwegere village, which had failed to form the committee with the neighbouring villages, which are involved in border disputes.

During the Focused group discussions, pastoralists at Twatwatwa village rated the performance of the CRC high, and they informed that the committee has minimized the farmer-pastoralists resource-use conflicts. The pastoralists reported strained communication with the farmers, and they emphasised a need to amend the strained relationships. However, on part of farmers from Rudewa – Buyuni village (a site of December 2000 Killings), the conflict resolution committee was reported to progressively becoming defunct. The reason given was that the counterparts from the pastoral community were not attending the committee sittings. The farmers were of the opinion that the committee members from the pastoral community were reluctant to take action against the offenders from their pastoral community. The shortcomings can be attributed to difficulty of communication between committee members. This arises from the fact that Twatwatwa is a very large village



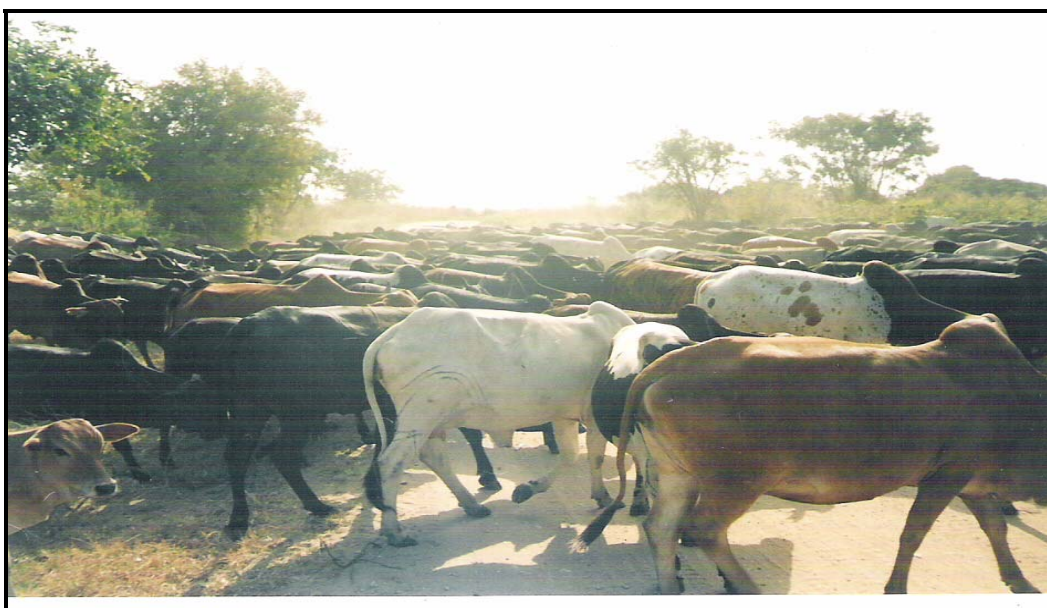
spanning over 16 km with four sub villages dispersed all over the area, with no access roads. The village offices for the two villages are 30 km apart. For this reason it is difficult for pastoralists to effectively contact their members. The efficiency of conflict resolution committee will be improved in the village if each sub-village form a committee with neighbouring farmers' village.

In Msowero village a full functional committee was reported which comprises of both farmers and resident pastoralists. The committee has achieved the following: registration of the resident pastoralists in a village register, assigned Msowero - Godess area as a village communal grazing area, and advised the district authorities to stop re-locating more pastoralists to the village. In addition to the registration of the pastoralists, both Barbaig and Maasai were allocated farming plots and asked to select their representatives to the village "Conflict Resolution Committee".

The committee reviewed the sanctions contained in the "Kilosa District by-law No 1 of 2002," providing for the formation and functions of village conflict resolution committees. The conflict resolution committee at Msowero village has minimized resource use conflict by setting rules providing for the following: specific stock routes to access drinking water along Msowero river, specific areas where livestock can drink water, designate areas for dry season cultivation along Msowero river banks. These measures taken at local level have reduced resource - use conflicts, where the livestock in the past used to cause damages on dry - season crops grown along the river banks. Both livestock and crop production now peacefully co-exist on Msowero riverbanks (Figures, 39 and 40). The longstanding conflicts between pastoralists and farmers over crop damage in the village have since been resolved. Another full functioning conflict resolution committee has been formed in Mbwade, which is also an agro-pastoral village. A number of workers on social conflicts, for example



**Figure 39: Irrigated dry season crops along Msowero river bank after resolving access conflicts between farmers and herders**



**Figure 40: A pastoral herd at Msowero village using a stock route designated by village conflict resolution committee to access Msowero river**

Kumar (1998) asserts that resource-use conflicts occur when different categories of resource users have competing demands for shrinking resources, and may attach different values to the resource base. According to Kumar (1998) resource-use conflicts occur in settings that involve an array of culture, economic, and political arrangements that may influence outcomes of the conflict process. Therefore, resource-use conflicts tend to vary in dimension, level and intensity, and may take place at different levels, from within the household to local, regional, societal scale (Anyling and Kelly, 1997). According to Hirsch *et al.*, (1999) ethnicity may also influence the use of natural resources, bringing to the fore cultural and social dimensions of conflicts. Some observers argue that conflicts are not always necessarily destructive or disruptive, and that they are inherent within any human relations, so that cannot be removed all together, but can only be managed (Weeks, 1992).

Nevertheless, sustainable management of natural resources as well as sustainable livelihoods of communities who are dependent on natural resources could only be attained after resolving the inherent resource-use conflicts. In this context, the presence or absence of conflict mediating mechanisms or the social institutions for conflict resolution are the main determinant factors of the outcome of conflict process.

### **4.3.3 Resource-use conflicts in Ngorongoro Conservation Area**

#### **4.3.3.1 Overview**

The Ngorongoro Conservation Area (NCA) was established in 1959 as a multiple land use unit to provide for dual goals of natural resource conservation and development of its resident Maasai people. Establishment of the multiple land-use system was a compromise of prevailing conflicts between international conservationists lobby groups which favoured separating human from conservation area and social welfare activists who were in favour of social economic development of pastoralists. From its inception the relationship between

Maasai residents and the Ngorongoro Conservation Area Authority has often been contentious. The Maasai pastoralists have since been subjected to policy changes that proven detrimental to their livelihoods as well as ecosystem sustainability. The unfavourable policy environment has invariably predisposed to intensification of conflicts between local Maasai and the conservation authority.

#### 4.3.3.2 Types of resource-use conflicts in Ngorongoro Conservation Area

The resource-use conflicts in the Ngorongoro Conservation Area are presented in Table 32. The main conflict involves cultivators and Ngorongoro Conservation Area Authority which was mentioned by 62.6% of respondents.

**Table 32: Types of resource-use conflicts in Ngorongoro Conservation Area**

| Conflict type            | Number of respondents |                     |                     |                     |                   |
|--------------------------|-----------------------|---------------------|---------------------|---------------------|-------------------|
|                          | Kakesio<br>(n=35)     | Enduleni<br>(n= 84) | Irkeepus<br>(n= 81) | Naiyobi<br>(n= 105) | Total<br>(n= 305) |
| Cultivators vs           |                       |                     |                     |                     |                   |
| conservation authority   | NA                    | 78(92.9)            | NA                  | 103 (98.1)          | 191(62.6)         |
| Pastoralist vs           |                       |                     |                     |                     |                   |
| conservation authority   | 3(8.5)                | NA                  | 79(97.5)            | NA                  | 82(26.9)          |
| Pastoralists vs predator |                       |                     |                     |                     |                   |
| animals                  | 21(60.0)              | 20(23.8)            | 50(61.7)            | NA                  | 91(29.8)          |
| Cultivators vs wild game | NA                    | 17(20.2)            | NA                  | 30(28.6)            | 47(15.4)          |
| Entrepreneurs vs         |                       |                     |                     |                     |                   |
| conservation authority   | NA                    | 50(59.5)            | NA                  | 78(75.7)            | 128(42.0)         |
| Immigrants vs            |                       |                     |                     |                     |                   |
| Conservation authority   | NA                    | 23(27.3)            | NA                  | 54(5.1)             | 77(25.2)          |

- The percentage in some columns exceeds 100 because of multiple answers

Key: - Numbers in parentheses are percentages

Most of these respondents were from midland villages - in Enduleni and Naiyobi – where extensive cultivation is being practised. Another important resource-use conflict involves local entrepreneurs and the conservation authority; mentioned by 42.0% respondents mainly from Naiyobi and Enduleni villages. The two locations are local shopping centres, which have recently been undergoing rapid expansion. The conflict involves increasing construction of permanent houses. Construction of permanent structures by local Maasai is prohibited under NCAA regulations, as it is considered detrimental to landscape and likely to interfere with animal behaviour. Yet, it seems the regulations have not stopped the expansion of permanent structures. Moreover, this regulation appears controversial, because the regulation does not appear to apply to external investors who are expanding permanent structures around areas of high wildlife concentrations, for example tourist facilities established around the Ngorongoro crater rim.

Other conflicts involve pastoralists and conservation authority which were mentioned by 26.9% of respondents from Kakesio and Irkeepus. This type of conflict arises from different underlying causes, whereby conflict in Irkeepus is mainly due to loss of village grazing land in the neighbouring crater area and NHFR. The NCAA restricts access to dry season grazing in these areas. Complaints in Kakesio were based on a lack of reliable water sources in dry lowland plains. A colonial government when it evicted the pastoralists from Serengeti area, promised as a compensation reliable supply water source in the area. The promise had never fully met by both colonial and independent governments. Another conflict is between the pastoralists and predator animals which was mentioned by 29.8% respondents from three villages – Kakesio, Enduleni and Irkeepus. These villages are located in areas with a high concentration of wild life, therefore facing a high risk of livestock predation by wild game. Cases of predation of cattle are in most cases followed by reprisal killings of

predators by morrans, compelling intervention by conservation authority to stop indiscriminate killings of wild game.

A few respondents (15.4%) from Enduleni and Naiyobi villages – where extensive farming is undertaken - reported a growing conflict involving farmers and wild game over crop damages. As a measure to prevent crop damages farmers are reported to fence off their crops, scaring away wild game or spearing animals damaging their crops. The wildlife in this case is increasingly becoming pests, as cultivation intensifies. This development has serious implication on conservation of wildlife in Ngorongoro area, thus threatening co-existence of agro-pastoralism and wild game. This is a challenge to a recently adopted approach to multiple land-use principle, whereby controlled cultivation has been allowed in NCA in order to improve the food security of Maasai pastoralists and minimizing resource – use conflicts in the area. According to McCabe (2002) and Kijazi (1997) this measure have improved substantially the welfare of NCA Maasai and reduced resource - use conflicts. Where as studies by Galvin *et al.* (2002) and Runyoro *et al.* (2002) concludes that controlled agriculture has not so far negatively impacted wildlife in NCA.

Another conflict involves immigrants and conservation authority, mentioned by 25.2% of respondents mainly from Enduleni and Naiyobi villages. The Conservation authority blames the immigrants for agriculture intensification in the area. Under NCAA regulations people entitled to reside in the area are those who were living in the area or moved into the area in 1959 or before, people born in the area after 1959, or people who moved to “Ujamaa villages” established in the area during “Ujamaa village” operation of mid 1970s. However, this definition fails to acknowledge the mobile nature of pastoral production system and the social network of pastoral community residing in Ngorongoro area with neighbouring communities. Thus, the legal definition of a legitimate resident of NCA is misleading and it

may underestimate the actual population of Maasai with a customary claim to the area. Furthermore, the linking of immigrants on expanding agriculture is based on flawed assumption, which stereotype Maasai pastoralists as dependent on animal products (blood and milk) as their main staples. The Ngorongoro Maasai had been, for generations, combining farming in their household livelihoods. As such, expanding of agriculture in NCA is most likely related to increasing household food insecurity experienced by resident Maasai.

From the study results, it is apparent that the main conflicts in the Ngorongoro area involve resource-users (local pastoralists) and regulators (NCAA). Conflicts among resource users are very rare, this being an indication of the effectiveness of local institutions in management of the local resources in the area.

#### **4.3.3.3 Causes of resource-use conflicts in Ngorongoro Conservation Area**

The causes of resource-use conflicts in the NCA are presented in Table 33. During the Focused Group Discussions in Ngorongoro area causes of resource-use conflicts were identified as (1) transmission of animal disease by wildlife to livestock, (2) restriction on access to dry season grazing area, (3) restrictions on cultivation, (4) livestock predation and (5) crop damage by wildlife. Livestock diseases transmission from wildlife was identified as major constraints on livestock production in all study villages in Ngorongoro area. Pastoralists consider a disease to be important if it causes considerable livestock losses or if there is no reliable cure for the disease, as well as diseases with potential for major outbreaks involving both livestock and wildlife. According to Machange (1997) the most important livestock diseases in NCA are tick borne diseases, Foot and Mouth Disease, rinderpest and Malignant Catarrh Fever. Different wildlife species serves as reservoirs for most of these diseases.

**Table 33: Causes of resource-use conflicts in Ngorongoro Conservation Area**

| Cause of conflicts             | Magnitude of resource-use conflict |          |          |         | Total score | Rank |
|--------------------------------|------------------------------------|----------|----------|---------|-------------|------|
|                                | Kakesio                            | Enduleni | Irkeepus | Naiyobi |             |      |
| Livestock disease transmission | √√√√                               | √√√√     | √√√      | √√√     | 14          | 1    |
| Restriction on agriculture     | √√                                 | √√√      | √√       | √√√√    | 11          | 2    |
| Restrictions to key resources  | √                                  | √√√      | √√√√     | √√      | 10          | 3    |
| Livestock predation            | √√√                                | √√       | √√√      | √       | 9           | 4    |
| Crop damage by wild life       | NA                                 | √        | NA       | NA      | 1           | 5    |
| Loss of human life             | NA                                 | NA       | NA       | NA      | 0           | 6    |
| Human injury                   | NA                                 | NA       | NA       | NA      | 0           | 6    |

Key: Scores, √√√√ - very high, √√√√- high, √√√- moderate, √√- low

Serious disease transmission occurs on the short grass plains, where increasing wildebeest population has increased the risks of malignant catarrh fever (a fatal disease in cattle), which is transmitted by wildebeest calves. In response to this problem pastoralists abandon the prime grazing lands for 3 to 6 months in order to avoid contact with calving wildebeests. In some areas the pastoralists have reacted by chasing wildebeest away from settlements, or constructing a thorny fence to prevent wildebeest from accessing areas for grazing livestock. All these measures are likely to lead to conflicts with NCAA.

A second cause of conflicts in NCA, which was mentioned in all villages during Focused Group Discussion, is restrictions on agriculture. Traditionally, the Maasai of Ngorongoro area subsisted on animal products that were supplemented with grain and other vegetable products. As livestock numbers have declined the Maasai dependence on cultivation increased. Cultivation was prohibited between 1975 and 1991, but despite a ban illegal



cultivation persisted throughout the ban period (Perkin, 1993; Runyoro, 1994). This exacerbated land-use conflicts between local communities and NCAA. The ban was temporarily lifted in 1992 in order to improve the food security situation in the area. The current conservation policies limit the amount of area that can be cultivated. Thus, as the human population expands land-uses and resource-use conflicts intensify, the local Maasai sensing that their welfare and economic status were declining. The long-term studies, for example Galvin *et al* (1994), have established that a large proportion of NCA Maasai have been impoverished.

Another cause of resource use conflicts mentioned in all study villages is the restrictions to key grazing resources. The rules that banned cultivation in NCA also contained restrictions on use of key resources (dry season grazing areas, water and salt lick) in the crater highlands and Northern Highland Forest Reserve. This period also was accompanied by eviction of some Maasai pastoralists from crater areas (Fosbrooke, 1990 in Neumann, 1998). These land-use constraints had significant impact on livestock productivity and pastoralists livelihoods leading to impoverishment, yet there were limited options for them to cope. Galvin *et al.*, (2002) arrived at a conclusion that the costs of conservation in NCA are partially borne by residents of the conservation area, and that there are needed some compensation for these costs.

Maasai pastoralists have historically been in a peaceful co-existence with a diverse of wildlife. Only minimum human-wildlife conflict involving predator animals are known to exist, whereby attacks of cattle by predators elicits reprisal killing of trouble animals by warriors, thus leading into conflicts with conservation authority. Livestock predation was identified as a serious problem in Irkeepus and Kakesio villages. This is most probably due

to a fact that the two villages are located in close proximity to areas with a high concentration of predators in crater area and short plain grasslands respectively.

The recent increase in cultivation in NCA has also generated potential sources for human-wildlife conflicts over crop damages. The herbivores that in the past co-existed peacefully with grazing livestock are now increasingly becoming pests to cultivating Maasai. Crop damages by wildlife were reported as cause of conflict in Enduleni village. As a control measure the Maasai were reported to scaring away animals from their farms, fencing of cultivated areas or in extreme cases they were reported to spearing problem animals. All this measures are likely to increase conflicts with NCAA.

The study results indicate that respondents do not consider human injuries and human life losses as important. An explanation for this is that the pastoralists had co-existed for millennia with wildlife. In turn they have evolved indigenous knowledge which enables them to sustainably share resource with wildlife. Furthermore, the Maasai generally have no significant consumptive use to wildlife. Discussions with Maasai youth reaffirmed this supposition; they argued that generally they do not take bush meat. This suggests persistence of local institutions that govern co-existence of Maasai pastoralists and wildlife. However, key informants reported occasional incidences of young warriors eating antelopes, and NCA Official informed a case of slaughtered giraffe at Irekeepus village. This has a significant implication to NCA policies, in that long term initiatives are needed that will ensure a thriving pastoral economy basing on a sustain human: livestock ratio.

#### **4.3.3.4 Determinant factors of resource-use conflicts in Ngorongoro Conservation Area**

A logistic model was used to determine the relationship between resource – use conflicts and the socio – economic, demographic factors and perceived degradation of rangelands.

The logistic model results are shown in Table 34. The socio – economic and demographic factors analysed in this study include family size, wealth heterogeneity, diversification to cultivation, livestock ownership, market integration, conservation policies and strength of traditional leadership. The perceived range degradation was used as a proxy to environmental factors. Results in Table 34 show that the model has predicted correctly the cases at 91.8% and statistically significant at  $p < 0.05$ . The Nagelkerke R square is 0.803, indicating that 80.3 % of the observed variation in resource-use conflicts is explained by independent variables in the model. The high -2 Log Likelihood (= 27.11) indicates that there is a high fit between the model and the data. Out of seven factors that have been analysed three factors have positive relationship to resource - use conflicts relationship and remain four factors have negative effect. The factors contributing significantly to intensification of resource-use conflicts include increase in household wealth differentiation and conservation policies. Whereas, factors that are likely to minimize conflicts. are increase in number of households owning livestock, increase in perceived degradation of rangelands, presence of strong local leadership and increase in family size..

The results show that increase in household wealth heterogeneity significantly ( $P < 0.05$ ) increase the likelihood of resource use conflicts by a factor of 5.87. This can be explained by a fact that much wealthier households are likely to diversify into others economic activities. This is likely to lead into conflicts with the conservation authority, which restricts expansion of economic activities by Maasai pastoralists. Conservationists assume that by diversifying the economic activities, Maasai pastoralists are likely to cause habitat destruction and subsequent loss of wildlife. The wealthier households in Ngorongoro area are diversifying their economic activities to shopping activities, restaurant business and cattle trading.

**Table 34: Determinant factors of source-use conflicts in Ngorongoro Conservation Area**

| Variable                     | $\beta$ | S.E.  | Wald   | df | Sig.  | Exp( $\beta$ ) |
|------------------------------|---------|-------|--------|----|-------|----------------|
| Conservation policies        | 3.631   | 1.254 | 8.382  | 1  | .004* | 37.749         |
| Wealth heterogeneity         | 1.770   | .546  | 10.495 | 1  | .001* | 5.870          |
| Diversification to farming   | 1.384   | .890  | 2.416  | 1  | .120  | 3.990          |
| Livestock ownership          | -1.448  | .611  | 5.612  | 1  | .018* | .235           |
| Perceived range degradation  | -3.682  | 1.424 | 6.683  | 1  | .010* | .025           |
| Strength of local leadership | -3.145  | .934  | 11.342 | 1  | .001* | .043           |
| Family size                  | -1.463  | 1.038 | 1.988  | 1  | .159  | .232           |
| Constant                     | -8.748  | 5.719 | 2.340  | 1  | .126  | .000           |

**Model Summary**

- Overall percentage = 91.8
- Model Chi- Square = 76. 581
- - 2 Log Likelihood = 27.111
- Nagelkerke R square = 0.803

\* = Significant at  $p < 0.05$  level

These economic activities have led to expansion of local marketing centres and increase of permanent houses built by local Maasai (Runyoro, 2000, Runyoro *et al.*, 2002). Increase in permanent structures by local community members is believed to be detrimental to landscape as well as wildlife habitats, and is prohibited by NCAA rules. This has in turn led to escalation of conflicts between local entrepreneurs and conservation authorities. For example, Lissu (2000) reported an attempt by the conservation authority to evict traders from Kimba settlement.

However, Runyoro (personal communication.) commented on legal complications of carrying out evictions in Ngorongoro area, arising from astronomical compensation costs demanded by would be evacuees. Furthermore, the wealthier local entrepreneurs engaging in cattle trading were reported to keeping large herds of cattle on communal grazing lands causing competition for resources and resentments by small herd owners. This increases the likelihood of resource-use conflicts among local pastoral communities.

The NCA conservation policies significantly ( $P < 0.05$ ) increases the likelihood of resource-use conflicts by a factor of 37.749. This is related to restrictive NCAA policies and regulations introduced as from 1975, which banned cultivation and restricted access to grazing in crater area and forest reserves. Implementation of these policies severely affected livelihood of the pastoralists. As a coping strategy they engaged in illegal cultivation as well as illegal grazing in restricted areas. These practices in turn led to clashes with NCA wardens as well as growing tensions and mistrust between local communities and the conservation authorities. At times, there are threats for full scale clashes between NCA wardens and Maasai warriors.

Adaptation of farming by pastoralists has a strong positive relationship with resource-use conflicts with a regression coefficient of  $\beta = 1.384$  and Wald ratio of 2.416. This explains a protracted conflict between Maasai pastoralist and NCAA over cultivation, banned by a legislature in the entire area of NCA starting from 1975 to 1992. During this period pastoralists, also experienced a progressive decline in herd productivity, range productivity as well as a decline on per capita herd ownership. For these reasons they resorted to illegal cultivation leading to escalation of conflicts with conservation authority.

The root cause of conflicts could be traced to flawed assumption when formulating the multiple land use system, which idealised a pastoral economic system in the area that was hinged on cattle economy, and with animal products forming the main staple. The reality is that the pastoralists of Ngorongoro, similar to other pastoral groups in East Africa, are experiencing socio-economic changes. These changes are manifesting as changing life styles, feeding habits and increasing demand of consumptive goods. Therefore, there are needed appropriate management models that could sustain co-existence of pastoralism and conservation activities. The government had lifted the ban on agriculture as from 1992. However, the ban was emphasised by the board of directors of the Ngorongoro Conservation Area, against the advise of a technical advisory committee (Perkin, 1995), demonstrating a conflict of interests between conservationist orientation and the reality on the ground.

The results further shows that increase in number of households owning cattle significantly ( $P < 0.05$ ) reduces the likelihood of resource use conflicts by a factors of 0.235. A plausible explanation for this is that as numbers of households owning cattle increase it also raise the livestock: human ratio. This has an implication on improved household food security, in particular improved supply of animal products that constitute the main staple food for

pastoralists. On the other hand increase in animal products, reduces a need to expand agricultural production as a means for supplementing household food requirements. Reduced agricultural expansion contributes to minimizing the likelihood of conflicts with conservation authorities. Increased perception of deterioration condition of grazing land, also significantly ( $P < 0.05$ ) reduces the likelihood of resource use conflicts by a factor of 0.025. This can be explained by a fact that NCAA has put in place a mechanism of benefit sharing; which includes issuing grazing permits into restricted areas during the dry season.

During this study the conservation authorities reported a high conformance to permit requirements. This has in turn improved the relationship between NCAA and local Maasai population. It has also been observed that the administration is more positive to local Maasai. For example during this study it was observed that, while officially the permanent habitation in the crater area was banned in 1975, yet permanent; encampment has been allowed just on a nearby crater rim. Pastoralists from these encampments have easy access to water and salt lick in crater areas. Moreover, a high concentration of livestock was observed on encampments located on the crater rim, suggesting that pastoralists residing in distant villages could have moved part of their livestock to the crater rim where they have easy access to water. This indicates increasing insights and tolerance of traditional pastoral production system by conservation officials. Furthermore, it was revealed by senior NCAA officials that in case of severe draughts the pastoralists shall receive a first priority in accessing the resources.

The results further show that strong traditional leadership can significantly ( $P < 0.05$ ) reduce the likelihood of resource – use conflicts by a factor of 0.043. The traditional leaders in Maasai society play a role in resource management and resolving resource-use conflicts. In this study, traditional leaders were reported to play a key role in resolving conflicts between

local communities and the NCA authorities. A strong traditional leader is defined as the one who adhere to a tradition, non-corruptible and impartial. These qualities enhance the legitimacy of a leadership before the eyes of the community, hence high level of conformity to rulings made by the leaders.

Family size has a strong negative relationship with resource - use conflicts, with a negative regression coefficient ( $\beta = - 1.463$ ) and a Wald ratio of 1.988. Although the relationship is not significant (at  $p < 0.05$ ), the results suggest that an increase in family size lead to reduction of resource - use conflicts in Ngorongoro area. A possible explanation for this is that because the pastoral economy in Ngorongoro area is under stress, therefore the main production strategy adopted by individual households aims at meeting household subsistence requirements. There is an institutionalised mechanism, which ensure a delicate balance between shrinking resources and increasing human population. This involves some family members migrating out when the family size increase. At present this is effected through urban migration by youth, where they engage in wage labour. In this way competition for resources is minimised.

Some families in NCA are reportedly being supported through remittances by members with paid job in urban areas. Furthermore, the Ngorongoro Division Executive Officer reported a drop in inter-ethnic cattle rustling around Kakesio area, because most of the youths who have migrated to urban areas were able to buy cattle and start their own herds. The regression model results show that socio-economic factors, policies and perceived rangeland degradation significantly affect resource-use conflicts. This suggests that the empirical data support hypothesis 2 in this study.



#### **4.3.3.5 Mechanisms for resolving resource-use conflicts in Ngorongoro conservation Area**

The NCA administration is increasingly promoting co-operation with local communities. This is mainly effected through informal contacts, and by conferring increasing recognition to traditional leaders. There is an unofficial commitment that under severe resource scarcity then, local pastoralists and their livestock shall be given a priority to access to limiting resources (water and pastures). Such a state of affairs has improved relationship. In addition, to a controlled access to resources, the NCAA operates a food security program, under which during drought periods the pastoralists are supplied with grain at subsidized price. The NCAA administration has long recognized the traditional leadership. There is now extensive informal co-operation and cordial relationship between the traditional leadership and the NCA Chief Conservator. The relationship is marked by designating the “Chief Conservator” a rank of Maasai traditional leader *Ole Laigwanani* and it was reported that the Chief Conservator attend some council of elders meetings *ekingwana*.

During this study it was learnt that, when introducing the NCAA leadership to visiting dignitaries the “Maasai” traditional leader is accorded a status next to the District Commissioner (the representative of central government in the district). Notwithstanding, such cordial relationship, there is no sufficient legal instruments linking the local communities to decision making process in the Ngorongoro Conservation area. Yet, the new found grounds may serve in future, as basis for aligning the local level institutions, the NCAA, national level as well as international conservation institutions.

#### **4.4 Institutional Innovations in Mkata plains and Ngorongoro Conservation Area**

##### **4.4.1 Mkata plains**

A number of institutional innovations have been identified in Mkata plains, whereby the main trend has been to scale up local institutions. Scaling up is defined as sustaining institutions both in time and space. This was achieved through extending institutional jurisdiction in space to cover more areas as well as increasing the number of participants in shared management of common grazing lands. This is particularly important under pastoral production system, characterised by high variability in distribution of key resources both in space and time. Olson (1965) when discussing on the effects of group size in collective action, referred to such tendency as creating critical mass for collective action. Another approach for the institutional scaling up was linking local level institutions to high level institutions at regional, national and international levels. The institutional innovations were both endogenous and exogenous and occurred in both pastoral as well as agro-pastoral villages.

The pastoralists have now settled in their designated villages where they are leading more or less sedentary life (Figure 41). The institutional innovations observed among the Maasai community in Mkata plains include (1) scaling up of the *Olo Laibon* and *Ole Laigwanani* institutions, (2) integration of both formal and informal local institutions, (3) forming formal organisations (4) incursion of foreign religions and (5) enhancement of gender equality. These innovations aims at enabling the pastoralists to cope with settled life in the pre-dominantly agricultural areas with high market pressure (Figures 42). At the same time they strive to maintain their Maasai cultural identity, by retaining the overall Maasai hierachical tribal organization, which is hinged on spiritual leaders *Olo Laibon* and age-set spokesmen *Ole Laigwanani*.

An important institutional innovation in Mkata plains is expanding the influence of magico – religious institution. Whereby, the *Olo Laibon* residing at Kiduhi village in Mkata plains, is increasingly assuming the role of overall spokesperson for all Maasai under his jurisdiction extending in Morogoro, Iringa, and Mbeya regions. He is particular playing a key role in negotiations at different levels of the central government. Furthermore, the *Olo Laibon* is involved in administrative functions, particularly in conflict resolution. This is different to roles played by the *Olo Laibon* under traditional Maasai settings in NCA, where his roles are basically ritual leader and private practitioner of traditional medicine.

Furthermore, under traditional settings the tribal leaders are attached to their ancestral lands the *oloshon*. Whereby, each locality forms a distinct administrative unit, with a council of elders and a tribal spokesman. In case of pastoral villages in Mkata plains, the social organization involves a combination of both formal village government and traditional leadership. All pastoral villages have full functional village governments, which more or less are subordinated to traditional leadership. This was achieved through electing to post of village chairman one of the influential local elite. The village executive officer post is in most cases taken by non-Maasai or younger literate Maasai, whose main duties are limited to handling directives from local government. The local elites make important decisions based on traditional Maasai system.

However, there are checks and balances, to the seemingly local elite's hegemony. This is through a council of elders, which is chaired by the overall tribal age-sets spokesman. Village members may seek recourse on decisions made by local leaders at this council. Another institutional innovation occurring in Mkata plains is the tendency to centralise the authority in the institution of overall tribal *Ole Laigwanani*. This is in apposition to

idealised Maasai society where the tendency has been to decentralise the authority to local level units as accounted for in Spencer (1993).



**Figure 41: Masaai permanent settlement at Twatwatwa village in Mkata plains**



**Figure 42: A bi-monthly market at Twatwatwa village in Mkata plains**

The *Ole Laigwanani* in Mkata plains is not based on traditional locality, as is the case in Maasai land, instead there is an overall spokesman who represents all Maasai community in all districts of Morogoro region. This is an institutional innovation aimed at scaling-up the local institutions to much larger geographical area. The authority of the overall spokesman is also recognised in other regions including Coast region, Arusha, Dodoma, Mbeya and Iringa. The current Maasai overall spokesman, in Morogoro *Ole Laigwanani* “Isirika Kiprotu” resides at Mikese, Morogoro Urban District. The decisions of the tribal spokesman are binding to all Maasai in Tanzania.

Among other things, the *Ole Laigwanani* has been instrumental in mobilizing the local communities for self-help projects: schools and water development projects in Mkata plains in particular and other areas in Morogoro region where Maasai are settled. Although the overall *Ole Laigwanani* is not directly responsible with the management of local resources in Mkata plains, but he provides a framework for community mobilisation as well as decision making in the community. This is attained through chairing important council of elders meetings, where community members may seek recourse to actions of local elites. It was reported at Twatwatwa village that the *Ole Laigwanani* played a key role that led to change of formal village government. This, ascertain a contention on the superiority of traditional governance system over formal village government.

The recent exogenous institutional innovations occurring in Mkata include forming formal community-based organisations (CBOs) as well as registered associations. Pastoralists at Mbwade village have formed and registered an association “Madoto Pastoralists Primary Association”, which’s main objective is to improve pastoral production in the village. While at Twatwatwa the pastoralists were finalising procedures to register a CBO “Parakuyo

Pastoral Community-Based Organisation”, which’s main aims, are economic development and environmental protection.

Formation of these legal entities arose from high interaction of Mkata Maasai with external agencies as well as government officials. The formal organisations are intended at providing a mechanism for obtaining donor money as well as benefiting from local government creding schemes. For instance Twatwatwa village has recently commissioned a TSh100 millions water supply project through a grant from the World Bank. Other institutional innovations in Mkata plains are increased incursion of foreign religion and schooling.

Table 35 present respondents religious faith in Mkata plains. The data on religious afflictions in Mkata indicates that the Moslems are the majority (37.5%), followed by Traditionalists (28.5 %) and the Roman Catholics (19.1%) and the Lutherans (10.5 %). These results combine religious affiliations of both the Maasai and other ethnic groups settled in Mkata plains. Despite of the fact that traditional religion is predominant in the Maasai community, the study results indicate that religious faith is increasingly penetrating in the pastoral communities, which is attracting mostly the youth (Figures 43 and 44 ).

**Table 35: Respondents religious affiliation in Mkata plains**

| Religion             | Number of respondents |            |
|----------------------|-----------------------|------------|
|                      | Frequency             | Percentage |
| Roman Catholic       | 51                    | 19.2       |
| Moslem               | 100                   | 37.7       |
| Lutheran             | 28                    | 10.5       |
| Traditional Religion | 76                    | 28.7       |
| Assemblies of God    | 10                    | 3.7        |

Nonetheless, the introduction of other religious faiths does not appear to have eroded most of the cultural codes of conduct. At most the new faiths appear to co-exist with traditional practices.

To support this contention is an observation made during this study, whereby a council of elders meeting “ekingwana” convened at Tindiga/ Luhoza in Mkata ranch area, was preceded by a prayer led by a young catechist of a Lutheran Church. The meeting was convened on *Olo Laibon* directives; to discussing a fait of pastoralists Maasai residing in the ranch area which was offered for sub-leasing.

The outcomes from the meeting were a decision by local pastoralists to organise themselves to buy the ranch block on offer. They formed a formal pastoral association, mobilised funds for the purpose of paying for leasehold fee and lobbied successfully through Kilosa District Commissioner, Morogoro Regional Commissioner and Minister of Water and Livestock Development- who facilitated them to obtain a lease hold for a 4 000 ha grazing block. This demonstrates how local institutions could link with formal institutions in organising for collective management of common pool resources. Another, landmark of penetration of foreign religion in Maasai community was the inauguration of a new Anglican church at Twatwatwa village which took place during the study period, and officiated by Anglican church representative from the United States of America.



**Figure 43: A Maasai temporary Baptist church at Madoto ranch in Mwade village**



**Figure 44: A new Anglican church at Twatwatwa village in Mkata Plains donated by the World Confederation for Anglican Church**



#### **4.4.2 Ngorongoro Conservation Area**

Scaling up of the local leadership institutions has been observed in the Ngorongoro Conservation Area. The trend in social organisation among the Ngorongoro Maasai is centralizing the traditional authority in an overall tribal spokesman, for the entire Kisongo section. The unified traditional leadership has served to improve the bargaining power as well as political force of Ngorongoro Maasai, in competition for resources with a more powerful NCAA.

The current tribal spokesman for Kisongo Maasai section “Ole Laigwanani Ile Lunguna” resides at Irkepuus village in Ngorongoro Conservation Area. His jurisdiction extends beyond NCA boundaries to Kisongo Maasai residing in Loliondo Game Controlled Area. Such scaling up of the local authority has proved to be effective in advocating for the Ngorongoro Maasai rights. Through their local structures, the NCA Maasai had lobbied successfully at higher political leadership leading to lifting up of the ban on cultivation by the President of United Republic of Tanzania. This demonstrated the organisational capacity of local institutions, whenever local formal institutions are weakened by central government policies, as is the case in Ngorongoro Conservation Area.

Another institutional innovation in Ngorongoro area is increasing number of local NGOs advocating for social development and human rights. However, most of the NGOs are meeting with resistance from NCAA. Only two NGOs until now are operating in the area. These are NGOPAEDO (Ngorongoro Pastoralist Development Organisation), which is centred at Enduleni area and PINGO (Pastoral Indigenous Non - governmental Organisations) an umbrella NGO which has wider coverage in Maasai pastoral areas. The incentives to forming these NGOs are basically a condition of obtaining donor money as well as advocating for rights of indigenous Maasai of Ngorongoro. Initially the local

communities were reluctant to be represented by these alien structures in stead they prefer to be represented by their traditional leaders. However, the two systems are now building bridges, for instance in a workshop organised by an NGO (PINGO) - in March, 2006 at Loliondo - the Maasai elders from Ngorongoro area denounced the NCAA Board of Directors calling for its resolution. It is important to note that the newly established NGOs can only win legitimacy before the communities if they work through traditional management systems. Furthermore, the NGOs are attracting followers from young generations. Therefore it can be asserted that should anticipate mounting advocacies for indigenous people rights in Ngorongoro area.

Table 36 show religious affiliations in Ngorongoro area. The main dominion in NCA is the Roman Catholic accounting for 52.9 % of respondents, followed by traditional religion comprising 38.0 % and the Moslems accounting for 6.1 percent of respondents. During the in-depth interviews it was learnt that some religious faith contradicts with the traditional-religious practises, on which most of the local institutions are based. Nonetheless, the new faith has not led into erosion of cultural code of conduct amongst the Maasai communities. Yet the new faiths are bringing about some changes on the traditional value system.

**Table 36: Respondents religious affiliation in Ngorongoro Conservation Area**

| Religion             | Number of respondents |            |
|----------------------|-----------------------|------------|
|                      | Frequency             | Percentage |
| Roman Catholic       | 156                   | 58.1       |
| Moslem               | 18                    | 6.1        |
| Lutheran             | 5                     | 1.7        |
| Traditional Religion | 112                   | 38.1       |
| Assemblies of God    | 3                     | 1.0        |

For instance discussions with youth who have attended some schooling disclosed that, whereas they are adherent to traditional practices but they consider the *Olo Laibon* as a private practitioner without any important role to play in community administration. This tendency is counterbalanced by the social institutions vesting more administrative and decision making powers in the overall age-set spokesman the *Ole Laigwanani*. During the in-depth interviews it was learnt that some religious faith contradicts with the traditional-religious practises, on which most the local institutions are based. Nonetheless, the new faith has not led into erosion of cultural code of conduct amongst the Maasai communities in which the traditional practises seem to coexist with modern practises.

#### **4.5 Proposed institutional framework for the management of communal pastoral resources and resolving resource-use conflicts**

Today the pastoralists in Tanzania are subject to economic, policy and social changes. These reforms are envisioned in the Tanzania Development Vision 2025 (URT, 1995) and the National Strategy for Growth and Reduction of Poverty (URT, 1997c). The two guiding vision aims at accelerated economic growth, reducing poverty and improving living standards. In order to realize the long term objectives, it has necessitated policy reforms in all sectors of the economy including the pastoral sector.

Policies changes that directly impact on pastoral systems were initiated in the Agriculture and Livestock Policy of 1997 (MAC, 1997), which redefined roles of public sector in particular the divestiture of the state and promotion of private sector in delivery of public services in agriculture and livestock sector. Yet, further reforms in the economy had necessitated reformulation of a new policy - the National Livestock Policy of 2006 (draft) (MLD, 2006). The draft livestock policy aims at commercializing the livestock industry in

order to increase income, improve food security to all stakeholders including pastoralists and environment conservation.

The Implications of these policy reforms on pastoral production system entails fundamental changes on pastoral strategies so that the system will match with current development in trade liberalization, privatization and divestiture of state enterprise as well as enhancement of the private sectors (MLD, 2006). As a measure to implement the policy a process to enact a law for control usage and management of rangeland has been initiated. During the time of this study the proposed Range Control and Management Act was at a draft stage. In order to ensure secure tenure security of rangeland the draft Act proposes establishment, registration and gazettelement of range development areas.

An apex body – the National Rangelands Management Council (NRMC) –has been proposed to enforce the proposed Act. The council will draw members from all sectoral-ministries involved with the management of land resources as well as associations representing main users of rangelands. Such arrangement will allow for coordination of activities with other sectors which may have overlapping mandates in the rangelands. The main functions of the council shall be advisory on policy issues, regulatory, co-ordination, registration of rangeland development areas and registering associations utilizing the rangelands.

The NRMC will function through proposed District Range Management Coordinating Committees (DRMCC) comprising of district functional officers of departments involved with development of land resources and representatives from associations of main rangeland users in respective districts. The proposed activities DRMCC are: registration of range development areas, monitoring and regulation use of rangelands as well as conflict

resolution. The DRMCC will be guided by local authority by-laws and regulations for management of rangelands to be enabled by the proposed rangeland Act.

A post of an Authorized Officer is proposed, who will serve as a secretary to DRMCC and a principal agency for enforcing the Act at district level. Duties of Authorized Officer include: monitoring of range condition, enforcing range management regulations, enforcing the carrying capacity in rangeland management areas, issuing permits to grazing in reserve rangeland management areas. Other function is to serve as agency in registration of range development areas, private ranches, group ranches, cooperative ranches and pastoral associations. Two categories of range development areas are being proposed: Village Range Development Areas and Reserve Range Management Areas. Whereby, the village range development areas will be established on village land and the reserve range management areas to be established on general lands.

A Village Range Management Committee (VRMC) is proposed for day to day management of Village Rangeland Development Area, under the directives of DRMCC. Procedure for establishment of village range development area will be initiated by an Authorized Officer who will contact the village council to designate a village rangeland development area. The village council upon approval by village assembly shall declare the proposed area and a Village Range Management Committee shall be formed to manage the VRDA. The Chief Executive Officer of Local Authority having jurisdiction in the area shall be notified of proposed VRMA, and will record it in the Register of Village Range Development Areas. Management rules for VRDMA will be established by village by-laws provided by the Local Government (District Authorities) Act, of 1982.

The proposed Reserve Range Management Areas will be established in general lands by district Range Management Coordinating Committees, and shall be designated by order established in the Gazette, stipulated on the Land Act No.4, of 1999. Grazing in the Reserved Range Management Areas will be by a permit and shall involve payment of grazing fee charged for not more than 6 months grazing period.

The proposed Rangelands Management Act will provide a mechanism to establishing secure tenureship to rangeland, particularly in pastoral areas. However, the proposed mechanism is a top-down approach and concentrates a lot of powers in central government bureaucrats at a district level. Thus, there are minimum roles devolved to local communities and no any provision for integrating pastoralists' indigenous technical knowledge. This is contrary to the livestock policy statement emphasizing community participation and indigenous knowledge.

Moreover, implementation of proposed Act is likely to generate conflicts, especially in villages shared by indigenous farmers and immigrant pastoralists. In this case village communal lands are considered as land reserves by farmers, and have statutory status under village land Act No. 5 of 1999. Moreover, given the vast areas of rangelands, effective enforcement range management regulations could best be achieved by integrating existing local institutions in the management of range resources as well as integrating existing local mechanisms for conflict resolutions.

Furthermore, the propose Act does not provide any mechanism for enhancing entrepreneurial livestock management skills amongst pastoralists, through encouraging large herd owners to establish individual medium scale ranches. There is a mention of

registration of group ranches, cooperative ranches and pastoral association but the proposed act is silent on how these apparently large livestock holdings will acquire land.

In order to address some of these shortcomings an institutional framework for sustainable management of communal rangeland and improved livelihoods is proposed (Annex, 17). The proposed alternative institutional framework is based on a livestock policy (draft) (MLD, 2006) and proposed Range Control and Management Act, and integrates a mechanism for involving local communities and existing local institutions in management and decision making process. The main emphasis is on local participation and cross-linkages with other stakeholders who are involved in the management of rangelands at local, district, regional and national levels. Such arrangement will contribute in obtaining the political support and scaling-up local level concern for the management of village communal rangelands. This will lead to empowering of local communities for sustainable management of rangeland resources.

The implication of proposed framework on pastoralist production systems is that by attaining security of tenure to specific areas, the nomadic pastoral movements shall be curtailed and pastoralists will have a duty for management their designated areas. Therefore, both short and long-term interventions will be needed in order to sustain the environment health in these areas.

The interventions should include appropriate technological packages for increasing productivity of both rangelands and livestock. There also needed to establish efficient markets, sufficient infrastructures and building schools in pastoral areas. Schooling shall play a crucial role in changing attitudes and value system which are key factors in

transformation of pastoral production systems. The main outcomes of the alternative institutional framework are sustainable rangeland resources and pastoral livelihoods.



## CHAPTER FIVE

### 5.0 CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Conclusions

##### 5.1.1 Land cover changes

The study indicates that high grazing intensities in the study areas have caused loss of grasslands. In Mkata plains the changes involve conversion of grassland into woodland cover type. Where as, palatable grass species such as *Themeda* spp in Ngorongoro highlands are being replaced by a least palatable grass species like *Eleusine jaegaris*, while the midland areas are being invaded by bush dominated by *Accacia* spp.

##### 5.1.2 Land - use changes

Pastoralists in the study areas have settled in permanent villages and some of them have started cultivating, thus shifting the pastoral system towards agro-pastoralism. However, expansion of agriculture production in Mkata plains has reduced common grazing lands previously available to pastoralists and limiting livestock mobility.

Whereas the restrictive conservation policies in NCA and increasing risks of disease transmission from wildlife has disrupted the traditional pastoral herd mobility: causing high grazing intensities in highland areas. This has led to range degradation, and a decline of per capita livestock number, thus threatening household food security. In order to cope the pastoralists have started to cultivate in order to improve household food security. A shift to agro-pastoralism is threatening a breakdown of compatibility between pastoralism and wildlife conservation, leading to escalation in resource-use conflicts in the study area.

### **5.1.3 Resource tenure changes**

Both Mkata plains and Ngorongoro area are characterized by a multiplicity of land tenure systems, which is a legacy of their historical integration into international market. Mkata plains were centre of colonial plantation economy, which led to expropriation of customary lands and conversion to private freehold property. The sub-sequent post-independence land policies led to increased expropriation of more customary lands. Nationalization policies of 1970s transferred ownership of private sisal estates to a parastatal organization (Tanzania Sisal Authority). More customary lands were expropriated following establishment of Mkata state ranch and pastoralists' settlements in the area. The liberalisation policies of 1980s transferred the nationalised sisal estates to a private company (KATANI Ltd) and private investors. Thus, land tenure changes in the area did not take into consideration the redistribution of lands to customary owners.

Ngorongoro area has been a centre of tourism. The establishment of NCA in 1959 as a multiple land -use system has created dualism and some times conflicting land tenure systems in the area. Between 1959 and 1974 the area was managed as a multiple land-use system, whereby local Maasai had access to resources all over the area. However, as from 1975 the area has been managed as a buffer zone to core protected areas with access restrictions imposed on core protected areas and a ban on cultivation. Enforcement of these restrictions had led to escalation of resource-use conflicts. Controlled cultivation was allowed in some areas as from 1992 as a measure to improve food security.

#### **5.1.4 Roles and strength of local institutions in the management of common grazing lands**

The evidence from this study indicates that the informal local institutions have persisted in the two study areas, whereby on their own or in combination with formal institutions are playing key role in the management of common grazing lands and as sources of customary land tenure security. In Mkata plains the local elites influence most decisions made by formal village governments with regards to allocation of grazing areas. In pastoral villages there is a parallel customary leadership system, whereby important decisions regarding management of communal grazing lands are made by a council of elders (*Ekingwana*) chaired by a customary leader (*Ole Laigwanani*).

In Ngorongoro area the, *de facto*, ownership and management of land at local level is vested in the local institutions, which are organised on basis of territories (*Enkutoto*) and age-set systems. Each neighbourhood has a council of elders (*ekingwani*) and age-set spokesmen (*Ole Laigwanani*). The *enkutoto* federates into a larger territorial section the (*oloshoni*). An individual has primary access to resources in his neighbourhood the (*enkutoto*). Recently there has been increased collaboration between customary leadership and the NCA official in mobilisation of local communities and resolving conflicts.

The study further establishes that the local institutions in the study areas are strong with cooperative index score of 1.95 ( $\pm 0.85$ ) and 3.52 ( $\pm 0.52$ ) in Mkata plains and Ngorongoro area, respectively. The factors likely to enhance strength of local institutions in Mkata plains include high commercialisation level and strong local leadership, while factor likely to undermine the local institutions is household wealth differentiation. The factors likely to enhance the local institutions in Ngorongoro area include perception of range deterioration,

ownership of livestock and autonomy to make own decisions; while factors undermining the local institutions are household wealth differentiation and increasing family size.

#### **5.1.5 Resource - use conflicts and local mechanisms for conflict resolution**

The study indicates that resource-use conflicts in Mkata plains involve farmers and Maasai pastoralists over crop damages by livestock, competitions for wetlands and village boundary disputes. Farmers' have customary claims to land while pastoralists have formal title deeds to disputed areas. The main determinant of resource-use conflict is increasing commercialisation in the area. The growing informal land market in the area has led to intensification of competition for land resources, closure of wetlands and commoditisation of crop residues in farmers' villages, which the pastoralists previously had free access. A local mechanism employed to resolve resource-use conflicts is establishment of "conflict resolution committees" between farmers and herders. These were successful in agro-pastoral villages, but have yet to form between pastoralists and farmers villages. Conflict resolution committees are a mix of local and formal institutions.

Resource-use conflicts in Ngorongoro area involve the local Maasai and Ngorongoro Conservation Authority over expanding cultivation. The decline of per capita livestock number in pastoral prompted the Maasai pastoralist to start cultivation in order to improve their household food security. Expanding cultivation is threatening the coexistence between pastoralism and wildlife conservation. A local mechanism employed to resolve the conflicts in include a benefit sharing schemes in the form of annual disbursement of USD 500,000 (≡ TSh 500 million) by NCCA to finance community development projects; supplying subsidised grain during dry season; issuing of grazing permits to restricted areas during the dry season and allowing controlled cultivation in order to improve household food security.

### **5.1.6 Institutional innovations in Mkata plains and Ngorongoro Conservation Area**

The main institutional innovation in Mkata plains involves a combination of formal village government system and traditional leadership, whereby important decisions on management of land resources are made by local village elites based on traditional systems. The tendency among Maasai pastoralists has been increased centralization of more authority in both the traditional leader (*Ole Laigwanani*) and spiritual leader (*Olo Laiboni*) who are increasingly assuming administrative roles and providing the checks and balances to local elites. Furthermore, the Maasai pastoralists are increasingly forming formal organisations like the Trust Funds, registered Community Based Organisations and Pastoral Associations. This aims at increasing integration into formal administrative structures.

The trend in Ngorongoro area has been centralizing the traditional authority in the overall tribal spokesman for the entire Kisongo section residing in Ngorongoro area, whose jurisdiction extends beyond the NCA boundaries to Loliondo Game Controlled Area. Such scaling up of the local authority has proved to be effective in advocating for the Ngorongoro Maasai rights. The customary leaders also serve as representatives of local pastoral communities in all political issues and when negotiating with high government organs.

## **5.2 Recommendations**

### **5.2.1 Need for policy changes**

Policy makers should take measures that will aim at improving and sustaining productivity of pastoral systems. One of the recommended measures is to establish secure tenure ship of common grazing areas to specific groups of users. This measure will limit the nomadic movements of pastoralists; it will also provide the incentives to user groups to invest in improvement of the rangelands and to set rules for access and limit the number of animals that can be grazed in their area. Policy measure should integrate and enhance the capacity of existing local institutions through their recognition by formal institutions.

The multiple land use systems like the pastoral and agro-pastoral systems as well as conservation areas have high likelihood of resource-use conflicts. It is recommended to incorporating a “Conflict Management Assessment Tool” in all development plans for the multiple-use systems. This policy tool will aid in identifying and mitigating both potential and real conflicts that may arise due to development interventions.

### **5.2.2 Need for further studies**

High livestock grazing intensities in the study areas has induced retrogressive ecological changes that led to conversion of grasslands into woodlands or invasion by unpalatable grass species. The changes have reduced primary productivity of rangelands. This is detrimental to pastoral economies as well tourism, which are dependent on healthy rangelands. It is recommended to carry out further research in order to establish the sustainable livestock carrying capacities in the two areas. The scientific data should be combined with indigenous pastoral knowledge to determine the sustainable grazing system in the study areas.

### **5.2.3 Need for long term studies on impacts of cultivation in Ngorongoro Conservation Area**

Another area that requires further studies is the conflicting demand for conserving wildlife and permission of cultivation in Ngorongoro area. Cultivation if not managed carefully it may jeopardize the traditional co-existence of pastoralism and wildlife conservation. This will be at detriment to both wildlife conservation and pastoralism. There is a need to conduct detailed and long term studies in order to establish the impacts of cultivation on Ngorongoro ecosystem. Then basing on study results an upper limit of cultivation in the area could be set.

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## APPENDICES

### Appendix 1:A Checklist of Questions for Key Informants

#### 1) Administrative Issues:

Village ..... Ward .....

Village registration number ..... Date .....

Village area (Ha) .....

Village population (Total) .....

Number of Households .....

What is the ethnic composition .....

What is the migration trends? .....

#### 2) Economic Activities

- What are the main economic activities?
- How many households practicing pastoralism?
- How many pastoral households practising farming?
- What is the current herd size?
- Do the pastoralists practice transhumant movement?
- What are the main production constraints?

#### 3) Land Resource Tenure

- Which land resources are owned communally
- Which rules and regulations governing access and use of communal resources
- How compliance to rules is monitored and enforced?
- How land is acquired?
- What is the current health of the communal rangelands ?
- What are the current changes in land use and land resource tenureship?

#### 4) Local Institutions

- Which customary institutions are functional in the area?
- Which roles and functions falls under customary institutions?
- What roles played by customary institution in access and tenureship of land resources?
- Which other institutions operating in the area?

#### 5) Resource-use conflicts

- Which are the main resource-use conflicts in the area?
- When the conflicts first occurred in the area?
- What is the main causes underlying the conflicts and who are the main parties involved in the conflict?
- At which period of the year resource conflicts are likely to occur?
- What is the local mechanism that can resolve resource conflicts?.

- A. 1 Household number.....
- A.2 Age of respondent.....(Years)
- A.3 Who is the head of the household ?  
(1) Male (2) Female
- A.4 What is your marital status ?  
1. Married  
2. Single  
3. Divorced  
4. Widowed ( )  
Others.....
- A. 5 What is your level of education?..... (Years of schooling)
- A. 6 What is your religion  
1. Roman catholic ?  
2. Moslem  
3. Lutheran  
4. Traditional ( )  
5. Other (specify)

## A.7 What is your household composition?

| Category                  | Number | Number residing in household | Number residing outside the household |
|---------------------------|--------|------------------------------|---------------------------------------|
| Adult male                |        |                              |                                       |
| Spouse(s)                 |        |                              |                                       |
| Infants 0 – 5 years       |        |                              |                                       |
| Children 6- 10 years      |        |                              |                                       |
| Female youth 11- 15 years |        |                              |                                       |
| Male youth 11- 17 years   |        |                              |                                       |
| Adult males 18- 65 years  |        |                              |                                       |
| Adult female 16 –65 years |        |                              |                                       |
| Dependants > 65 years     |        |                              |                                       |
| TOTAL                     |        |                              |                                       |

## A. 8 Give reasons for family members staying outside your household

1. Employment in public service
2. Wage labourer
3. Transhumant movement
4. Operating business
5. New farming area
6. Schooling ( )
7. Others.....

## A. 9 For how long you have resided in this village ?.....(Years)

## A. 10 What is your ethnic group?.....

## A. 11 What is the domicile area of your ethnic group ?.....

## A. 12 What is your birth place .....(District)

## A. 13 Have you ever migrated ? 1) Yes 2) No

## A. 14 If yes in Qn A. 13, please indicate the frequency of shift

| Period             | Place | Number of shifts | Reasons for shifting |
|--------------------|-------|------------------|----------------------|
| 0 – 5 years (past) |       |                  |                      |
| 6- 10 years “      |       |                  |                      |
| 6- 15 years “      |       |                  |                      |
| > 15 years “       |       |                  |                      |

## A.15 What are the main reasons for migration?

1. Searching for grazing lands
2. Searching for water
3. Searching for agriculture lands
4. Avoiding livestock disease
5. Avoiding resource conflicts
6. Easy access to marketing facility ( )
7. Others (specify).....

## SOCIO – ECONOMIC INFORMATION

### Section B: Farmholdings

#### B.1 What are your main economic activities

1. Farming
  2. Livestock keeping
  3. Both farming and livestock keeping
  4. Charcoal making ( )
  5. Others (please specify)
- .....
- .....

#### B.2 What occupations performed by other members in your family ?

| Family member | Sex | Age | Education level | Occupation |
|---------------|-----|-----|-----------------|------------|
| Husband       |     |     |                 |            |
| Wife          |     |     |                 |            |
| Relatives     |     |     |                 |            |

#### B.3 Do you own any land in this village ? 1) Yes 2) No

#### B.4 If yes in Qn B.3 How did you acquire the land you own?

1. Bought
  2. Rented
  3. Inherited ( )
  4. Allocated by government
  5. Other (specify)
- .....
- .....

#### B.5 What is the total agricultural land you own .....(Ha)

#### B.6 Where is the location of your farm plots in the landscape ?

1. Beside the stream/river
  2. Around homestead
  3. Near the grazing lands ( )
  4. Other (Specify)
- .....
- .....

#### B.7 How far is your farm holding located from the village? .....(Km)

#### B.8 Is your land holding adequate? (1) Yes (2) No

B.9 If not in Qn B. 8, give the reasons

.....

B.10 How much additional land do you need? ..... (Ha)

B.11 For how long have you been cropping the same field? .....(Years)

B.12 Do you think soil fertility in your farm have changed? (1) Yes (2) No

B.13 If yes in Qn B .12, in which direction is the change?

1. Decreased a lot
2. Little decrease
3. Little increase
4. Increased a lot
5. I don't know ( )

B.14 What property rights do you have over your farm holdings?

1. Have title deed
2. Have customary rights
3. Village protection
4. No rights ( )
5. I don't know

B.15 Does the land rights influence your investment decisions with regard to farm production ? (1) Yes (2) No

B. 16 If yes in Qn B.15 in which ways you are affected by the land rights?

1. Expansion of farm holding
2. Improving farming methods
3. Diversification of enterprises
4. Land conservation measures ( )
5. Others (specify)

.....

B.17 Is your village experiencing an influx of immigrants of other ethnic groups ?  
(1) Yes (2) No

B.18 Have the immigrants affected the land holdings you previously had traditional rights to? (1) Yes (2) No

B.19 If yes in Qn B.18, how did you manage the situation?

.....

**Section C: Livestock Production**

C..1 Do you own livestock ? (1) Yes (2) No

C. 2 If yes in Qn C.1, what categories of livestock your are owning ?

| Type of animal | Number | Feeding system | Purpose for keeping the animal category |
|----------------|--------|----------------|---|
| Cattle         |        |                |   |
| Goats          |        |                |   |
| Sheep          |        |                |   |
| Donkeys        |        |                |   |
| Total (TLU)    |        |                |   |

C.3 Where do you graze your livestock?

1. Communal grazing lands
2. Fallow lands
3. Harvested fields
4. Established pastures
5. Privately owned pastures ( )

C.4 Is the available grazing land adequate

(1) Yes (2) No

C.5 If no in Qn C.4, what is the main reason?

1. Too many animals.
2. Poor pastures
3. Encroachment by farmers ( )
4. Others (specify)

C.6 At what time of the year do you experience shortage of pastures for your livestock?

1. Dry season
2. Rain season
3. All year round ( )
4. Other (specify)

C.7 Do you have access to crop residues on fields belonging to farmers?

(1) Yes (2) No

C.8 If yes in Qn C.7, under which terms do you access to the crop residues?

1. Freely available
2. Purchase
3. Exchange with livestock manure
4. Negotiate with farmers ( )
5. Other (specify)

C.9 Who decides on general grazing matters in this village?

1. Village government leaders
2. Customary leaders

3. Grazing management groups  
 4. Farmer groups ( )  
 5. Others (specify)

C.10 Are there any restrictions on stocking rates in this village?

(1) Yes (2) No

C.11 If yes in Qn C.10, who imposes these restrictions?

.....

C.12 Which institutions are involved with regulation of resource use in this village?

1. Customary authority  
 2. Farmer groups  
 3. Grazing management groups  
 4. Formal institutions set by the government  
 5. Mixed institutions ( )

C.13 Which of the institutions in C.12, has legitimacy and exercise the real power over Resource control?

.....C.

14 Are there any by-laws which bar grazing in some areas?

(1) Yes (2) No

C.15 If yes in Qn C.14, what are these areas?

.....

C.16 Is there any degradation of range resources ? (1) Yes (2) No

C.17 If yes in Qn C. 16, how do you rate the extent of range degradation ?

1. Very high degradation  
 2. High degradation  
 3. Medium degradation  
 4. Slight degradation  
 5. Not sure ( )

C.18 What are the main causes of range degradation ?

.....

C.19 In your opinions how can the grazing lands be improved ?

1. Demarcating grazing lands  
 2. Restricting stocking rates  
 3. Destocking  
 4. Pasture improvement  
 5. Imposing a tax on grazing lands ( )

C.20 What incentives would attract you to participate in improvement of grazing lands?

1. Casual employment  
 2. Granting grazing rights  
 3. Education on conservation values  
 4. Re-introduce customary management ( )  
 5. Other (specify)

.....



C.21 What are the main sources of information on range management available to you ?  
.....

C.22 How many numbers of visits by village extension officer per month ?  
.....

C.23 Are you an immigrant into this village? (1) Yes (2) No

C.24 If yes in Qn C.23, what incentives attracted you to migrate to this village?

1. Availability of grazing lands
  2. Availability of water
  3. Land for cultivation
  4. Ecological stability
  5. Easy access to market ( )
  6. Other (specify)
- .....

C.25 Does the immigrant pastoralists have rights of access to the grazing lands in this village? (1) Yes (2) No

C.26 How do immigrant pastoralists interact with farmers in the village?  
.....

C.27 What are the attitudes of indigenous ethnic groups towards immigrants? .....C.

28 Do you have to move your herd to grazing areas in other villages ?  
(1) Yes (2) No

C. 29 If yes in Qn C.28 what proportion of your herd is moved ?  
.....

C.30 At what time of the year the herd is moved to other areas ?  
.....

C.31 How do you gain access to grazing areas in other villages?  
.....

C.32 Who are consulted before making decision on herd movement ?

1. Youths involved in herding
2. Relatives residing in neighbouring villages
3. Elders in the village
4. Customary leaders ( )

C.33 Does the herders in the village make collective decisions?  
(1) Yes (2) No

C.34 If yes in Qn C.33, please explain  
.....

C.35 Does your household experience any labour shortage for herd management ?  
(1) Yes (2) No

C.36 What are the main livestock production constraints you are facing?

.....

C.37 Do you combine livestock production with crop production ?

(1) Yes (2) No

C.38 If yes in Qn C. 37, when did you start crop production?.....(Year)

C.39 What are the main reasons for your engaging in crop production ?

.....

#### **Section D: Social Interactions**

D.1 Do you belong to any social group ?

(1) Yes (2) No

D.2 If yes in Qn D.1 what is the composition of this group ?

.....

D.3 What are the functions of the social group indicated in Qn D.2 ?

.....D.

4 What advantages do you get through your membership to this group?

1. Enjoy social interactions

2. Social support

3. Psychological support

4. Production benefits ( )

D.5 Are there any spiritual healers in this village ? (1) Yes (2) No

D.6 If yes in Qn D.5, how are they regarded in the village community ?

.....

D.7 Are there any multipurpose institutions in the village ? (1) Yes (2) No

D.8 If yes in Qn D.7, please explain

.....

D.9 Do you observe any of your tribal traditional ceremonies and rituals ?

(1) Yes (2) No

D.10 If yes in Qn D. 9, please explain

.....

D. 11 Do you have a tribal leader in this village ?

(1) Yes (2) No

D.12 If yes in Qn D .11, what are the roles played by the traditional leader ?

.....

D.13 Does the tribal leader authority recognised by other ethnic groups ?

(1)Yes (2) No

D.14 Are there any inter-ethnic group marriages ?

(1) Yes (2) No

D.15 If yes in Qn D.14, which ethnic groups inter-marry ?

D.16 Is there any inter-ethnic groups co-operation ?

(1) Yes (2) No

D. 17 If yes in Qn D.16, in which areas the different ethnic groups co-operate?

.....

D.18 Is there any resource use conflicts?

(1) Yes (2) No

D. 19 If yes in Qn D.18, which types of resource conflicts are common in the village?

.....

D. 20 Which resource users are involved in conflicts?

.....

D.21 When the resource conflicts were first experienced in this village?

.....

D. 22 During which time of the year the resource conflicts intensify?

.....

D. 23 What are the main causes underlying resource conflicts?

.....

D. 24 How the resource conflicts are resolved?

.....

D.25 Is there any local mechanism for resolving resource conflicts?

(1) Yes (2) No

D.26 If yes in Qn. D. 25, please explain

.....

D.27 How do you rate the capacity of local institutions in resolving resource conflicts?

.....

D.28 How do you rate the capacity of local government in conflict resolution?

.....

D.29. In your opinions how best the resource conflicts can be resolved?

.....

### Appendix 3 Range Survey Sheet

#### Range Condition Assessment

---

Region: ..... District: .....  
 Ranch: ..... Organisation: .....  
 Paddock No: ..... Site No: .....  
 Ecological Zone: ..... Vegetation type: .....  
 Assessor: ..... Date: .....

| Plant species   | Frequency Counts<br>(Step – point Method) | $\Sigma$ | %<br>comp. |
|-----------------|---|----------|------------|
| <u>Grasses:</u> |   |          |            |
| Forbs:          |   |          |            |
| Woody:          |   |          |            |
| Litter          |   |          |            |
| Bare ground     |   |          |            |

Climax Portion: .....

Condition Rating

.....

.....

.....

Total: .....



**Appendix 4: Main land use practices in the study villages in Mkata plains**

| Land use                      | Number of respondents |           |          |          |              |
|-------------------------------|-----------------------|-----------|----------|----------|--------------|
|                               | Twatwatwa             | Mabwegere | Msowero  | Mbwade   | Total(n=267) |
| Farming                       | NA                    | NA        | 69(40.6) | 5(16.7)  | 74(27.7)     |
| Livestock keeping             | 9(24.3)               | 26(93.0)  | 17(10.0) | 5(16.7)  | 59(22.1)     |
| Farming and livestock keeping | 28(75.7)              | NA        | 59(34.7) | 17(56.7) | 104(56.7)    |
| Others                        | NA                    | NA        | 2(1.2)   | NA       | 2(0.8)       |

Key: Numbers in brackets are percentages

NA =Not applicable

**Appendix 5: Ethnic composition in the study villages in Mkata plains**

| Ethnic groups | Number of respondents |                       |                      |                   |                   |
|---------------|-----------------------|-----------------------|----------------------|-------------------|-------------------|
|               | Twatwatwa<br>(n = 37) | Mabwegere<br>(n = 30) | Msowero<br>(n = 170) | Mbwade<br>(n =30) | Total<br>(n= 267) |
| Malaysia      | 37 (100)              | 30 (100)              | 3(1.8)               | 17 (56.7)         | 87 (32.6)         |
| Barbaig       | NA                    | NA                    | 6(3.5)               | NA                | 6(2.2)            |
| Arusha        | NA                    | NA                    | NA                   | NA                | NA                |
| Sagara        | NA                    | NA                    | 23(13.5)             | 1(3.3)            | 24(9.0)           |
| Kaguru        | NA                    | NA                    | 4(2.4)               | 1(3.3)            | 5(1.9)            |
| Pogoro        | NA                    | NA                    | 81(47.6)             | 1(3.3)            | 82(30.7)          |
| Gogo          | NA                    | NA                    | 19(11.2)             | 9(30.0)           | 28(10.5)          |
| Nyamwezi      | NA                    | NA                    | 7(4.1)               | NA                | 7(2.6)            |
| Sukuma        | NA                    | NA                    | 8(4.7)               | 1(3.3)            | 9(3.4)            |
| Nyaturu       | NA                    | NA                    | 16(9.4)              | NA                | 16(6.0)           |
| Others        | NA                    | NA                    | 3(1.8)               | NA                | 3(1.1)            |
| Total         | 37(100)               | 30 (100)              | 170(100.0)           | 30(100.0)         | 267(100.0)        |

Key: -Numbers in brackets are percentages      -NA = Not applicable

**Appendix 6: Livestock ownership by respondents in study villages in Mkata plains**

| Owning livestock | Number of respondents |                   |                  |                 |                |
|------------------|-----------------------|-------------------|------------------|-----------------|----------------|
|                  | Twatwatwa (n= 37)     | Mabwegere (n= 30) | Msowero (n= 170) | Mbwade (n = 30) | Total (n =267) |
| Yes              | 37(100.0)             | 21(70.0 )         | 23( 13.5)        | 15( 50.0)       | 96( 39.3)      |
| No               | 0.0                   | 7( 23.3)          | 130( 76.5)       | 11(36.7 )       | 148( 60.7)     |

Key -Numbers in brackets are valid percentages,

- Percentages in some columns are not totalling to 100 because of missing data

**Appendix 7: Response distribution on land availability in the study villages in Mkata plains**

| Land availability | Number of respondents |                  |                 |               |               |
|-------------------|-----------------------|------------------|-----------------|---------------|---------------|
|                   | Twatwatwa (n =37)     | Mabwegere (n=30) | Msowero (n=170) | Mbwade (n=30) | Total (n=267) |
| Adequate          | 8 (21.6)              | 1(3.3)           | 86(50.6)        | 13(43.3)      | 108(54.8)     |
| Inadequate        | 21(56.8)              | 1(3.3)           | 59(34.7)        | 8(26.7)       | 89(45.2)      |

- Numbers in brackets are percentages, Percentages in some columns are not adding to 100 because of missing data

**Appendix 8: Response distribution on land holding by study villages in Mkata plains**

| Landholding category | Number of respondents |                  |                 |               |               |
|----------------------|-----------------------|------------------|-----------------|---------------|---------------|
|                      | Twatwatwa (n =37)     | Mabwegere (n=30) | Msowero (n=170) | Mbwade (n=30) | Total (n=267) |
| 0.5 – 1.0 ha         | 12(32.4)              | NA               | 54(31.8)        | 6(20.0)       | 72 (27.0)     |
| 1.1 – 2.0 ha         | 10(27.0)              | NA               | 43(25.3)        | 5(16.6)       | 58 (21.7)     |
| 2.1 – 5.0 ha         | 6(16.2)               | NA               | 28(16.4)        | 3(9.9)        | 37 (13.8)     |
| 5.1 – 10. ha         | NA                    | NA               | 1(0.6)          | 2(6.6)        | 3(1.1)        |
| > 10 ha              | 2 (5.2)               | NA               | NA              | NA            | 2(0.7)        |

Key -Numbers in brackets are percentages, - NA = No answer

**Appendix 9: Main land use practices by respondents in the study villages in Ngorongoro Conservation Area**

| Land-use                         | Number of respondents |                    |                    |                    |                   |
|----------------------------------|-----------------------|--------------------|--------------------|--------------------|-------------------|
|                                  | Kakesio<br>(n=35)     | Enduleni<br>(n=84) | Naiyobi<br>(n=105) | Irkeepus<br>(n=81) | Total<br>(N= 305) |
| Farming                          | NA                    | 49<br>(58.3)       | 56 (53.3)          | NA                 | 105 (34.4)        |
| Livestock keeping                | 35 (100)              | NA                 | NA                 | 81(100)            | 116 (35.3)        |
| Farming and<br>Livestock keeping | NA                    | 35<br>(32.4)       | 49(46.7)           | NA                 | 84 (25.5)         |

Key: - Numbers in brackets are percentages, -NA = Not applicable

**Appendix 10: Livestock ownership by respondents in Ngorongoro Conservation Area**

| Owning cattle | Number of respondents |                   |                    |                    |                    |
|---------------|-----------------------|-------------------|--------------------|--------------------|--------------------|
|               | Kakesio<br>(n=35)     | Eduleni<br>(n=84) | Irkeepus<br>(n=81) | Naiyobi<br>(n=105) | Total<br>( n= 305) |
| Yes           | 35(100.0 )            | 35(41.7)          | 81(100.0 )         | 105(100.0 )        | 256(83.9)          |
| No            | NA                    | 49(58.3)          | NA                 | NA                 | 49(14.0)           |

Key : - Numbers in brackets are percentages, NA = Not applicable

**Appendix 11: Ethnic composition of respondents by study villages in Ngorongoro Conservation Area**

| Ethnic group | Number of respondents |                     |                     |                     |                   |
|--------------|-----------------------|---------------------|---------------------|---------------------|-------------------|
|              | Kakesio<br>(n= 35)    | Enduleni<br>(n= 84) | Irkeepus<br>(n= 81) | Naiyobi<br>(n= 105) | Total<br>(N= 305) |
| Malaysia     | 35(100.0)             | 80(95.2)            | 81(100.0)           | 105(100.0 )         | 301 (98.7)        |
| Arusha       | NA                    | 4(3.7)              | NA                  | NA                  | 4 (1.3)           |

Key: Numbers in brackets are percentages



**Appendix 12: Response distribution on land availability in study villages in Ngorongoro Conservation Area**

| Land availability | Frequency of respondents |                    |                     |                    |                    |
|-------------------|--------------------------|--------------------|---------------------|--------------------|--------------------|
|                   | Kakesio<br>(n=35)        | Enduleni<br>(n=84) | Irkeepus<br>(n= 81) | Naiyobi<br>(n=105) | Total<br>(N = 305) |
| Adequate          | 33 (94.3)                | 84 (100.0)         | 76 (93.8)           | 53 (50.5)          | 246 (74.5)         |
| Inadequate        | 2 (5.7)                  | NA                 | 5 (6.2)             | 13(12.4)           | 20 (6.1)           |

Key -Numbers in brackets are percentages, -Some data in the table are not adding to hundred percent because of missing figures

- NA = No answer

**Appendix 13: Land ownership by respondents in study villages in Mkata plains**

| Land owner-ship | Number of respondents |                     |                    |                     |                  |
|-----------------|-----------------------|---------------------|--------------------|---------------------|------------------|
|                 | Twatwatwa<br>(n =37 ) | Mabwegere<br>(n=30) | Msowero<br>(n=170) | Mabwegere<br>(n=30) | Total<br>(N=267) |
| Yes             | 30 (81.1)             | 7 (23.3)            | 109 (64.1 )        | 18 (60.0 )          | 164(61.4)        |
| No              | 6(16.2)               | 23 (76.7)           | 42 (24.7 )         | 12 (40.0 )          | 72 (27.0)        |

Key: - Numbers in brackets are percentages, Data in some columns does not total up to sample size because of missing data

**Appendix 14: Distribution of landholding categories of respondents from study villages in Mkata plains**

| Land hold    | Number of respondents |                     |                    |                  |                  |
|--------------|-----------------------|---------------------|--------------------|------------------|------------------|
|              | Twatwatwa<br>(n =37)  | Mabwegere<br>(n=30) | Msowero<br>(n=170) | Mbwade<br>(n=30) | Total<br>(n=267) |
| 0.5 – 1.0 ha | 12(32.4)              | NA                  | 54(31.8)           | 6(20.0)          | 72(30.5)         |
| 1.1 – 2.0 ha | 10(27.0)              | NA                  | 43(25.3)           | 5(16.6)          | 58(21.7)         |
| 2.1 – 5.0 ha | 6(16.2)               | NA                  | 28(16.4)           | 3(9.9)           | 37(13.9)         |
| 5.1 – 10. ha | NA                    | NA                  | 1(0.6)             | 2(6.6)           | 3(1.1)           |
| > 10 ha      | 2 (5.2)               | NA                  | NA                 | NA               | 2(0.7)           |

Key: - Numbers in brackets are percentages,

-Data in some columns does not total up to 100 because of missing data

**Appendix 15: Response distribution on land ownership in the study villages in Ngorongoro Conservation Area**

| Owning land | Number of respondents |                        |                     |                    |                    |
|-------------|-----------------------|------------------------|---------------------|--------------------|--------------------|
|             | Kakesio<br>(n=35)     | Endulen<br>i<br>(n=84) | Irkeepus<br>(n= 81) | Naiyobi<br>(n=105) | Total<br>(N = 305) |
| Yes         | NA                    | 29( 26.6 )             | NA                  | NA                 | 29(9.5)            |
| No          | NA                    | ( 55 )                 | 81(100)             | 53(50.5)           | 189(62.0)          |

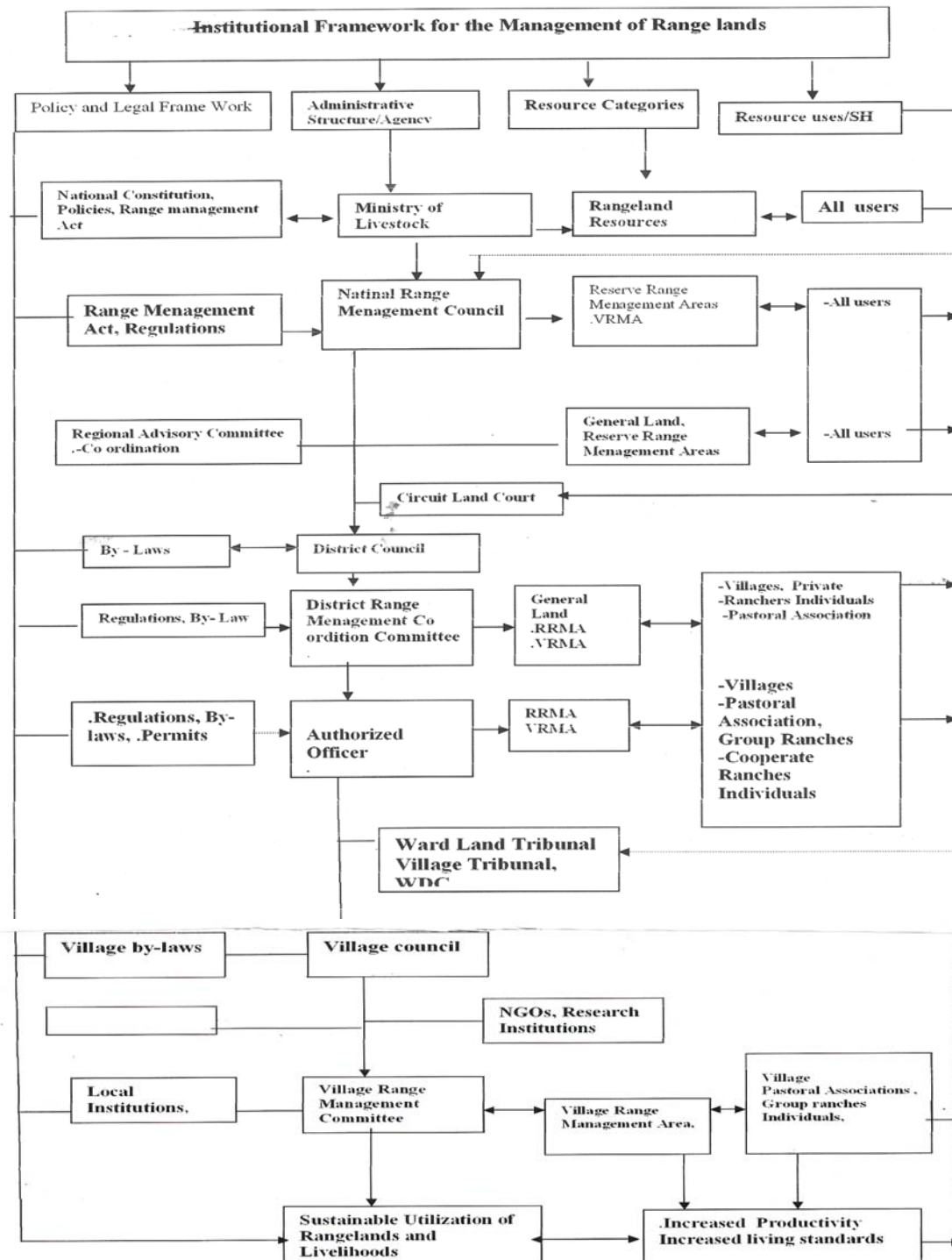
Key - Numbers in brackets are percentages, - NA = No answer provided

**Appendix 16: Land acquisition and tenurial security of respondents in Ngorongoro Conservation Area**

| Land acquisition                | Number of respondents |                    |                     |                    |                    |
|---------------------------------|-----------------------|--------------------|---------------------|--------------------|--------------------|
|                                 | Kakesio<br>(n=35)     | Enduleni<br>(n=84) | Irkeepus<br>(n= 81) | Naiyobi<br>(n=105) | Total<br>(n = 305) |
| Bought                          | NA                    | NA                 | NA                  | NA                 | NA                 |
| Rented                          | NA                    | NA                 | NA                  | NA                 | NA                 |
| Inherited                       | 33(94.3)              | 68(80.9)           | 74<br>(91.4)        | 37(35.2)           | 179(58.7)          |
| Allocated by village government | NA                    | 36(10.3)           | NA                  | 51(48.6)           | 120(39.3)          |
| Land security                   | (n=35)                | (n=84)             | (n= 81)             | (n=105)            | (N = 305)          |
| Title deed                      | NA                    | NA                 | NA                  | NA                 | NA                 |
| Customary rights                | 35 (100.0)            | 80(95.2)           | 39(13.4)            | 37(35.2)           | 191(62.6)          |
| Village government              | NA                    | 81(96.4)           | NA                  | 51(48.6)           | 155(50.8)          |
| No rights                       | NA                    | NA                 | 7(2.4)              | 17(16.2)           | 24(7.8)            |

Key: -Numbers in brackets are percentages, -Some data in the table are totalling above 100 because of multiple response, - NA = No answer

## Appendix 17: Institutional framework for management of rangelands and resolving resource-use conflicts



Key: CRC= Conflict Resolution Committees, VRMA= Village Rangeland Management Area, JVMA= Joint Village Range Land management Area, VLT=Village land tribunal,

**Appendix 18: Monthly rainfall (mm) from 1975 to 1998 in Central Kilosa**

| Year | Jan   | Feb   | Marc  | Apr   | May   | Jun  | July | Aug  | Sept  | Oct   | Nov.  | Dec.  | Total  |
|------|-------|-------|-------|-------|-------|------|------|------|-------|-------|-------|-------|--------|
| 1975 | 84.2  | 46.6  | 245.9 | 297.7 | 91.6  | 6    | 1.2  | 1.8  | 19.2  | 10.2  | 0.3   | 182.1 | 986.8  |
| 1976 | 89.5  | 156.4 | 148.6 | 220.5 | 89.2  | 39.4 | 5.8  | 23.6 | 0     | 12.3  | 3     | 10.3  | 798.6  |
| 1977 | 306.4 | 130.4 | 72.4  | 154.1 | 26.2  | 1.6  | 3.5  | 17.2 | 103.8 | 23    | 153.8 | 346.4 | 1338.8 |
| 1978 | 43.3  | 48.9  | 215.4 | 275.2 | 36.1  | 12.3 | 5.2  | 5.8  | 0     | 1     | 197   | 176.9 | 1017.1 |
| 1979 | 193.1 | 170.4 | 279   | 299   | 77.8  | 32.3 | 1.9  | 2.7  | 8.2   | 19.8  | 31.2  | 98.2  | 1213.6 |
| 1980 | 353.1 | 62.2  | 73.6  | 294.5 | 60.3  | 0    | 1.3  | 18.1 | 0.7   | 18.5  | 81.4  | 125.1 | 1088.8 |
| 1981 | 89.5  | 199.6 | 131.7 | 171.6 | 217.6 | 18.4 | 14.3 | 6.6  | 12    | 26.7  | 49.1  | 361.4 | 1298.5 |
| 1982 | 96.5  | 73.5  | 86    | 262.3 | 91.7  | 12.7 | 15   | 14.4 | 45    | 276.4 | 195.1 | 220.7 | 1389.3 |
| 1983 | 116.4 | 97.4  | 340.6 | 103.2 | 152.2 | 9.3  | 30.3 | 0.7  | 8.7   | 4.6   | 0     | 104.2 | 967.6  |
| 1984 | 171.4 | 108.1 | 100.1 | 168.8 | 96.2  | 11.1 | 65.6 | 42   | 26.5  | 64.1  | 212.8 | 117.5 | 1184.2 |
| 1985 | 176.4 | 139.8 | 134.7 | 192.9 | 47.6  | 2.7  | 5    | 2.3  | 17.5  | 0     | 80.2  | 147.2 | 946.3  |
| 1986 | 216.4 | 90.4  | 190.9 | 136   | 59.9  | 2.8  | 1.9  | 26   | 0.9   | 5.5   | 198.1 | 214.2 | 1143   |
| 1987 | 165.2 | 221.8 | 122.1 | 133.1 | 83.8  | 5    | 48.4 | 21.2 | 2     | 68.6  | 64.7  | 59.2  | 995.1  |
| 1988 | 220.8 | 71.2  | 119.2 | 148.4 | 36.4  | 88.5 | 1.9  | 13.5 | 21.5  | 10.1  | 34.2  | 86.3  | 852    |
| 1989 | 146.7 | 52.6  | 129   | 179.4 | 91.5  | 56.9 | 4.7  | 20.1 | 1.3   | 78.4  | 60.8  | 153.9 | 975.3  |
| 1990 | 75.4  | 147.9 | 276.6 | 185.8 | 25.7  | 0    | 1.7  | 18.8 | 14    | 12    | 79    | 43.1  | 880    |
| 1991 | 244.4 | 43    | 261.6 | 121.9 | 85.9  | 4.3  | 68.9 | 25.8 | 97.8  | 2.4   | 79.1  | 27    | 1062.1 |
| 1992 | 8.9   | 170.5 | 187.1 | 442.2 | 121.5 | 29.5 | 1.9  | 42.5 | 0.1   | 0     | 322.5 | 139.9 | 1466.6 |
| 1993 | 96.5  | 90.6  | 301   | 370.8 | 115.1 | 1.8  | 2.6  | 6.7  | 4     | 8.3   | 45.5  | 0.7   | 1043.6 |
| 1994 | 244.0 | 160.2 | 232.6 | 80.5  | 22.1  | 10.2 | 4.9  | 27.1 | 0.7   | 39.6  | 59.5  | 163   | 1044.4 |
| 1995 | 182.6 | 83.1  | 204.2 | 104.6 | 61.5  | 2.3  | 0    | 26.8 | 14.6  | 76.9  | 0     | 70.5  | 827.1  |
| 1996 | 61.5  | 175.1 | 86.3  | 159.6 | 175.2 | 3.4  | 6.8  | 3.4  | 16    | 12.5  | 8.1   | 31.5  | 739.4  |
| 1997 | 78.3  | 82.9  | 151.1 | 214.7 | 28.1  | 54.4 | 1.3  | 50.9 | 3.8   | 81.2  | 168   | 716.3 | 1631   |
| 1998 | 297.4 | 126.4 | 170.5 | 201.3 | 122.4 | 15.1 | 1    | 32.8 | 43.8  | 9.8   | 0     | 0     | 1020.5 |
| Mean | 156.6 | 114.5 | 177.5 | 204.9 | 84    | 17.5 | 12.3 | 18.8 | 19.3  | 35.9  | 88.5  | 149.8 | 1079.6 |

**Appendix 19: Monthly rainfall NCA- Head quarters 1963-2003**

| YEAR | JAN   | FEB   | MAR   | APR   | MAY   | JUN  | JUL  | AUG  | SEP  | OCT   | NOV   | DEC   | TOTAL  |
|------|-------|-------|-------|-------|-------|------|------|------|------|-------|-------|-------|--------|
| 1963 | 140.7 | 80.1  | 170.3 | 240.3 | 130.8 | 50.6 | 10   | 2.7  | 8.1  | 29    | 310.3 | 200.9 | 1373.8 |
| 1964 | 40.6  | 140.4 | 190.4 | 290.2 | 30.1  | 10   | 20   | 10   | 5.5  | 6.3   | 30    | 150.1 | 923.6  |
| 1965 | 100.7 | 70.1  | 120.9 | 150.4 | 70.1  | 11   | 7    | 2.5  | 50   | 10.8  | 2.5   | 50.5  | 646.5  |
| 1966 | 20.2  | 70.6  | 140.3 | 30.7  | 50.8  | 50.1 | 37   | 1    | 4.5  | 10.7  | 10.5  | 60    | 486.4  |
| 1967 | 50    | 80.6  | 60.8  | 250.7 | 260.1 | 70.6 | 100  | 50.1 | 50.5 | 70.8  | 170.7 | 200.3 | 1415.2 |
| 1968 | 120.1 | 80.9  | 100.7 | 160.3 | 260.6 | 4.3  | 4.5  | 0.5  | 0.5  | 8.6   | 100.2 | 200.8 | 1042   |
| 1969 | 94.9  | 129.6 | 13.9  | 16.5  | 11.4  | 5.4  | 22.8 | 43   | 46.2 | 160   | 245.3 | 76.2  | 865.2  |
| 1970 | 251.3 | 88.1  | 191.2 | 115.7 | 94.7  | 22.5 | 23   | 9    | 5.5  | 6     | 105.4 | 177.9 | 1090.3 |
| 1971 | 55.9  | 69.5  | 37.3  | 224.3 | 47.4  | 18.8 | 15.8 | 15.1 | 6    | 5     | 28.6  | 97.8  | 621.5  |
| 1972 | 104.6 | 128.7 | 108.7 | 84.2  | 108.8 | 31.3 | 5.8  | 3    | 0.9  | 121.7 | 154.4 | 181.4 | 1033.5 |
| 1973 | 303.8 | 278.8 | 5.4   | 181.4 | 39.1  | 13.1 | 7    | 4    | 8    | 10    | 34.4  | 38.8  | 923.8  |
| 1974 | 51.6  | 56.6  | 308.4 | 39.5  | 48.9  | 41.5 | 7.2  | 10.4 | 10.4 | 2.7   | 42.1  | 82.1  | 701.4  |
| 1975 | 66.1  | 32.2  | 142.8 | 121.1 | 118.2 | 3.6  | 28.9 | 3    | 8.7  | 15    | 4.5   | 117.9 | 662    |
| 1976 | 54    | 90.8  | 112   | 206.2 | 42    | 27.3 | 3.5  | 6.2  | 15.5 | 16.5  | 57.3  | 81.8  | 713.1  |
| 1977 | 133.1 | 173.2 | 103.1 | 300.8 | 85.6  | 2.3  | 1.9  | 10   | 14.4 | 48    | 112.8 | 145.5 | 1130.7 |
| 1978 | 160   | 61.3  | 228.1 | 197.4 | 58.7  | 12.1 | 2.7  | 2.5  | 4    | 40.1  | 51.8  | 131.5 | 950.2  |
| 1979 | 140.4 | 103.7 | 136.6 | 227.8 | 26.5  | 10.1 | 34.4 | 3    | 3    | 7     | 3     | 110   | 805.5  |
| 1980 | 73.1  | 22.6  | 10.4  | 69.5  | 93.7  | 12.7 | 7    | 58.4 | 12.7 | 10.1  | 80.7  | 57.1  | 508    |
| 1981 | 73    | 60.5  | 183.8 | 137.6 | 101   | 11   | 2.5  | 28.4 | 6    | 35    | 23.3  | 121.1 | 783.2  |
| 1982 | 90.2  | 62.3  | 48.5  | 152.1 | 137.6 | 49.7 | 15.5 | 30   | 30.6 | 102.3 | 167.8 | 156.4 | 1043   |
| 1983 | 352.8 | 75.3  | 287.2 | 329.1 | 299.4 | 80.5 | 13.7 | 4.9  | 14.4 | 16    | 45.9  | 87.9  | 1607.1 |
| 1984 | 103.3 | 39.7  | 97.3  | 178.8 | 29.2  | 20.3 | 25.2 | NIL  | 1.1  | 105.7 | 110.4 | 105.2 | 816.2  |

|             |       |       |       |       |       |      |      |      |     |       |       |       |               |
|-------------|-------|-------|-------|-------|-------|------|------|------|-----|-------|-------|-------|---------------|
| <b>1985</b> | 28.8  | 96.5  | 282.4 | 203.9 | 79.4  | 5.7  | 5.3  | 2.5  | NIL | 15    | 129.5 | 71.4  | <b>920.4</b>  |
| <b>1986</b> | 86    | 20    | 189.7 | 191.1 | 139.5 | 11.1 | NIL  | 2    | 1   | 81.5  | 99.5  | 179.5 | <b>1000.9</b> |
| <b>1987</b> | 135.3 | 99    | 141.1 | 71    | 141.5 | 4.5  | NIL  | 11.1 | NIL | NIL   | 37.7  | 72.2  | <b>713.4</b>  |
| <b>1988</b> | 215.2 | 56.7  | 93.7  | 176.3 | 10.5  | 28   | 0.5  | 17.3 | 6.1 | 23.4  | 29.9  | 87.2  | <b>744.8</b>  |
| <b>1989</b> | 117.6 | 122.4 | 203.3 | 318   | 180   | 21/1 | NIL  | 10   | 20  | 118.3 | NIL   | 187.4 | <b>1277</b>   |
| <b>1990</b> | 76.3  | 167.4 | 167.8 | 179   | 128   | 4    | NIL  | NIL  | 2.5 | NIL   | NIL   | 160   | <b>885</b>    |
| <b>1991</b> | 97.9  | 40    | 83    | 128,2 | 94.8  | 7.7  | 2.2  | NIL  | NIL | 43    | 38.2  | 284   | <b>690.8</b>  |
| <b>1992</b> | NIL   | 91    | 67    | 330   | 14    | NIL  | NIL  | NIL  | NIL | 10.4  | 7     | 188.4 | <b>707.8</b>  |
| <b>1993</b> | 128   | 108   | 104   | NIL   | 103   | NIL  | NIL  | NIL  | NIL | NIL   | 6     | NIL   | <b>449</b>    |
| <b>1994</b> | 130   | 170   | 320   | 270   | 210   | 45   | 32   | NIL  | NIL | 66    | 87    | 76    | <b>1406</b>   |
| <b>1995</b> | 2     | 20    | 67    | 109   | 98    | NIL  | NIL  | NIL  | NIL | -     | -     | -     | <b>296</b>    |
| <b>1996</b> | -     | 91    | -     | 284   | 128.8 | 35.1 | -    | NIL  | NIL | NIL   | 15    | 204.4 | <b>758.3</b>  |
| <b>1997</b> | 0     | 0     | 274.9 | 428.6 | 258.4 | 47   | 15   | NIL  | NIL | 35    | 206   | 440.1 | <b>1705</b>   |
| <b>1998</b> | 292.3 | -     | -     | -     | -     | 37   | NIL  | NIL  | NIL | 17    | 51    | 26.5  | <b>423.8</b>  |
| <b>1999</b> | 107.5 | 10.5  | 167   | 85.1  | 6     | NIL  | NIL  | 32   | 8   | 0,5   | 35.5  | 51    | <b>502.6</b>  |
| <b>2000</b> | 38    | 89.7  | 79    | 78.8  | 73.2  | 16.5 | 1    | 33   | NIL | NIL   | 122   | 155   | <b>686.2</b>  |
| <b>2001</b> | 369   | 88.5  | 171.8 | 181.2 | 99.3  | 5.9  | 25   | 6    | NIL | 1     | 41    | 63.9  | <b>1052.6</b> |
| <b>2002</b> | 145.1 | 123.9 | 142   | 234.6 | 147.1 | 0    | 2    | 16   | 0   | 60.5  | 56    | 216.6 | <b>1143.8</b> |
| <b>2003</b> | 146   | 64    | 67.1  | 57.5  | 207.5 | 122  | 10.5 | 1    | 4.5 | 44.7  | 18    | 22.5  | <b>765.3</b>  |

**Appendix 20: Livestock population in the study villages in Ngorongoro conservation area**

| Year, 1994 |            |                                   |                           | Year, 2000 |                                   |                           |
|------------|------------|-----------------------------------|---------------------------|------------|-----------------------------------|---------------------------|
| Village    | No. Cattle | No. small stock (livestock units) | Equivalent livestock unit | No. Cattle | No. small stock (Livestock units) | Equivalent livestock unit |
| kakesio    | 56,602     | 5,232 (1,308)                     | 57,870                    | 4,180      | 4,487 (1,121)                     | 5,301                     |
| Enduleni   | 110,073    | 9,884 (2,477)                     | 112,544                   | 13,926     | 14,485 (3,621)                    | 17,547                    |
| Irkeepus   | 10,271     | 93,338 (23,334)                   | 33,605                    | 8,111      | 4,955 (1,238)                     | 9,349                     |
| Naiyobi    | 16,133     | 11,106 (2,776)                    | 18,909                    | 7,134      | 13,859 (3,464)                    | 10,598                    |
|            |            |                                   |                           | 33,351     | 37,786                            | 42,795                    |

Key: 1 livestock unit  $\equiv$  4 goats or sheep

**Appendix 21: Livestock population in the study villages in Mkata plains**

| Year, 1994 |            |                                   |                           | Year, 2000 |                                   |                           |
|------------|------------|-----------------------------------|---------------------------|------------|-----------------------------------|---------------------------|
| Village    | No. Cattle | No. small stock (livestock units) | Equivalent livestock unit | No. Cattle | No. small stock (Livestock units) | Equivalent livestock unit |
| Twatwatwa  | 60,732     | 30,406 (7,601)                    | 68,333                    | 13,495     | 2,559 (639)                       | 14,134                    |
| Mabwegere  | 37,064     | 47,402 (11,850)                   | 48,914                    | 9,375      | 1,268 (317)                       | 9,692                     |
| Msowero    | 1,116      | 2,429 (607)                       | 1,723                     | 1,116      | 569 (142)                         | 1,258                     |
| Mbwade     | 6,631      | 1,791 (447)                       | 7,078                     | 64,489     | 12,555 (3,138)                    | 67,627                    |
|            |            |                                   |                           | 88,475     | 16,751                            | 92,711                    |

Key: 1 livestock unit  $\equiv$  4 goats or sheep