POVERTY TRAPS AND WILDLIFE CONFLICTS: A LIVELIHOODS CASE STUDY OF MGORI VILLAGE LAND FOREST RESERVE, SINGIDA

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN FORESTRY OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA

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ABSTRACT

Changes of conservation policy from fortress to community conservation aimed at balancing sustainable conservation and rural livelihoods. However, little is known as to how much Community Based Forest Management (CBFM) approach contributed to livelihoods enhancement. Similarly, impacts of wildlife conflicts as a result of successful conservation, and causes of poverty among local communities are poorly known. This study aimed at assessing poverty traps and wildlife conflicts in Mgori Village Land Forest Reserve. Specifically, it assessed people's livelihood assets and the way institutions modify access to the assets, the extent of wildlife conflicts and its link to poverty. Both qualitative and quantitative data were collected. Ninety seven households were randomly selected from three villages. Content analysis was used to analyse qualitative data while SPSS computer software was used for quantitative data analysis. There was reduced access to livelihood assets especially natural assets. Respondents (60%) felt that they subsidised more than they benefit from the forest revenues. Household income sources were: agriculture 54.1%, environmental income 5.6% and non-farm and off-farms contributed 40.3%. Forest use was mainly for fuel wood and non wood forest products. The total household income increased with increase in agricultural crop sales and the relationship was significant ($P<0.01$). Environmental income reduced income inequality whereby the Gini coefficient without environmental income in Mughunga, Ngimu and Pohama increased to 0.1, 0.01 and 0.01 units respectively. The overall Gini coefficient decreased to 0.08 units. Community's perception on CBFM towards poverty reduction was negative. Wildlife conflicts were reported by 87.6% of respondents, among them 58.1% of the respondents indicated the extent of conflicts as high, 27.9% medium and 10% as low. Therefore, this study recommends for compensation mechanisms to prevent local communities from falling into abject poverty. Practical implementation of participatory forest management policy to address clear benefit sharing patterns is inevitable.

DECLARATION

I**, ANDREW INNOCENT MWAKISU** do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work and that it has never been submitted nor concurrently being submitted for a higher degree award in any other institution.

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DEDICATION

This dissertation is dedicated to my parents Marietha J. Misanya and the late Innocent B. Mwakisu who laid education foundation for me. To my lovely wife who persevered my absence while pursuing this study.

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LIST OF ABBREVIATIONS AND ACRONYMS

ABE	Amani Butterfly Enterprise
CAWM	College of African Wildlife Management
CBFM	Community-Based Forest Management
CBOs	Community Based Organisations
CIFOR	Centre for International Forestry Research
cm	Centimetres
DANIDA	Danish International Development Agency
FAO	Food and Agriculture Organization of the United Nations
FINIDA	Finish International Development Agency
GDP	Gross Domestic Product
HBS	Household Budget Survey
HASHI	Hifadhi Ardhi Shinyanga (Environmental Conservation)
ha	Hectare
IMF	International Monetary Fund
JBIC	Japan Bank for International Cooperation
kg	Kilogram
LAMP	Land Management Programme
MNRT	Ministry of Natural Resources and Tourism
NTFPs	Non-Timber Forest Products
NSGRP	National Strategy for Growth and Reduction of Poverty
OECD	Organisationfor Economic Co-operation and Development
PFM	Participatory Forest Management
SNAL	Sokoine National Agricultural Library
SIDA	Swedish International Development Agency
TAS	Tanzanian Shillings

TASAF	Tanzania Social Action Fund
UNDP	United Nations Development Programme
URT	United Republic of Tanzania
USD	United States Dollar
VEC	Village Environmental Committee
VICOBA	Village Community Bank
VFMP	Village Forest Management Plan
VLFR	Village Land Forest Reserve

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Forests and woodlands serve rural poor in terms of income and provision of ecosystem services. Local communities' livelihoods depend on natural resources such as forest products and wildlife to overcome unexpected income shortfalls (Goldman, 2003). Forests and woodlands play important roles in preventing households from falling into abject poverty (Vedeld *et al.*, 2007). In Tanzania, forests and woodlands cover about 40% of the total land area and they support livelihoods of 87% of the rural poor (Milledge *et al.*, 2007). Fuel wood contributes to over 90% of the energy used in the country (*ibid*). Despite the fact that forests are important for communities not to fall into poverty cycles, successful conservations require attention on improving livelihoods of the local communities.

Conservation discourses in Tanzania changed from fortress approach to the inclusion of local people in the management of forest resources. Change of forest ownership from a traditional and customary system to centralised aliened communities from forest resources subsequently reduces interest in forest conservation for future use (Akida and Blomley, 2006). Consequently, the role of local communities' interests in managing natural resources declined; forests are subjected to encroachment and over harvesting (Monela *et al.*, 2000). In early 1990s, participatory approach "Community-based Forest Management" has been adopted by the Government in order to ensure maximum protection under co-management arrangements (Adams and Hutton, 2007). This was a significant step which aimed to increase attention to economic benefits and local communities' access rights and improvement of management of forest resources. The

CBFM approach was introduced in Tanzania with facilitation from Government of Tanzania and various development partners such as the World Bank, NORAD, DANIDA, FINIDA and SIDA. The Swedish International Development Agency (SIDA) facilitated Duru-Haitemba in Babati, Suledo in Kiteto District and Mgori Village Land Forest Reserve in Singida. The facilitation aimed at piloting participatory forest activities through the Land Management Programme (LAMP). Under this programme villages were facilitated to manage their forests using their own resources for their own benefit as per the 1998 National Forest Policy, Village Land Act (1999), National Forest Programme (2001) and a Forest Act (2002).

CBFM is regarded as a "win-win" approach that would provide sustainable conservation and communities' livelihoods enhancement (Blomley and Ramadhani, 2006). As a result of this approach, forest conditions in various places including Mgori have dramatically improved and community's authority over the area has been consolidated (Willy, 2000; Tango, 2007). Poverty alleviation is one of the very important components of participatory forest management. It is believed that CBFM can have positive impacts on people's livelihoods at community as well as individual levels. CBFM can also have negative impacts on people's livelihoods and may make people fall deeper into the cycle of poverty. Lack of user right, lack of clear benefit sharing framework, control and reduced access to forest resources could lead to poverty and result into forest degradation (Galvin and Haller, 2008). Institution failure; market failure, poor infrastructures and soil infertility are among causes of poverty traps (Jeffrey *et al.*, 2004).

Moreover, the villages' success in establishing effective protection regimes resulted to increased wildlife in the forest (Willy, 2000; Willy, 1998). Other authors (Tango, 2007;

Galvin and Haller, 2008; UNDP, 2004) revealed that wildlife population has increased, especially in the dry season since1990s. The regeneration of forest could cause conflicts with the surrounding local communities (Ashley *et al.*, 2002; Philip, 2005). Wildlife conflicts can lead into low agriculture productivity due to crop raiding, infrastructures destruction, diseases, human and livestock killings and reduced access to livelihood assets such as natural, financial and physical capitals. Therefore, knowledge on the income variation between communities, economic groups, ethnic groups and proximity to forest is important. Income or household poverty levels can be determined through understanding household livelihood strategies, CBFM contribution to poverty alleviation and the wildlife poverty linkage.

1.2 Problem Statement and Justification

1.2.1 Problem statement

Despite the importance of CBFM approach as an intervention to ecological problems and development needs of local people, the livelihoods of communities have not been improved (Goldman, 2003; Ashley *et al.*, 2002). It is not known as to how much CBFM in Mgori has contributed to poverty alleviation. There are still debates around the use, control and management of forests despite their contribution to local livelihoods (Nelson and Blomley, 2007). The revenue generation potential of various community managed forests including Mgori are not well realised by the local communities who live adjacent and depend on these forests in order for them not to be trapped in the cycle of poverty (Blomley and Iddi, 2009).

There is inadequate information on people's livelihood assets and how various social relations and institutions modify access to such assets. Few studies (Ellis, 2000; CIFOR, 2009; Galvin and Haller, 2008; Mbeyale and Songorwa, 2008) quantified community

conservation and rural livelihoods trade-off; but have not captured information on wildlife conflicts emanating from successful conservation of forest under participatory basis. Wildlife conflicts and their scale are relevant in explaining causes of poverty among the local communities.

Mgori Village Land Forest Reserve is one of the forests piloting CBFM arrangements located in Singida region. This forest reserve is rich in miombo woodlands; covers an area of 44 000 ha and managed by five villages namely Ngimu, Pohama, Unyampanda, Mughunga and Nduwamnghanga. Despite the improved condition of forest, there are several factors underlying use, access and control of the forest. Products such as timber harvesting, charcoal making, extraction of building poles and poaching may determine the expected trade-off between community conservation and Mgori rural livelihoods. Therefore, this study intended to examine the impact of CBFM approach on poverty reduction. The examination was done through assessment of causes of poverty traps and wildlife conflicts in Mgori community forest.

1.2.2 Justification

The findings of this study will hasten stakeholders´ efforts towards regular reviews of CBFM guidelines to meet the emerging challenges such as management of wildlife, forests and agriculture in an integrative manner so as to ensure sustainable conservation and improved people’s livelihoods. It will provide strong advocacy of multi sectoral policies that would address rural livelihood issues and mitigate the prevailing wildlife conflicts which have been a major driving factor to most of the mentioned poverty traps.

1.2.2.1 Significance of the study

Forests are considered to be means of rural poor escape from poverty traps. Fuel wood only contributes to over 90% of the energy used in the country (Milledge *et al.*, 2007). In order for forests to serve as incentive in Mgori community; Community Based Forest Management was established and strategies for sustainable forest management which led to regeneration of the forest reserve were developed (Blomley and Ramadhani, 2004). CBFM initiatives are the central concern of the policy and decision makers. Other studies (Massawe, 1999; Goldman, 2003; Ashley *et al.* 2002; Akida and Blomley, 2006; Nelson and Blomley, 2007) have documented contribution of CBFM in improving forest conditions. However, mechanism for the transfer of ownership and management responsibility from central to village governments and maintenance of forest quality is questionable. There are still concerns on the approach regarding local expectations on livelihoods improvement.

The regeneration of forest results in increased number of wild animals which threatens lives of people living nearby the forest reserve. An extensive body of literature (Nelson and Blomley, 2007; Tango, 2007; CAWM, 2002 and Mbwambo *et al.,* In press) underlined that Mgori forest has now heavily re-colonised with wild animals as a result of improved condition. This has resulted into crop raiding, damage to property and threatening the safety of people's lives. Nelson and Blomley (2007) put forward that the driving factor for increased number of wild animals is successful conservation of the forest reserve. The authors (ibid) pointed out that in light of the mentioned factor, the surrounding communities may be trapped into poverty cycles.

Goldman (2003) revealed that poor households who do not have a diversifying economy are the most affected group as a result of wildlife conflicts. Thus, examining poverty

traps and wildlife conflicts is important as it may contribute to a significant push to the state and other stakeholders such as CBOs, NGOs and Private sector in order to improve social relations and reduce resource use conflicts (Hulme and Murphree, 2001).

1.2.2.2 Why choosing Mgori as a research site?

Mgori Village Land Forest Reserve is colonised by wildlife, the extent and impacts of wildlife conflicts on the well being of the surrounding communities is poorly known (Nelson and Blomley, 2007; Tango, 2007).There is no information on how and what costs households incur from the wildlife as among evidence on the link between wildlife conflicts and poverty. Various studies (Blomley and Iddi, 2009; Ngaga *et al*. (2009), cited by Blomley and Iddi, 2009) on the impacts of CBFM to rural livelihoods focused northern and southern parts of Tanzania, but has not been reported in Mgori.

Blomley and Iddi (2009) illustrated a sample of four forest areas under village management with revenue generation potential but Mgori forest reserve was not included. The authors (ibid) have found that forests with the revenue generation potential reduce income inequalities among social economic groups. Therefore, the study considered Mgori as a research-priority site in order to provide information necessary for identifying management options and alternative livelihood strategies for poverty alleviation and sustainable management of the forest.

1.3 Objectives

1.3.1 Overall objective

The overall objective was to assess the causes of poverty and wildlife conflicts in Mgori village land forest reserve by examining the impact of CBFM approach on the livelihoods of the local communities surrounding the forest reserve.

1.3.2 Specific objectives and research questions

Specifically, the study intended:

(1) To assess people's livelihood assets and the way various social relations and institutions modify access to these assets.

1.3.3Research Questions

(a) What constitute poverty traps in communities around Mgori VLFR?

(b) Does the local community have access to the forest products in the forest reserve?

(c) What are the trends in terms of access to natural assets?

(d) If access to forest products is reduced, does it affect other livelihood asset?

(e) What are the alternative sources of income to the surrounding local communities?

(2) To assess poverty situation in the study area.

1.3.3 Research Questions

(a) What are the household's sources of income?

(b) What are the household alternative livelihoods strategies?

(c) What are the causes of poverty?

(d) How do livelihood strategies help in reducing poverty?

(3) To assess the extent of wildlife conflicts and its link to poverty.

1.3.4 Research Questions

(a) What is the extent of wildlife conflicts and its link to poverty?

(b) What are the factors influencing wildlife conflicts?

(c) What are the impacts resulting from wildlife conflicts?

(d) What are the conflicts mitigation measures?

(4) To assess trade-off between forest conservation and the rural livelihoods.

1.3.5 Research Questions

(a) Is Mgori VLFR perceived as land that the Government have denied them the right to use while their needs for land and other resources increase day and night?

(b) Are the villagers feel that they subsidise it more than they benefit from the forest?

(c) How does the local community participate in decision making and management activities?

1.4 Conceptual Framework

This study conceptualises that (Fig. 1) wildlife conflicts, limited access to livelihoods asset and the scale of trade-off may deprive local community livelihoods in Community Based Forest Management despite its success. The local communities have remained poor and vulnerable to poverty traps although the forest keeps on flourishing. The reasons behind vulnerability to poverty traps include: shocks resulting from increased number of wildlife species which they can't earn income because of stiff regulations and bureaucratic procedures posed by the Government; high incidences of crop raiding, a burden of diseases, livestock killings, endangerment of people's lives and damage to property. Lack of benefits at community and individual level disappoint to local communities' expectations.

Trends which can be observed include rising costs of protection, rising costs and diminishing availability of veterinary services such as vaccine and dip facilities as well as forest encroachment and infrastructure destruction. Due to forest destruction and degradation, extensification of agricultural activities will be limited by diminishing rainfall due to seasonality. If shocks persist, people's access to livelihood assets would be reduced but the access can be influenced or reversed if the Government and other stakeholders such as private sectors and NGOs set alternative management and livelihood diversification strategies.

The transforming structures include formulation or scaling up of governance structures and facilitating private sector so as to provide services that would increase access to livelihood assets. The transforming processes include policy reforms and law amendmen9ts that lead to the improvement of livelihood and well being of the local communities. Empowerment of institutions that govern resource use by using laws and cultural norms will enhance sustainable use of natural resource base and this will in turn lead to improved income, reduced vulnerability, improved food security and increased well-being of the communities.

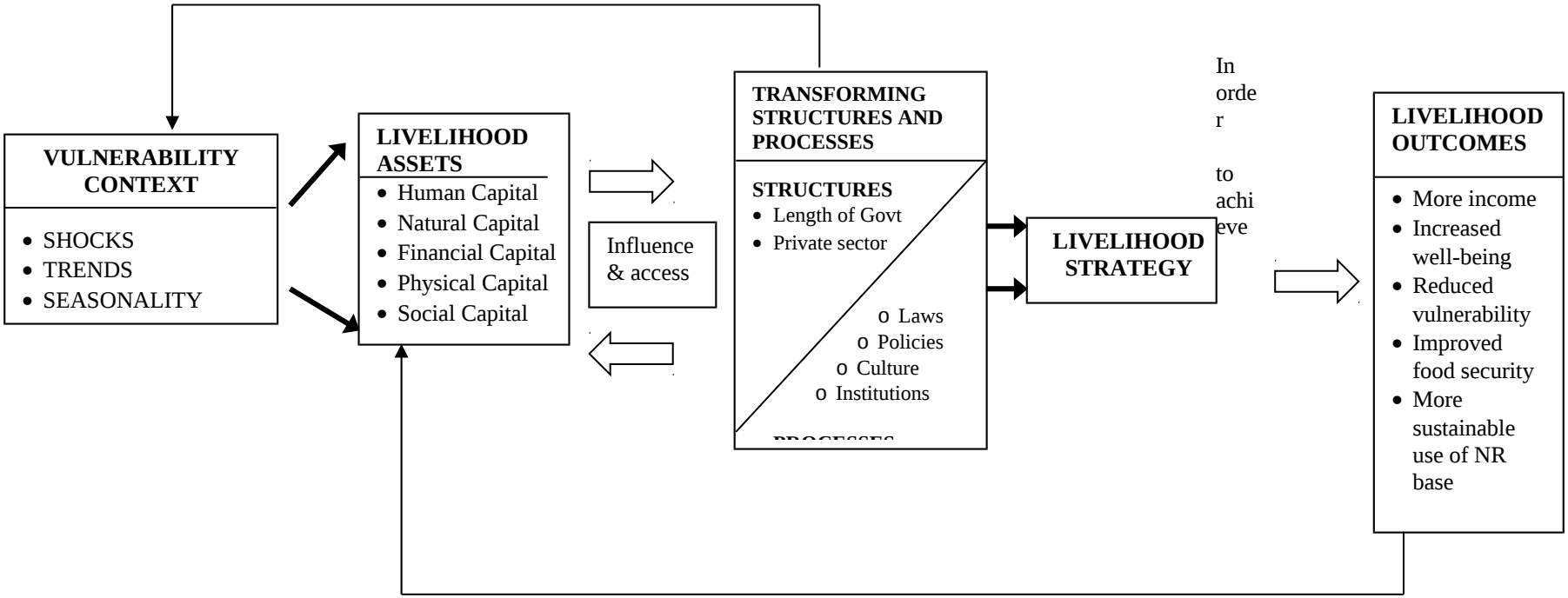

Figure 1: The Sustainable Livelihood Framework adopted from Ellis (2000)

1.5 Study Limitations

During the research study several drawbacks were encountered, however efforts were made to overcome them. The following were the limitations and their solutions:

(a) Many respondents were not transparent; they hid data on number of livestock owned, timber harvesting, charcoal making and hunting. Livestock keepers reported small number of livestock may be because of their tax evasion behaviour. The same applied to charcoal makers, illegal hunters and timber harvesters. This is because none of these activities is allowed in the forest reserve. This problem was solved by spending more time in clarifying the future use of findings in solving the prevailing problems. Focus group discussions triangulated information obtained from the social economic groups, village reports and livestock census data.

(b) Respondents had problems of recalling past events especially on fuel wood and charcoal energy consumption data, the frequency of access to the forest, the amounts of forest products collected. This problem was solved by reducing durations in which specific events were undertaken, for instance asking how often and how many headloads they used to collect firewood per week rather than per month or per year.

(c) Direct contribution of CBFM to poverty reduction: It was very difficult to assess the direct contribution of CBFM to livelihoods of local communities because there were no baseline data. The problem was solved by conducting both the perception analysis and collection of income data from sales of natural resource products.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Overview of Forest Management in Tanzania

Tanzania has an area of 942,000 km^2 and a population of about 40 million (JBIC, 2006). Forests cover about 39.9% of total land area (FAO, 2009). Miombo woodlands are widespread in lowland areas across the central and southern parts of the country. Other forests found in various parts of Tanzania include mangrove, montane and closed canopy forests. The forests support the livelihoods of 87% of poor populations who live in rural areas (Milledge *et al.*, 2007).

About 14 million ha have been gazetted as forest reserves; 2.5 million ha are proposed forest reserves and game reserves or national parks (Blomley and Iddi, 2009). The remaining 16.5 million ha of forests lie in village and general lands. Forest reserves fall under the legal authority of Central Government (National Forest Reserves-NFRs), District Councils (Local Authority Forest Reserves-LAFRs) or Viillage Government (Village Land Forest Reserves-VLFRs, Private and Community Forest Reserves), and are either designated for production or protection. Mgori forest reserve is one of the Village Land Forest Reserves managed under participatory basis for both sustainable management and improved livelihoods of local communities that surround the forest reserve.

Despite the high biodiversity value and contribution to poverty reduction, Tanzania's forests have been facing various challenges including deforestation and degradation. FAO (2009) estimated that between 1990 and 2005 the deforestation rate was at 412 000 ha which is equivalent to 1.1% of the country's total forest area per annum. Forest

clearing for agriculture, overgrazing, wildfires, charcoal making, and persistent reliance on firewood for energy are the main drivers of deforestation. Other drivers involve low production efficiency and marketing, over-exploitation of wood resources and lack of land use plans. Indirect causes of deforestation include rapid population growth, poverty, policy and market failures, expanding need for industrial and residential sites and unemployment (*ibid*).

2.2 Evolution of Community Conservation Approach

Tanzania has gone through several stages of development in conservation. Historically, the interactions between human and natural resources indicate that, for a long time, local communities' dependency on natural resources has been very high. Communities developed knowledge and experience in exploitation of the resources notwithstanding the costs (Goldman, 2003). However, this socio-ecological relationship has been interfered by the establishment of protected areas (PAs) i.e. shifting from human inclusion to total protection (Zahabu *et al.,* 2009).

The German colonial rule started to develop PAs and thereafter the British continued with the practice, whereby big areas were demarcated and protected through legal instruments such as Wildlife Acts of 1891 that prohibited wildlife hunting and Land Ordinances of 1931 (Mbeyale and Songorwa, 2008). After Independence in 1961, the Government of Tanzania continued to promote expansion of the existing PAs and starting new ones. To conservationists is a big achievement, but poses a great practical management problem where more than 80% of the rural people rely heavily on natural resources for their livelihoods (Galvin and Haller, 2008). This conservation approach (fortress approach) raised debates over the rights of access to natural resources by the local people and the levels of exclusion in management and decision making processes.

However, in the 1990s conservation attitudes began to change into what is called a paradigm shift (Galvin and Haller, 2008). This refers to major institutional changes from the fortress approach in which human use is completely forbidden to the participatory approach i.e. CBFM that recognises and returns power and decision-making to the local level, in the communities. Mgori Village Land Forest Reserve in Singida is one of the managed forest reserves under CBFM approach.

2.3 Forests and Poverty

2.3.1 Poverty concept

The concept of poverty can be derived from different dimensions of deprivation that relate ability of people to earn income, consumption and food security, health, education, clean water and shelter. Madulu (2003) elucidated that poverty is a dynamic concept which change with time and space. It also includes human rights, voice and some influence over public policies and political priorities whereby deprivation of basic political freedoms or human rights is a major aspect of poverty because of unjust and even violent action by authorities to poor people (OECD, 2001). However, a challenge is how to measure the poverty for comparison, and tracking poverty over time for the purpose of monitoring progress while considering other dimensions of poverty.

Some dimensions of poverty are difficult to measure and quantify (Broca, 2002). For instance, the poverty line of one dollar a day has been used as a measure of poverty level at the global level while it was originally defined as expenditure in a country equivalent to one dollar a day in the United States in 1985. The author (ibid) pointed out that even though the concept of poverty is considered acceptable, attaching a

monetary value to food grown at home as a primary source of food for many poor households in developing countries is very difficult. Thus, poverty measures should base on lack of economic resources, supplemented with information on other forms of deprivation.

Tanzania is ranked as one of the poorest countries in the world despite it declared a war against poverty in year 1961. The extent of poverty among Tanzanians is still high because average earnings do not meet requirements for basic needs. It is estimated that 48% of Tanzanians live under the poverty line, 36% live in very poor conditions, getting a single meal per day (URT, 2003; Kidane, 2010). The authors (ibid) underlines that there are large differences remain between urban and rural areas despite the Tanzania mainland reduced the share of its population in poverty.

Dar es Salaam has lowest poverty levels, with 18% followed by 26% in other urban areas, but rural areas have the highest poverty levels, with 39% of the population below the basic needs poverty line. Agriculture is the main economic activity that accounts for more than 40% of GDP and provides employment opportunities to about 80% of the workforce (CIA, 2008). In households headed by people working in the agricultural sector the poverty incidence is about 57%.

2.3.2 Poverty situation in Tanzania

Since independence, the Government of Tanzania has been fighting against ignorance, diseases and poverty as three development enemies (URT, 2003; URT, 2001). A decade after independence, there was a significant improvement in per capita income, access to education, health and other social services due to national efforts put forward

through medium-term and long-term development plan (Zahabu *et al.*, 2009; Kidane, 2010).

Tanzania through Millennium Development Goals is making considerable progress in various aspects such as education in which about 97% of girls and boys are able to access primary school, 30% parliamentary seats are occupied by women. Others include HIV prevalence among 15-24 years population is 3.5% although poverty remained to be a big challenge in the country. These gains could not be sustained in the preceded years due to various shocks including Tanzania and Uganda war. Other shocks include poor implementation of policies such as decentralising power to local communities in managing natural resources which led to continually decreasing land area covered by forests e.g. 46% (1990), 41% (2000) and 37.5% (2005) (Mwanri 2007, cited by Lusambo, 2009).

IMF (2011) has indicated that other policies which faced challenges during their implementation include: recognition of cross-sectoral contribution to outcomes and inter-sectoral linkages and synergies, emphasis on mainstreaming cross cutting issues including environmental degradation, legal and regulatory framework, infrastructure, institutional set-up and integration of Millennium Development Goals into country's plans. Other challenges involve greater role of private sector, economic growth and good governance and recognition of the need to address vulnerability, human rights and social protection issues. The author (ibid) points out that although the large proportion of the rural poor depend on agriculture as their mainstay; about 70% of farming being dependent on the hand hoe; 20% on ox-plough, and 10% on tractors. Agriculture is still dominated by small-scale farmers but it has not lifted up many of the poor out of poverty.

The Government is determined to eradicate poverty and with regard to this, Tanzania joined the International Community in 1995 at the Copenhagen Social Summit in determining strategies to eradicate poverty globally. In the year 2005/06, the Government through National Strategy of Growth and Reduction of Poverty (NSGRP) interventions with two phases made considerable improvements. NSGRP I focused on planning, stakeholder participation, engagement in policy dialogue, improving quality of life and social well-being particularly of the poorest and most vulnerable groups in the population; and reduced inequalities in allocation of national resources e.g. education, health, income and other attributes. NSGRP II focused on growth for reduction of income poverty, improving quality of life and social well-being and good governance and accountability.

The NSGRP emphasises the role of natural resources for income generation and underlines the importance of good governance and local involvement and participation for sustainable management of natural resources. The Government under the Ministry of Natural Resources and Tourism adopted PFM to reduce poverty of communities through equitable benefit sharing from forest resource use. This among other issues led to the establishment of Village Land Forest Reserves including Mgori in the years 1995 for the purpose of providing more benefits to local communities and enhances conservation.

2.3.3 Poverty status and distribution

Poverty can be related to household income though it depends on the proportion of the population that is under nourished and the severity of poverty (UNDP, 2006). Information on the number of people under nourished and incidences of under nourishment and population density are very important. Poverty varies from place to

place and from time to time but more dominant by 87% in rural areas compared to the urban areas which is about 13% (IMF, 2003; URT, 2009). Percentage of households living below basic needs poverty line from 1991 to 2007 in Dar es Salaam decreased from 28.1 to 16.4; in other urban areas decreased from 28.7 to 24.1, while in rural areas decreased from 40.8 to 37.6 (*ibid*).

There has been a marginal change in consumption levels from 2000 to 2007 as almost 98% of Tanzanians have extremely low consumption levels. In the year 2000 the consumption level was TAS 30 000 per month, in 2007 the consumption rose to TAS 58 000 (URT, 2009). About 50% of the population from poor households usually engaged in physically exhausting activities with greater calorie intake but do not consume sufficient calories. Gini coefficient in Tanzania has decreased between 2000 and 2007 whereby in Dar es Salaam the Gini decreased from 0.36 to 0.34; in other urban decreased from 0.36 to 0.35 and in rural areas decreased from 0.35 to 0.33 units (URT, 2009). The trend shows that there has been an increase in income inequality across the country. Mgori being one of the rural areas is faced with the similar situation. Therefore, determining the value of Gini coefficient is very important in order to understand the poverty status in the area and distribution.

2.3.4 Poverty traps

Poverty trap is a self-perpetuating condition where an economy, caught in a horrible period or point, suffers from persistent underdevelopment (Jeffrey *et al.,* 2004). The essential message of poverty traps is that poverty tends to persist, and that it is difficult, though not necessarily impossible, for the economy to escape. In the presence of terrible shocks such as drought, civil wars, floods and disease outbreaks, the economy may occasionally and recurrently escape or fall into poverty. Poverty trap is

often interpreted as an explanation for the income difference in a country (Aart and Claudio, 2007). Sources of poverty traps include continuous low productivity agriculture, diseases outbreak, poor infrastructures and market availability may reflect extent of poverty and income distribution among social economic groups.

2.3.5 Contribution of forests to poverty reduction

In Tanzania, forests play a big role in poverty reduction because of their high biodiversity values. The forestry sector contributes significantly (about 92% of ecosystem services) to the reduction of poverty in the country. The majority of rural communities depend on forest products for their livelihoods (MNRT, 2003). A variety of wood (timber, poles, fuel wood, charcoal) and non-wood products (fruits, honey, fodder, mats) are obtained from forests. Fuel wood and charcoal account for about 90% of the total energy consumption in the country in which they are main sources of bio-energy for both urban dwellers and the rural population (Blomley and Iddi, 2009).

Forests conserve soils, mitigate climate through sequestering carbon, and are a source of water for domestic and industrial use, irrigation agriculture and power generation. Forests have aesthetic, recreational, cultural, spiritual, medicinal and scientific value. They are a source of revenue through sales of wood and non-wood products and services. Based on 2006 prices, the value of forest goods and services is estimated at USD 2.2 which is equivalent to 20.1% of Gross Domestic Product (GDP) per annum (MNRT, 2006).

The forest sector provides about 3 million person-years of employment (MNRT, 2006). Employment is provided through forest industries, government forest administration and self-employment in forest related activities. Forests are important

especially to the poor by reducing vulnerability and risks. Their loss is a significant barrier to the achievement of Millennium Development Goals particularly to those related to the reduction of poverty, hunger and diseases. Therefore, sustainability should be a central component of poverty reduction strategy efforts (MNRT, 2003). In Mgori, a Village Land Forest Reserve was established for the purpose of ensuring sustainable conservation by reducing poverty through benefit sharing arrangements.

2.4 Environmental Income, Poverty and Rural Inequality

Rural households especially the poor rely on goods and services freely provided by environmental resources to sustain welfare. Environmental income significantly brings about reduction in inequality and it is important in mitigating poverty (IMF, 2011). Recently, interests in the economic relationship between rural households and environmental resources have increased (Vedeld *et al.,* 2007). Environmental issues have been linked to growing income inequality and poverty. The poor live in areas where arable land is scarce, agricultural productivity is low; drought and environmental degradation are common (Madulu, 2003). Rich households use greater quantities of environmental resources in total than poor households thereby bringing inequality (Cavendish and Campbell, 1993).

Julie (1999) defines inequality as “mean differences in income”. Here the author conceptualises inequality as the dispersion of income or other welfare attributes of a population. IMF (2011) underlines that continued environmental degradation emanates from limited incentives for sustainable management, limited alternative livelihoods and unsustainable land management practices which further propagate the poverty cycle. Areas that lack sustainable income generation and employment opportunities, basic

social services and infrastructure tend to push the poor to environmental degradation and stimulating further poverty (Madulu, 2003).

2.4.1 Measuring inequality

Measuring environmental income requires insight on basic income concepts, gross income, value added and rent, the relevant sources for such incomes as well as ways by which it differs from other types of income in terms of location, market chains, supply chains and production processes (Vedeld *et al.*, 2007). Income inequality can be measured by using Poverty Line, Poverty index, Theil's entropy index T, Theil's second measure L, Lorenz curve, the Coefficient of Variation and the Gini coefficient, Gini index, Relative poverty line and relative income criteria.

These measures are used to describe contribution of different sources of income to total income inequality. The Gini coefficient is a common means of measuring income inequalities (Adams, 1999; Mutagwaba, 2009; 2006; Zhu and Luo, 2008). Adams (1994) used Gini coefficient to examine the impact of non-farm income on inequality in rural Pakistan. The technique was applied in this study to measure income inequalities in Mgori Village Land Forest Reserves.

2.5 Forest Conservation, Wildlife Conflicts and Poverty

Sustainable conservation emphasises co-management partnerships between rural communities, the state and stakeholders such as CBOs, NGOs and Private sector in order to improve relations and reduce resource use conflicts (Hulme and Murphree, 2001). Other studies (Massawe, 1999; Goldman, 2003; Ashley *et al.* 2002; Akida and Blomley, 2006; Willy, 1998) revealed that CBFM as a sustainable conservation approach contributes to improved forest conditions which then reduce poverty by

supplying products and services to people. Participatory projects have played a big role in influencing policy, providing a mechanism for the transfer of ownership and management responsibility from central to village governments and for the successful maintenance of forest quality.

However, there are still concerns of the approach regarding local expectations on livelihood enhancement and local communities' involvement in decision making. Similarly, studies (Blomley and Ramadhani, 2004; Nelson and Blomley, 2007; Tango, 2007) showed that community managed forests such as Mgori has now been re-colonised with game as a result of improved forest condition leading to crop raiding, property damage and putting people's lives at risk. According to Andersson and Slunge (2005), vermin and wild animals destroying crops, climate changes, bush fires which destroy biodiversity are linked to poverty. Loss of access to resources due to a failure of integrating local communities in the management together with the failure to resolve wildlife conflicts can lead to poverty and livelihood insecurity to local people (Mbeyale and Songorwa, 2008). In this case, forest conservation would never serve as an incentive for community conservation (Galvin and Haller, 2008).

2.6 Livelihoods

2.6.1 Overview of livelihoods concept

The concept of livelihoods is widely used in present-day writings on poverty and rural development; its definition varies according to situations. A livelihood comprises assets (natural, human, financial and social capital), activities and access to these (intervened by institutions and social relations) that together determine the living

gained by the individual or household (Ellis, 2000). A livelihood is said to be sustainable if it can cope with/ or *recover from stresses and shocks such as drought, human fatalities, crop raiding, destructed infrastructures, pests, diseases, dangerous wildlife and famine and maintain its capabilities and assets both now and in the future, without undermining the natural resource base* (MNRT, 2006; Ellis, 2000). The important aspect of livelihood is the link between assets and options people have in order to pursue alternative activities that can generate income level required for survival (Ellis, 2000).

2.6.2 Livelihoods and sustainable forest management

The concept of livelihood has been essential in the debate about rural development, poverty reduction and environmental management. Livelihoods imply activities, entitlements and assets by which people make a living (Carney, 1998). The access to use and interaction among assets, their contributions to overall household well being as well as household coping strategies form a livelihood system. For a livelihood to be sustainable it has to cope with, recover from and adapt to stresses and shocks, maintain its capabilities and assets, and ensure opportunities for the next generation (Carney, 1998).

Sustainable forest management includes enhanced long-term physical condition of the forest ecosystems while improving people's livelihoods through ecological, economic, social and cultural opportunities and benefit of the present and future generations under constant management (FAO, 1999). Thus, for the forest management to be sustainable there should be a balance between the needs of people and ecological values. This can be achieved through involvement of various stakeholders in decision-making processes

concerning forest management and the distribution of forest benefits. It is from this perspective CBFM approach was adopted by the Government of Tanzania in the early 1990s (URT, 1998). It also aims at promoting participation in forest management through establishment of VLFRs to improve livelihoods and reduce poverty where communities are both managers and owners of forests.

2.6.3 Rural livelihood strategies

Livelihood strategies can be pursued through access to livelihood resources which are natural, economic, human and social capitals (Scoones, 1998). The definition of sustainable livelihoods is centred on the ability of livelihood to cope with and recover from stresses and shocks. Resilience is a key to both livelihood adaptation and coping in the face of stresses and shocks. Those who are unable to adjust themselves in the face of change or shocks are inevitably vulnerable and unlikely to achieve sustainable livelihoods.

About 90% rural livelihoods are reliant on natural resource as the livelihood strategy (IMF, 2011). Thus, effective use of natural resources base results into sustainable yields of useful products or services for livelihoods. Within the sustainable livelihoods framework, there are three major groups of livelihood strategies which cover the range of options open to rural people. These are agricultural intensification/ extensification, livelihood diversification and migration, and can be pursued as a combination of strategies together, individually or in sequence. Scoones (1998) broadly clarified the three major groups as presented in the next section.

2.6.3.1 Agricultural intensification/ extensification

Livelihood improvement can be gained from various agricultural activities such as crop cultivation, livestock rearing, aquaculture as well as tree planting or forestry practices. These activities can be carried out through a process of intensification whereby people improve quality and increase output per unit area through capital investment or increases in labour inputs or extensification by having more land under cultivation (Farrington *et al.,* 1999). Agroforestry technologies in the East and Central Africa regions are reducing poverty, improving agricultural productivity and achieve natural resource sustainability (Jama *et al.,* 2006).

In Tanzania, traditional agroforestry systems such as Chagga home-gardens, Mara home-gardens (Obohochere) and Wasukuma silvopastoral system (Ngitili) have been practiced for decades. Multipurpose trees have been included to increase crop yields in degraded lands. Medicinal trees and improved varieties of indigenous fruits can be used to supplement household incomes and nutrition (Jama *et al.,* 2006). Also fast growing timber and fuel wood trees can be grown within the farm and in commercial woodlots and plantations. Lives in many parts of the country are already transformed after applying these technologies. Since, PFM is being carried out on general land or unreserved forests, it can be a very useful approach for mainstreaming agroforestry technologies in the community conservation programmes.

2.6.3.2 Livelihoods diversification

Diversification aims at coping with temporary harsh conditions or more permanent adaptation of livelihood activities, when other options are failing to provide a livelihood. It involves an active choice to invest in diversification for accumulation by developing a wide income earning portfolio to cover all types of shocks or stress, or

develop strategies to particular shocks through developed coping mechanisms (Farrington *et al.,* 1999). Livelihood diversification may be a source of other opportunities such as employment, agricultural processing industries or petty trading only if pursued properly (Jama *et al.,* 2006). Conversely, a certain type of livelihood diversification may interrupt other strategies by diverting factors as land, labour, credit or markets.

However, Hussein and Nelson (1998) defined livelihood diversification as "attempts by individuals and households to find new ways to raise incomes and reduce environmental risk". Livelihood diversification is more than a choice because it includes both on- and off-farm activities such as the sale of waged labour, or self-employment in small firms, and other strategies undertaken to spread and generate income in addition to that from the main household agricultural activities. Therefore, local community's dependency on the forest products as their livelihood diversification strategy can be achieved through PFM implementation. PFM ensures sustainability of forest resources and generation of forest incomes to improve rural livelihoods.

2.6.3.3 Migration

A study by Hussein and Nelson (1998) in Mali, Ethiopia and Zimbabwe showed that migration of rural people forms a central part of risk mitigation strategies. In rural Tanzania, migration has long been an important livelihood strategy. Migration involves voluntary and involuntary movements to or from different places due to different causes such as drought, investment in agriculture, diseases outbreaks and industrial development.

Migration is not only considered as the exit from the livelihood system but also a last resort in a sequence of strategies designed to absorb the impact of the shock (Farrington *et al.,* 1999). Wasukuma (agropasoralists), Nyaturu, Barbaig, Gogo and Maasai (pastoralists), migration is an important component of a livelihood system and is an economically significant activity. The search for new farming land, better pasture and water for livestock and employment opportunities are considered as the drivers of continued migration.

2.6.4 Community adaptation to alternative livelihood strategies

Successful conserved forests can be a source of non forestry income to the rural poor and significantly reduce reliance on forest. These forests have a direct impact on livelihoods by ensuring sustainable flow of benefits such as sales of NTFPs, attraction of ecotourists and researchers in the case of high biodiversity forest (Schreckenberg *et al.*, 2007). According to MNRT (2005) on the impact of the *Hifadhi Ardhi Shinyanga* (HASHI) project, a traditional system of reserving pasturelands and dry season grazing areas known as "*ngitili*" (enclosure) has contributed substantially to the household income. The study shows further that formerly the average consumption per person was USD 7.1 per month in the rural areas but after re-establishment of ngitili the total monthly value of benefits increased to USD 11.7. This was from the cash returns after the sale of ngitili products such as grazing rights, firewood and poles.

Ngitili has also reduced time spent in the collection of fuel wood, thatch grass, poles, fodder and water. The monetary value per household per day for the reduced time in collecting various *ngitili* products was found to be USD 0.7 for firewood collection, USD 0.5 for collecting poles. Others include USD 0.8 for collecting fodder, USD 0.55

for thatch materials collection, USD 0.3 for collecting withies, USD 0.3 and USD 0.34 for domestic and livestock use of water respectively.

Scurrah-Ehrharand and Blomley (2006) in Mheza District shows that the Amani Butterfly Enterprise contributes towards poverty reduction by providing employment to villagers and raising the household incomes of member farmers. Amani Butterfly Enterprise (ABE) breeds and exports butterfly pupae to live exhibits in Europe and North America since December 2003. In the year 2005, the enterprise received about USD 45 000 in revenue from butterfly sales which is twice the revenues received in 2004 (e.g. USD 20 000). During periods of high production, individual farmers can earn up to TAS 70 000 per month.

Farmers' ability to hire agricultural labour and build brick houses were increased through butterfly sales. This has led to reduced forest dependency and on activities that could lead to increased clearing and timber extraction in local forests in the East Usambara which is the Global biodiversity hot spot. Selling flowers can be an alternative livelihood strategy because it has no impact on the forest but it increases household income. All of these have been possible because of Participatory Forest Management inception.

2.6.5 Costs and benefits underlying CBFM approach

It is evident that CBFM serves as an incentive to local communities which ultimately lead to sustainable natural resources management. A report by MNRT (2005) showed that traditional system of reserving pasturelands in Shinyanga region results into a rapid regeneration of trees. Large numbers of small acacia woodland patches of

between 378 000 and 472 000 ha of degraded land across the region regenerated and re-established as a result of this land management system. Through CBFM, forest resources on village land provide investment opportunities with the potential of sustainable flows of revenue to local communities as shown in Table 1.

Table 1: Revenue generation of various village land forest reserves in Tanzania

Forest name and location	Size (ha)	Status	Estimated annual revenue from sustainable harvesting (USD)	Number of villages managing forest	Potential revenue per village/annum (USD)
Angai forest, Liwale District	141 000	Management plan being developed	784 000	13	60 300
SULEDO forest, Kiteto District	164 000	Village land forest reserve	213 000	9	23 700
Mtanza Msona forest, Rufiji District	10 713	Village land forest reserve	57 900	2	28 950
Ipole Wildlife Management area, Sikonge District	247 500	Wildlife Management area	730 000	4	182 500

Source: Blomley and Iddi (2009)

However, one of the management costs of CBFM to forest users is that much of the early CBFM was carried out on degraded forest land that had little merchantable timber left. For instance, it has taken 11 years of community management in Duru-Haitemba forest to be considered for low level commercial harvesting (Blomley and Iddi, 2009). Other costs include time spent during planning for and establishing CBFM, undertaking of regular patrols inside the forest management areas, crop raiding and damage to property by wildlife.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of Study Area

3.1.1 Geographical location

The study was carried out in Mgori Village Land Forest Reserve in Singida region. Mgori VLFR has large and less fragmented miombo woodland with an area of 39 361 ha, located 45 km from Singida region. The village forest reserve lies between 35° 05' and 35° 22' east, and 4° 45'and 4° 58' south. The forest shares borders with Kondoa and Hanang districts in the eastern and northern parts respectively (Fig. 2).

Mgori Village Land Forest Reserve covers three wards namely: Ngimu, Mgori and Nduamughanga with five villages namely Unyampanda, Pohama, Mughuunga, Nduwamughanga and Ngimu. The contribution of each participating village is as follows: Nduamghanga (14 019 ha), Ngimu (1966 ha), Pohama (10 856 ha), Unyampanda (7 250 ha) and Mughunga (7 270 ha). Pohama and Nduamghanga villages cover more than three quarters of the total area. However, Ngimu village covers the smallest forest area because Lamba, being one of its hamlets, was converted to a fully independent village.

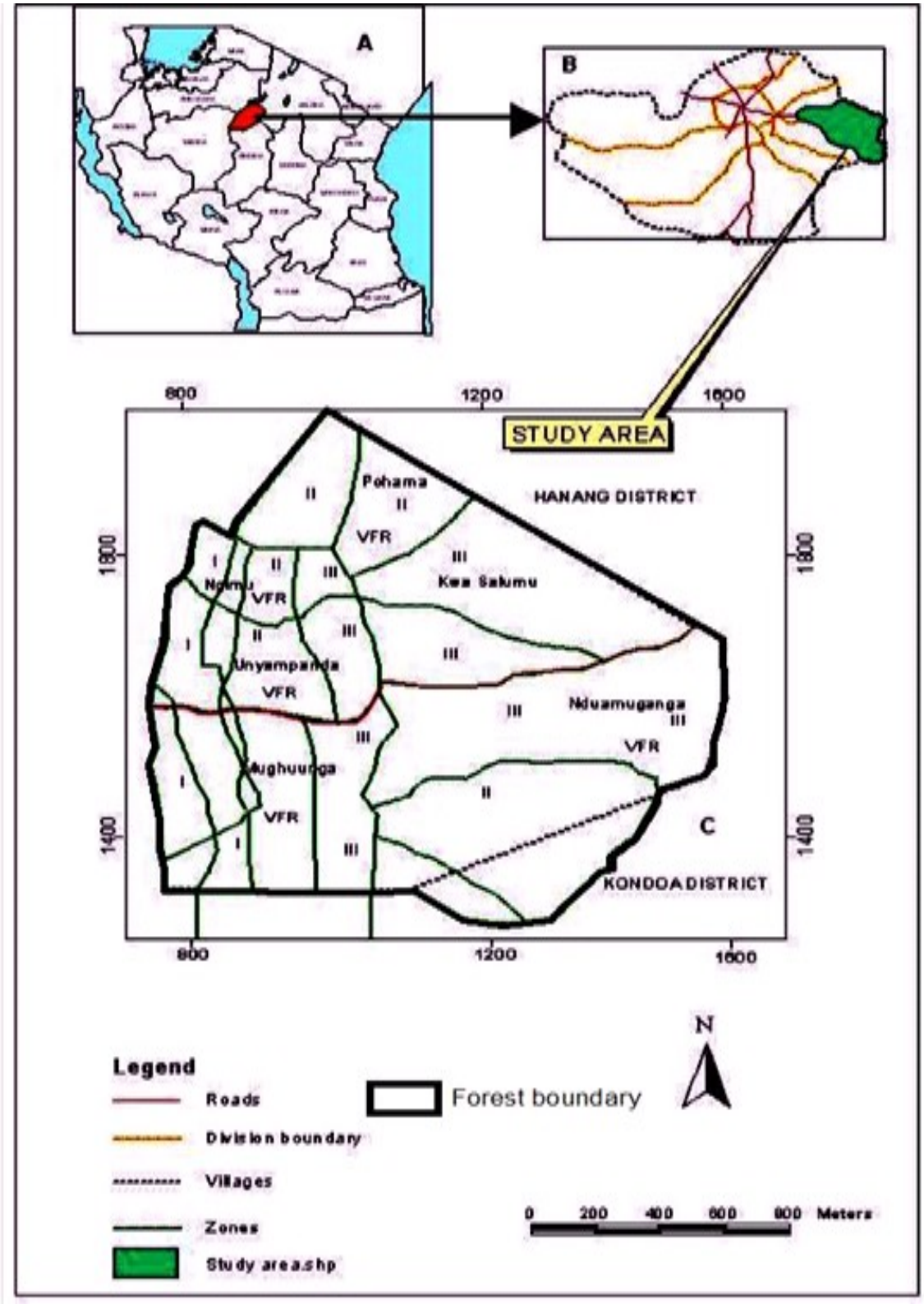

Figure 2: Location of Singida District, Mgori Division and study site.

3.1.2 Topography and geology

The larger part of forest reserve is situated on the plateau with gentle slopes. The forest reserve is located in altitude between 1400 and 1 600 metres above the sea level. Due to down wrapping of the land masses which formed a rift valley; the area has a number of rocky protrusions forming good looking hills. According to CAWM (2002), the rock that dominates the area is batholithic granite, which has been modified due to basalt flows from old volcanoes. Higher elevated areas comprise sandy loam soils whose fertility are slightly lower and can't hold water for a long time. There has been siltation in the lowlands and valley areas due to various economic activities such as clearing of forested land for agriculture expansion. Gullies can be seen in areas with poor vegetation cover which also encourage soil erosion especially in sloping areas.

3.1.3 Climate

The area receives an average annual rainfall of 790 mm, a typical characteristic of semi-arid areas. The wet season is from December to the end of April each year while dry season is from May to October. Due to semi aridity, temperature varies between 15 º C and 30º C.

3.1.4 Vegetation cover

The whole area is typically covered with miombo woodland with a diversified species distribution. According to Mbwambo *et al.* (In press), there are 115 stems/ha and a basal area of 15.1 m^2/ha, the volume is 90.8 m^3/ha, biomass is 59.1 tons/ha and carbon is 29.0 tons/ha. The area is also endowed with valuable species such as *Afzeliaquanzensis* (mkola), *Dalbergiamelanoxylon* (mpingo), *Brachystegia spp.* (miombo), *Pterocarpus angolensis* (mninga), *Combretum spp.*, *Lannea schimperi* and *Julbernardia globiflora*.

3.1.5 Status of the forest reserve

Community-Based Management of Mgori Forest began in 1996 whereby each village community was recognised as the common hold owner of its respective Reserve. This woodland forest is managed as five adjoining Village Land Forest Reserves formerly claimed as Government Land. Due to its vast land, neither Forestry Division nor the local government (Singida District Council) had the means to manage it. Thus, the Government would seek support from forest-adjacent communities and a result an agreement was made so that the five forest-adjacent villages on the west of the forest would manage the forest in partnership with Singida District Council (Wily and Mbaya, 2001).

Mgori under co-management arrangement put in place immediate protection schedules whereby one hundred village forest guards were recruited. With a joint effort, fires, illegal harvesting and clearing for short-term millet production ceased. Wildlife poaching by outsiders was also reduced. Nelson and Blomley, (2007) found that local control and ownership has contributed profoundly to the regeneration of this miombo woodland and create conducive environment that harboured wildlife. Other research findings (Mbwambo *et al.,* In press; CAWM, 2002) quantified the considerable improvement on forest condition since its establishment in the 1990s.

Table 2: Previous studies on the status of the Mgori village land forest reserve

Year	N (Stems/ha)	G (m^2/ha)	V (m^3/ha)	Source
1994	988	9.1	43	Malimbwi and Mwansasu (1994)
2002	70		20	CAWM (2002)
2010	1 155	15.1	90.8	Mbwambo *et al.* (In press)

The above findings imply that CBFM has contributed to a significant increase of the stems per hectare, basal area and the volume. This created conducive environment and pasture land to wildlife and livestock.

3.1.6 Population and ethnicity

Mgori is inhabited by a number of ethnic groups that include Nyaturu who constitute 97.9% of the total population followed by a small number of Barbaig, Rangi, Nyiramba, Maasai and Taturu tribes. There has been a demographic change before and after establishment of the forest reserve. The population in the area has increased from 6 281 people in the year 1995 to 9 398 people in the year 2009 as shown in Table 3.

Table 3: Population trend in Mgori forest community

Year	Village	Population size	Source
1988	Mughunga	1 140	Opole (1994)
	Ngimu	3 200	in CAWM (2002)
	Pohama	2 531	
1996	Mughunga	1 210	Village register
	Ngimu	2 671	(2009)
	Pohama	2 400	
2002	Mughunga	1 382	
	Ngimu	3 738	URT (2003)
	Pohama	2 991	
	Mughunga	1 684	Village register
2009	Ngimu	4 758	(2009)
	Pohama	2 956	

Table 3 shows that before establishment of Mgori Village Land Forest Reserve, the total population in sampled villages was 6 871 in the year 1988 but it increased to 9 398 in the year 2009. The population increase has economic implications as far as the study is concerned. The population increase can lead to scramble for natural resources among people and between people and wild animals. Homer-Dixon and Blitt (1998) explained that population increase is directly related with demand increase and it has social and economic dimensions, including changing consumption patterns, trade liberalisation, rural enterprise development and changes in technology and land use (clearing land for habitats and agriculture in order to meet increased food demand at household level).

3.1.7 Socio-economic activities of the surrounding community

The major land based economic activities in the area include agriculture, livestock keeping and beekeeping. The forest is endowed with resources that include woodland species that make a good source of charcoal, timber, and firewood and non-timber forest products such as mushrooms which contribute significantly to income sources, especially during the rainy season. The most important source of income from the forest to the surrounding community is honey. About 7 500 beehives were hanged in the forest in the year 2008 and which yielded approximately 151 000 litres of honey. Brown and Robbin (2005) found that approximately 189 000 litres of honey is currently produced from the forest each year. Because of semi aridity, dependence on rain fed agriculture by the local community is very high.

3.2 Sampling Procedure

3.2.1 Stratified sampling

Three villages namely Mughunga, Ngimu and Pohama were sampled. The sample population was categorized into three social economic levels namely poor, intermediate and rich based on the criteria set out during focus group discussions done in the villages as shown in Table 4. Households were used as sampling units and village registers as sampling frame.

Table 4: Wealth groups and criteria in Mgori VLFR

Social economic group	Criteria
Rich	Modern house
	Have animals (Cattle)
	Own big farms
	Have ploughs
	Has a shop
	Rents a house
	Own Cars, tractors and motorbike
	Certain of 3 meals per day
	Government employee/Political leader
Intermediate	Modest house
	Own modest farm plots
	Have few animals (cattle/ goats)
	Has a plough
	Own a motorbike/ bicycle
	Certain of 3 meals per day
	Government employee
	Has a kiosk/canteen
Poor	Poor housing (Mud wall/thatch grass)
	Own very few animals (Mostly goats/chicken)
	Food insecurity
	Two or less than 2 meals a day
	Physically disabled/ widow (er)/aged
	Work as casual labourer
	Neither bicycle nor radio

3.2.2 Sample size determination

The total number of households in the three villages was found to be 1431 (July, 2009 village counts) of which 97 households equivalent to 17% were reached in this study

(Table 5). Household sample size was determined using the formula $n = \frac{N}{1 + N(e^2)}$ by Yamane (1967). Where; N =Village population

n =the required sample size

e = sampling error

Table 5: Sample size by social economic groups

Village name	Total households number	Social economic group Rich (HH) n=26	Intermediate (HH) n=23	Poor (HH) n=48	Sample size (HH) n=97
Mughunga	310	5	5	21	**31**
Ngimu	565	12	8	14	**34**
Pohama	556	9	10	13	**32**

HH-Household

3.2.3 Research design

A cross-sectional research design was used. This design aimed at providing data at one point in time from the sample selected to present a larger population. It is considered to be favourable when the time of data collection is limited (Bailey, 1997). It is also assumed to provide quick results. Babie (2007) considered the design suitable for the description of relationships among variables and allows valid information in a limited point of time. Kothari (2004) found that cross-sectional research design is important at acquiring information over a large geographical area and at a reasonable cost.

3.3 Data Collection

3.3.1 Primary data

Both qualitative and quantitative data were collected using semi-structured questionnaires. Semi-structured interviews are the most common form of assessing

people's experiences, perceptions and feelings of reality. They use predefined questions which are in both closed and open-ended format. They are very simple, efficient and practical in getting the data (Minichiello *et al.*, 2009).

3.3.1.1 Semi-structured interview

Semi-structured interviews were used for in-depth interviews. The interviews are more flexible because in the course of the interview due to their both closed and open ended nature, the respondents have an opportunity to provide detailed information. Checklists (Appendix 2a, 2b and 2c) were used to supplement data collected from household questionnaires (See section 3.3.1.2). The checklists captured data for livelihood assets, a balance between community conservation and rural livelihoods and wildlife conflicts. The interviewees were District Forest and Game officials, Court clerks and Village Government leaders. Others were Village Game Scouts, Singida Land Council, Religious leaders, Village elders and Influential people.

3.3.1.2 Household questionnaire

A total of ninety seven (97) households were interviewed. Both quantitative and qualitative data were collected by using closed ended questionnaires (Appendix 1a, 1b, 1c, 1d, 1e and 1f) from all the sampled households. The data collected include livelihood assets, balance between community conservation and rural livelihoods as well as wildlife conflicts.

3.3.2 Secondary data

Secondary data were collected by reviewing various sources including annual reports of Singida District Forest office, Forest and Beekeeping Division, Singida Police Post, Court, Wildlife Department, Mgori Village Land Forest Reserve, books, scientific

papers, journals, Sokoine National Agricultural Library (SNAL) and other information from the internet. The reports reviewed include inventory of Game in Mgori (CAWM, 2002), impact of CBFM to the rural livelihoods (MNRT, 2005; Blomley and Said, 2009; Nelson and Blomley, 2007), management of trade-offs between conservation and rural livelihoods (CIFOR, 2009) as well as poverty, environmental income and rural inequality (Cavendish and Campbell, 1994). Reports from the villages included population trend, records of various events such as the farms plots destroyed by wildlife, the number of villagers and livestock killed by wildlife and management and benefit sharing patterns.

3.4 Data Analysis

3.4.1 Qualitative data analysis

Qualitative data were transcribed and analysed through content analysis and from which the researcher drew conclusion through triangulation of the generated information. Fundamental issues analysed included community's access to livelihood assets, institutions and social relations modifying access to livelihood assets, trade-off between community conservation and wildlife conflicts. The detailed analysis of some documents such as research and other reports, historical records, policy manuals and books were also done so as to generate information that could be used to explain the situation in the field regarding poverty traps and wildlife conflicts.

3.4.2 Quantitative data analysis

The data collected from structured household questionnaires were summarized and coded. Statistical Package for Social Sciences (SPSS) computer software was used for data analysis. Descriptive statistical analysis was used in exploring the data for

distribution of responses, central tendencies and dispersion. Cross tabulation was performed to ascertain responses and percentages.

3.4.3 Gini coefficient

Gini coefficient is a measure of inequality, defined as the mean of absolute differences between all pairs of individuals for some measure. Gini coefficient was employed to measure inequalities in households' incomes from forest and non forest products in order to examine the extent to which CBFM has either reduced or increased income inequalities between households in the study villages. Gini coefficient (Buchan, 2002; Burkey, 2006) was calculated using formula:

$Gini\ Coefficient = \frac{1}{n^2 \times \mu} \sum (2_i - n - 1) x_i$ in which n is the number of individuals in the sample, x_i is the observed value, and μ is the mean value. The Gini coefficient takes the value between 0 and 1 with zero interpreted as no inequality (i.e. perfect equality) and the value of 1 reflecting inequality (perfect inequality).

3.4.4 Relative forest income

Forest resources contribute substantially to the household income. The relative forest income was used to measure the degree to which household depended on forest income.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Socio-economic Characteristics of the Respondents

Socio-economic characteristics assessed include age, sex, education level, marital status, occupation, household size and ethnicity. Others were land ownership, occupation and household's size. This type of information is important in determining the functional roles of the individuals who head households and how they influence wellbeing of the household as shown in Table 6.

Table 6: Socio economic characteristics of the respondents

Household characteristics	**Rich**	**Intermediate**	**Poor**
a) Age			
18-35	7	5	6
36-60	13	13	24
Above 60	6	5	18
b) Sex			
Male	24	21	29
Female	2	2	19
c) Marital status			
Single	1		
Married	23	23	31
Divorced	1		3
Widow			13
Widower	1		1
d) Household size	8	7	6
e) Education status			
Primary	21	17	21
Secondary	1	1	1
College			1
None	4	5	15
f) Occupation			
Farmer	14	18	46
Agro-pastoralist	5	4	1
Govt employee	2		
Business person	3	1	
Religious leader	2		
None			1
g) Ethnicity			
Nyaturu	25	22	48
Barbaig	1	1	

Results in Table 6 imply that majority of household had ages between 36 and 60 years. This shows that most of the respondents were aware of the prevailing situation and they were likely to have experience with the operation of the CBFM in 1995. They were matured enough to understand the impact of CBFM on the households' livelihoods. According to the results, rich households had large family sizes. Most of the households were male-headed and few were female-headed. Poor households had divorced heads contrary to other social economic groups. In gender perspective, women were considered to be disadvantageous in accessing society's economic resources compared to men. In Mughunga village, boys who reached 18 years age as opposed to girls are given land as a capital for cultivation. The Village Executive Officer had this to say during the interviews:

> *"There is a notion that giving land to girls is like loosing it. Many people believe that after marriage, girls will find land to their husbands".*[1]

FAO (2007) found that although women contribute substantially to the household's economy, their roles are not fully recognized and they unequally benefit as compared to men, as a result their working conditions are likely to be poor. A major problem is that they are not involved in decision making processes. Women's social and economic status in Tanzania is not equivalent to their economic contribution. Therefore, ensuring gender equity leads to the economic sustainability of the household.

The household size reported in this study is not quite different from figures in the Singida District in 2002 by the National Population Census (URT, 2003). The consumption and expenditure patterns are lined with the size of the household. This has a reflection on the distribution of the household income. In terms of adult

[1] Interview with Mughunga VEO on 14Nov, 2009

equivalent, it determines the income per capita, which is one of the strongest measures of income poverty. Household size is also associated with food security whereby the larger the family size the higher the food insecurity and vice versa.

Generally, about 71.1% of household heads had primary school level of education, 3.1% secondary education, 1% higher education, 18.6% had no formal education and 6.2% had adult education. Both lack and low level of education among community members can lead to increased poverty level due to the fact that people will have insufficient knowledge on how to use the available resources to improve their livelihoods. Moreover, lack of education gives chance for elite capture and few individuals dominate decision making processes for personal benefits. Education level among heads of households influences their wellbeing.

As for ethnicity and occupation in the area, Nyaturu tribe is the largest tribe followed by other small tribes. This shows that not only there is low influx rate of immigrants in the area but also CBFM ensures a supply of pasture to residents especially the pastoralists who migrate to other places in search for fodder and water. Furthermore, about 81.6% of the respondents were peasants. Therefore, understanding occupation of the population was important in determining the extent to which the society depends on forest resources because rural economies in most of the rural areas including Mgori are well integrated with forest resource use.

4.2 Forest Based Livelihood Options

4.2.1 Household economic activities

The economic activities of the area, like in many other parts of the country particularly semi arid regions were mainly crop cultivation as a central livelihood strategy,

agropastoralism. The off-farm activities include casual labour and handicraft (forest products). Others were petty trade, collecting firewood, medicinal products, selling snacks, religious activities and carpentry works (Table 7).

Table 7: Household economic activities in Mgori

	Social economic group		
Economic activity	**Rich**	**Intermediate**	**Poor**
Crop cultivation	15	17	46
Civil servants	2		
Agro pastoralism	5	3	1
Off-farm activities (Hired labour, handicraft, petty trade)	1	3	1
Others (Means of transport, shop, milling machine, video shows)	2		
Religious leader	1		
Total	**26**	**23**	**48**

A large (46%) proportional of households engaged in crop cultivation was from poor income bracket. Intermediate income households engaged in off-farm activities more than other economic groups. The rich households had a more diversifying economy than the remaining groups due to wide income earning portfolio developed. The poor households can easily be trapped in poverty cycles because they had less diversifying economy.

4.2.2 Access to assets

4.2.2.1 Land acquisition system

Means of land acquisition in the area included buying pieces of land, inherited land, rented, village given and land from clearing of bushes (Table 8).

Table 8: Land acquisition systems by wealth groups

	Percentage by each social economic group		
Means of land acquisition	**Rich**	**Intermediate**	**Poor**
Bought land	50.0	22.7	27.3
Inherited land	21.3	33.5	44.1
Rented land	50.0	25.0	25.0
Village given land	30.6	22.2	47.2
Land from bushes clearing	21.4	21.4	57.2

The findings in Table 8 imply that poor households acquired land mainly from inheritance, bush clearing and allocation from the village. Majority of rich households acquired land through buying and renting probably due to their financial capability. Despite that poor households have more access to land for cropping, they remained poor due to lack of capital, poor soils, poor tools (hand hoes) and shortage of food stock. Thus, this group is more susceptible to submerge further to poverty since they spend more time especially during rainy season on casual labours to earn cash or food for their survival than cultivating their own farms.

On the other hand, a tendency of poor households to clear bushes to increase the sizes of cultivation land may result into increased forest degradation. Hence, a need to have a land management plan to avoid unsustainable means of acquiring land as is the case for shifting cultivation is inevitable (Plate 1).

Plate 1: Forest degradation due to shift cultivation

(Photo: Singida District Office, 2010)

4.2.2.2 Access to loans

Majority of the local communities surrounding Mgori VLFR do not have access to loans; instead most of them either sell live animals or animal products to meet household needs (Fig. 3). As Ellis (2000) observed, in rural sub-Saharan Africa money savings and loans are kept in other forms, whereas in Mgori the savings are done in the form of livestock and livestock can be easily converted into cash. The larger the size of livestock herds implies more livelihood security. The results show that poor households are able to sell to a maximum of three cattle at once. On the other hand, the intermediate and rich households are capable of selling between five (worth TAS 700 000) and 10 cattle (TAS 2 500 000).

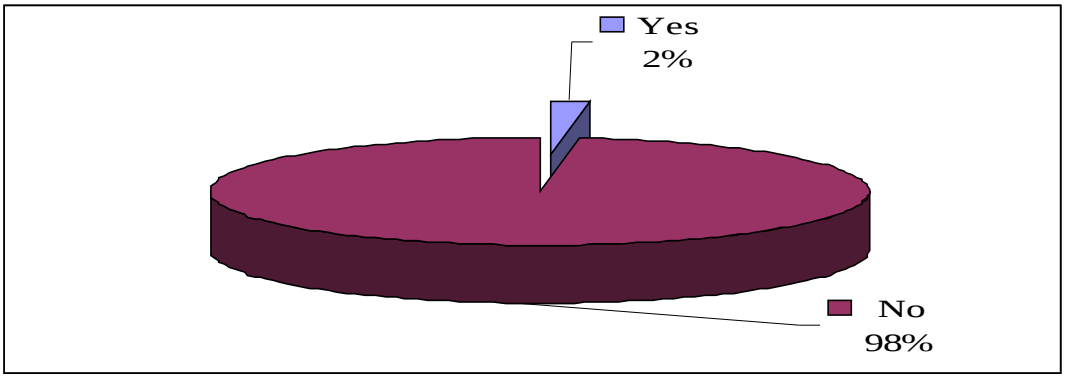

Figure 3: Responses on access to loans

The above results show that only 2% of the respondents had access to loan, however, by the time this research was conducted, the loans were not matured because the Village Community Bank (VICOBA) were still at the grass root level. The remaining 98% of the respondents did not have access to loans due to various reasons (Table. 9).

Table 9: Reasons for communities not accessing loans

Category	Code	Count	Responses (%)
No financial institution	1	17	17.5
People not sensitized	2	4	4.1
Not aware of issues pertaining loans	3	13	13.4
Only depends on remittances	4	2	2.1
Weak leadership	5	9	9.3
Corrupt leaders	6	3	3.1
Unable to access due to old age	7	8	8.2
Institutions are too bureaucratic	8	10	10.3
Reluctance to join Financial Institutions	9	12	12.4
No capital (shares) due to poverty	10	7	7.1
Fear of being confiscated	11	12	12.5
Total responses		**97**	**100**

7 missing cases; 90 valid cases
Note: *Total responses are 97 due to multiple response analysis

Findings from Table 9 entail that 17.5% of the respondents reported the unavailability of financial institutions for them to access loans. Enterprise developments can not be propagated in place where there no financial institutions as result people shift to natural resources. Similarly, IMF (2011) underlines that putting emphasis on enterprise development and small grants especially to rural poor leads to improved livelihoods and ensured sustainability of natural resources.

About 13% of respondents were not aware of issues pertaining loans. Reluctance to join financial institutions and fear of being confiscated were reportedly to be 12.4% and 12.5% respectively. Awareness creation on the benefits of loans can attract many to engage in enterprise development and reduce dependence on forest products for their livelihoods. Bureaucracy was another obstacle to secure loans as it was reported by 10.3% of the respondents.

However, about 15% of respondents did not have assets that could guarantee them to get access due to poverty and old age. Some people in poor households depend on remittances whereby none of them appeared in other economic groups. According to Lusambo (2009), poverty can socially be defined as isolation within the community or feeling powerlessness. This means a poor person does not have financial power and can not be easily entrusted. Corruption and weak leadership accounted little percentage as far as the access to loans is concerned. Therefore, provision of loans with less strict regulation and low interest rates will help local communities from falling into poverty cycles.

4.2.2.3 Access to physical property

Five respondents from high social economic group owned five milling machines, shops, ploughs for hire and one of them owned a mini-bus and this brings a total income of about 30 million annually. About 45% of the rich farmers had capitals that they use to undertake sunflower business; majority of these business men can buy up to 300 bags of sunflower per annum. They gain up to TAS 20.4 million from sunflower sale per year. This means that sunflower could contribute 22.7% to the total household income. Some rich and intermediate households store crops in order to raise prices during rainy season. However, this is very difficult for poor households who sell their produce even in low prices for subsistence need.

Production is hampered by poor infrastructures such as roads (high transaction costs), reliable water supplies, absence of electricity and processing machines. All big factories are situated in Singida town as a result farmers either look for customers in Singida or sell their crops at low prices at farm gate. Most of them are unable to produce more or buy farm implements in order to expand production through improved technology. If the Government provides subsidies to farmers to intensify sunflowers production, dependency on forest resources would significantly reduced.

4.2.2.4 Livestock ownership

Livestock is one of the major livelihood assets in Mgori (Table10). The main types of livestock kept include cattle, goats and sheep. They are kept under on-farm and off-farm model of feeding. Since the area had long drought seasons, some families do own donkeys which are mainly used for fetching water and carrying light loads. The donkeys have been very useful to the area because they even assist other families who cannot afford to keep them.

Many households (over 90%) keep chicken, and according to their norms women are the ones owning chicken for commercial purposes while the men are responsible for keeping larger animals. Thus, most of the male respondents could not recall well the exact number of chicken their households had. However, from the researcher's observation, women are responsible for taking care of livestock (grazing, milking and treating) while the men deal with financial matters. Also, most of the men who claimed that chicken were part of women's responsibility, sold chicken whenever they wanted and used the money for boozing (drinking local brews).

Table 10: Livestock ownership by social economic groups

Livestock species	Social economic group			
	Rich	**Intermediate**	**Poor**	**Total**
Cattle	1019	446	321	1786
Goats	579	268	398	1245
Sheep	84	72	25	181
Donkey	11	13	18	42

Nonetheless, rich households constitute 25% of the total sampled population but they own large size of cattle, goats and sheep compared to the intermediate and poor economic groups. However, the results show that sheep are being kept in a smaller number than other species because they were less marketable in the area. Cattle, goats and sheep were used as one of the major livelihood strategies to both rich and intermediate wealth households. This suggests that livestock policy should focus on livestock health protection by having comprehensive vaccination programmes that ensures improved quality of livestock products in the local and international markets.

4.2.3 Access to environmental resources

Generally, communities surrounding Mgori forest reserve had access to various environmental resources as shown in Table 11. Nevertheless, for forest products to be utilized in Mgori one may either pay or not pay for use depending on the type of product. Some of forest products were not paid for and others were being paid for someone to have access (Table 12). Modality of payment used in the village is through a permit or gate passes.

Table 11: Access to environmental resources among social economic groups

	Social economic group		
Individuals responses	**Rich**	**Intermediate**	**Poor**
Yes	12	15	30
No	13	8	10
I don't know	1		6
Total	**26**	**23**	**46**

Findings from the Table 11 entail 58.7% of respondents from intermediate and poor income brackets had access to environmental resources. However, the larger percent of rich households do not utilise environmental resources as opposed to intermediate and poor households

.

Table 12: Payment for use of forest products among social economic groups

	Social economic group			
Responses	**Rich**	**Intermediate**	**Poor**	**Total** (*n*)
Yes	12.4	10.3	8.25	31.2
No	14.4	13.4	41.25	69.1
	26.8	23.7	49.5	100

Findings in Table 12 imply that most of the rich households purchased forest products from individuals rather than collecting them directly from the forest as the poor households do. Forest products that were mainly paid for include building poles and

logs for making beehives and bricks. The price poles ranged from TAS 200 to 1500 per pole and that of logs was TAS 10 000 per log. Fuel wood, charcoal, mushroom, wild vegetables, ropes, yokes and wild fruits were not paid for. Other products not paid for included hoe handles, wooden spoons mortar and pestle, beehives, sticks, thorns for fencing.

Table 13: Access to various forest products in Mgori

Forest product	Social economic group				
	Rich	Intermediate	Poor	Total	Percentage
Wild fruits	14	14	23	51	52.6
Fuel wood	23	22	41	86	88.6
Honey	12	16	16	44	45.3
Building poles	21	17	24	62	63.9
Mushroom	20	15	26	61	62.8
charcoal	9	2	2	13	13.4
Wild vegetable	16	15	18	49	51.0

Findings from Table 13 imply that majority (88.6%) of the respondents interviewed, reported to collect dead wood for firewood from the forest. On average, head load was reported to be 10 bundles per month per household and this is mostly used for domestic consumption. As Blomley and Iddi (2009) observed, about 90% of the total energy used in Tanzania comes from firewood. The main use of firewood is for cooking, local brew making and heating. However, increased number of lions, buffalos and elephants reduced access to the forest. Therefore, scaling up of agroforestry techniques should be a focus of CBFM to encourage more villagers to have their own tree farms.

Beekeeping was one of the economic activities in the area. About 45.3% of the respondents interviewed were involved in beekeeping. Honey production was mainly

for commercial purposes and very few beekeepers produced honey as food. Most of beekeeping activities were carried out individually. However, the harvests have increased after the adoption of CBFM approach because of improved skills through training on modern harvesting techniques and use of modern technologies. The regenerated forest also provides raw materials that encourage beekeeping activities in the area.

According to village bylaws, charcoal making activities in the forest have been banned. But, rich household accessed charcoal more than intermediate and poor households. This would accelerate illegal charcoal making since most of the charcoal are being extracted by the poor and sold to rich men for cash earning. Potential tree species for charcoal making identified in the area include; *Brachystegiaspp, Ptrocarpusangolensis and Afzeliaquazaqnsis.* But poor technologies used led to low lumber recovery and poor quality products.

Building poles harvest was mainly for subsistence. Rich households appeared to have accessed building poles more than intermediate and poor households. These poles were used in different household activities such as constructing houses and livestock enclosures. This means that successful community conservation can lead to sustainable supply of forest resources. Other forest products include medicinal products, wild vegetable, wild fruits, mushrooms, ropes, wooden spoons, thorns as well as handles. Since the area is inhabited by livestock keepers, ropes were very important. Also ropes are used for constructing houses and livestock enclosures. Dwing ropes extraction trees are debarked or cutting down. This can lead to deforestation if not controlled.

Wildlife hunting was illegally practiced; most of the respondents were not transparent in providing information on wildlife hunting. None of them reported to have been involved in hunting but the results show that 2.7% of the respondents reported to use bush meat for consumption or commercial.

The following statement was given by some of the respondents:

> *"Most of the village leaders cooperate with illegal hunters to have bush meat either for subsistence or commercial uses"*[2].

Participant observation revealed that bush meat is widely consumed in the area, and its availability is high during rainy season. The availability of bush meat is very high during rainy season because of enough pasture for wildlife. However, there are challenges faced by the rural poor whose dependence on natural resource is very high. These involved reduced access to due to both stiff regulation and increased number of wildlife. Another statement was given by one of the respondents:

> *"Fingers have been pointed to the rural peasants that we are the agents of environmental degradation while the greater quantities of the total environmental resources are consumed by rich households"*.[3]

Cavendish (1999) pointed that although, poor households depend heavily on natural resources for their livelihoods, a large portion of environmental resources are being consumed by rich households. This study suggest implementation of participatory forest management policy in order to have clear benefit sharing patterns that will avoid ongoing destruction accelerated by overuse of resources.

[2] Four different respondents complained during interview in Mughunga and Ngimu villages on 5and 9April, 2010

[3] Interview with one of the Village elders in Mughunga village on 15th November, 2009

4.3 Institutions Responsible for Management and Use of Resources

Both formal and informal institutions were used in managing resources. Informal institutions include rituals and taboos for example in the forest reserve there are big trees set aside as sacred items and people often go for worship ceremonies under these trees. These trees are highly protected and fines were introduced to punish whoever is found guilty of committing an offence. The fine is locally known as "*njuguda*". The offender is required to pay a cow worth TAS 250 000 per the offence committed.

Njuguda is also charged to someone found guilty of setting bush fires, debarking herbal trees, collecting ropes or harvesting timber although this kind of njuguda varies with the nature of the offence. Therefore, fines are very useful and effective in regulating or maintaining dignity among the members in the surrounding societies. The importance of institutions is that they change with societal changes as well as change in societies' priorities (Kajembe *et al.*, 2004), cited by Shayo (2008). The formal institutions include Village Government, District Council and Ministry of Natural Resources and Tourism (Table14).

Table 14: Institutions responsible for management and use of natural resources

	Social economic group		
Name of Institution	**Rich**	**Intermediate**	**Poor**
District Council	13	11	12
Village government	2	3	6
MNRT (Anti poaching Unit and FBD)	2	1	1
No institutions	4	2	7
Total	**21**	**17**	**26**

Results in Table 14 entail that majority of rich households viewed that the District Council was an important institution in modifying access to livelihood assets. The District Council links local communities with the central government through the Ministry of Natural Resources and Tourism (MNRT) or Donors and NGOs (Massawe, 1999). The Council also provides technical and management support through professional foresters. The same is also reported in other parts of Tanzania where CBFM has been undertaken (Blomley and Ramadhani, 2006; Blomley *et al*., 2008).

Village Government ranked the second in modifying access to livelihood assets especially forest products. The village government modified access by lowering charges, providing permits and allowing pastoralists to graze their cattle in the forest free of charge. The village government is the organizer of planning and implementation processes (Wily, 1998). Lack of fund to coordinate management activities was a challenge facing all village governments in the study area. This lowered the performance of these villages.

On the other hand, ineffective performance of village government is caused by corruption among the leaders and domination of elites within the group of forest users (Ferraro, 2005). If the elites dominate in decision making and access; minority will benefit from the natural resources leaving the majority who are in the poor bracket fall into poverty cycle. However, other village governments in many forest reserves that are under CBFM have been reported to be effective (Blomley and Ramadhani, 2006; Blomley and Iddi, 2009). Participation of stakeholders in forest resources management is the only solution to ineffective performance of PFM at a village level.

Ministry of Natural Resources and Tourism ranked the third in modifying access to resources and the MNRT was ineffective. The reason is that the Ministry is not close to the local communities. Anti poaching Unit which is one of the Ministry's sectors is located at Manyoni District about 120 km from Mgori. They seldom appear even after several appeals from the villages. However, the Central Government through MNRT contributed towards the establishment of CBFM at Mgori Village Land Forest Reserve through formulation of policies, programmes, guidelines and acts (URT, 1998, 2001, 2002) which are being implemented in the whole country. The MNRT in collaboration with SIDA assisted the implementation of CBFM and gazetting of Mgori Village Land Forest Reserve. However, about 20% of respondents answered that there are no institutions responsible for management and use of natural resources. This is probably because of community lack of involvement in decision making and management of natural resources.

4.4 Poverty Situation in Communities Adjacent to Mgori Forest Reserve

Sections 4.4.1 and 4.4.2 focused on assessment of poverty situation in the study area on the household ability to earn income, consumption and food security, shelter, and access to health services, education and clean water. About 21% of poor households faced food insecurity. The main causes of food insecurity include declined soil fertility that lead to low yield and crop raiding by wildlife (Wildlife conflicts discussed in details in section 4.6).

4.4.1 Household income, variation and diversification by source and wealth groups

In all the three villages, agriculture represented the main source of cash income by 79.4% of the sample households, agropastoralism (10.3%) other non farm economic

activities constitute 11.3% despite their importance. The rich households have more diversified economies than the intermediate and poor households. The richer households obtained money from non-farm activities such as milling machine, transportation and shops (Table 15). In the past twelve months, rich households' income (TAS 70 million) has been about eighty times greater than that of poor households (TAS 8 471 400). For example, last year one respondent in Pohama village collected TAS 20 million from his mini bus. These non- farm activities seem to have contributed significantly to the households incomes. Poor households (12.1% of the total sample) engaged in selling local brewed alcohol. Little *et al.* (2001), cited by Barretta *et al.* (2001), point out that more than 40-45% of the average household income of farmers in Africa was obtained from non farm sources which increasingly become important livelihood source to many. In all the three villages, forest income was mainly for subsistence needs. Other less significant sources of cash income originated from selling animal products such as milk, hides, butter, chicken, as well as eggs. Only four respondents from the sample received government support because one of them is a widow, one widower and two old men.

Table 15: Household income sources as percentage among social economic groups

Income sources	**Rich**		**Intermediate**		**Poor**		**Mean**	
	TAS	**%**	**TAS**	**%**	**TAS**	**%**	**TAS**	**%**
Agriculture	24 283 000	35.1	2 453 000	20.1	2 704 000	33.6	9 813 333	32.9
Livestock	12 913 700	18.7	4 166 000	34.1	1 972 500	24.5	6 350 733	21.3
Forest products	1 363 500	0.6	2 169 000	11.1	1 089 400	8.2	1 540 667	2.7
Livestock products	216 000	0.3	582 000	4.7	391 000	4.9	396333	1.3
Non-farm	31 414 000	45.4	3 130000	25.6	1 291000	16.1	11 945000	40.0
Off-farm			532 000	4.4	1 023 500	12.7	518 500	1.7
Total	**70 190 200**	**100**	**13 032 000**	**100**	**8 471 400**	**100**	**30 564 533**	**100.0**

Findings in Table 15 imply that income from livestock products is very low because there is no reliable market for such products. Henceforth, most of the households practiced barter exchange between milk or eggs and cereals. Neither slaughtering places nor butcher were found in any of the three villages, which means it was profitable to sell live livestock than selling livestock products.

It was noted that, selling of chicken was one of the main source of income for the poor households in spite of high rate of chicken death due to fowl typhoid disease and wildlife such as pole cat, wild cat and foxes. Annually, one could earn up to TAS 135 000 or even more from chicken sales which worth an average of TAS 3500 per one chick. Therefore, if a fowl typhoid disease is prevented, predation to chicken reduced; market assured and prices increased; chicken sales would have a significant contribution to the rural poor economy.

Table 16: Income from livestock among different social economic groups in Mgori

	Social economic group			
Item	**Rich**	**Intermediate**	**Poor**	**Total**
Number of cows sold	47	22	11	80
Number of cows traded	17			17
Cows sold (%)	58.8	27.5	13.8	
Cows traded (%)	100			
Total income from cow sales	12 390 000	2 888 000	1 135 000	16 413 000
Number of goats sold	18	33	15	66
Number of goats traded	5			5
Goats sold (%)	27.3	50.0	22.7	
Goats traded (%)	100.0			
Total income from goat sales	650 000	620 000	304 000	1 574 000
Number of sheep sold	2	6	18	26
Sheep sold (%)	7.7	26.1	69.23	
Total income from sheep sales	160 000	84 000	328 000	572 000
Number of chicken sold	51	36	53	140
Number of chicken traded			9	9
Chicken sold (%)	36.4	25.7	37.8	
Chicken traded (%)			100.0	
Total income from chick sale	317 500	270 000	253 000	840 500

Findings in Table 16 imply that rich households earned ten times income from cattle selling both for subsistence needs and commercial purposes higher than intermediate and poor households sold cattle for subsistence needs. About 69% of sheep sold came from poor families. Poor households sold many chickens (37.8%) but the income was less than what was sold by the intermediate and rich households, this is probably they have less diversifying economy i.e. they have no any other choices.

Table 17: Mixed crop and income average of social economic groups per year

	Social economic group		
Stock average (bags)	**Rich**	**Intermediate**	**Poor**
Sunflower	130	30	20
Millet	40	20	10
Maize	45	8	10
Sorghum	40	15	4
Income average (TAS)			
Sunflower	3 500 000	500 000	300 000
Millet	450 000	300 000	100 000
Maize	600 000		40 000
Sorghum	1 000 000	250 000	150 000

Mgori has a semi arid climate; therefore crop cultivation has a substantial contribution to the incomes of local communities. Sandy soils support most of the drought resistant crops such as millet, sorghum, sunflower, coriander, sweet potatoes and small scale maize cultivation. Sunflower is grown by more than 90% of the residents adjacent to Mgori forest reserve. It is therefore considered to be the most important cash crop that contributes enormously to the incomes of many farmers since it requires either little or no agricultural inputs. Rich households benefited from large scale sunflower cultivation.

The results reveal income and stock variation among social economic groups in Mgori. In the year 2009; 68% of the respondents from rich economic bracket were involved in sunflower cultivation while only 30.4% of the intermediate and 36.73% of the poor

households cultivated sunflower. Other cash crops grown by the local communities adjacent to Mgori forest include coriander, chick peas, beans, sweet potatoes and groundnuts which are in very small scale. These crops were only grown by the rich and intermediate households but not by poor households.

The results show that a price per bag of these small scale grown cash crops was much higher than that of sunflower. The price per bag of beans was TAS 75 000 and that of coriander was TAS 50 000 but that of sunflower was TAS 30 000. Thus, if emphasis is put on expanding production of these small scale grown cash crops, dependence on forest products by the rural poor will be reduced. Sorghum, maize and millet were considered as both food and cash crops. From the findings, despite the intermediate wealth group constituted 50% of those growing sorghum, they performed poorly in production. From these findings, strong advocacy of multi sectoral policies that will address rural livelihood issues is inevitable.

Local markets commonly known as "*minada and or gulio*" operate once in a week. These local markets operated in Ngimu and Pohama but not in Mughunga. Villagers from Mughunga usually had to walk 26 km to the market place. Market proximity influences the prices of various products. For example, a cow sold at 250 000 TAS in the market place is sold at a price ranging 70 000 to 150 000 TAS in Mughunga village. Therefore, investment policies should focus on establishing the organ that will protect the rights for both farmers and livestock keepers by regulating and controlling prices.

4.4.2 Access to social services

About 71.1% of the respondents had primary education. Few schools and lack of teachers has resulted to low level of education. Revenues collected from the forest was not reflected in the development of social services such as increasing level of education for pupils who come from distant villages by building classrooms and hospitals at ward levels. For instance, there was only one dispensary located in Ngimu village, and has a single building and three nurses to serve more that 7714 people from three villages namely Ngimu, Pohama and Lamba. In Mughunga dispensary, only one nurse was found providing services.

Dispensaries in the mentioned villages were built by using the villages' workforce; and TASAF provided technical and financial support. The same applied to schools; many teachers transferred to Mgori or recruited by the District Council did not report to working stations because of poor housing or lack of accommodation. In Ngimu village there were seven teachers teaching 480 pupils, in Pohama there were six teachers required to teach 600 pupils. There was also one agricultural extension worker operating in a whole ward.

Households' water dependence is on traditional wells, shared with livestock and wildlife. Those natural wells were not covered and protected as a result there were frequent cases of typhoid, cholera and diarrhoea. Poor families were more liable to suffer from diseases because they had no money to buy water from the community tank whereby one twenty litres' bucket was sold at an average of TAS 20. According to Madulu (2003), the major cause of mortality in rural areas is poor access to clean water because it leads to many water-borne diseases.

Out of 80.4% of those who do not pay for water services, 43.3% come from poor social economic group. Only 19.6% of those who do not pay come from intermediate and rich social economic groups. The average time spent for water fetching was one hour and the distance covered to water sources averaged 1.5 km. The maximum time one could spend in searching water was eight hours and the maximum distance covered was 10 km. one of the respondents said:

> *"Water is a very big problem in our village; we are spending a lot of time in searching for water instead of doing other economic activities such farming and carrying out businesses".* [4]

This increased workload to women and children since most of them wake up early in the morning to search for water. Therefore, the risks of encountering wild animals are high.

Table 18: Households' sources of water for domestic use in Mgori

	Social economic group		
Source of water	**Rich**	**Intermediate**	**Poor**
In nearby river during rain season			1
Community tank(paying for use)	7	4	5
Natural wells throughout the year	14	7	28
Water ponds in rain season	3	4	5
Natural wells during rainy season	1	5	2
Natural wells during dry season	1	2	6
Drilled wells during dry season		1	1
Total	**26**	**23**	**48**

[4] Interview with One female respondent in Pohama village on 23 Nov, 2009

Findings in Table 18 imply that there are no reliable water sources in the area and the scarcity increase during dry seasons. Majority (51.5%) of respondents depend on natural wells, whilst only one drilled well was found in Ngimu village and one community tank was found in Pohama village in which one could pay for use of water. Therefore, if clean water is supplied labour time and diseases outbreaks will be reduced.

4.5 Forest Resource Dependence

4.5.1 Relative forest income

Relative forest income for different wealth groups was 12.8% for the poor, 16.6% for intermediate and 1.9% for the rich. The correlation between relative forest income and total income was significant and the relationship was weak. The weak relationship between relative forest income and total household income (R^2=0.168, P<0.3, N=97) imply that CBFM has not contributed considerably to Mgori rural livelihoods. Results indicate that forest income constitutes a larger share of the total household income in the intermediate households than among the other groups (Table 19).

The intermediate households to have a larger share of forest income due to the fact they have food to eat but they need money to supplement other needs such as school fees, clothing and medical charges. The successfully conserved environments represent a sensible alternative means of enhanced sustainable development to many people especially the rural poor (Sauer *et al.,* 2007). As Cavendish (1999) reported, rural incomes in developing countries considerably depend on environmental resources that contribute almost a half of poorer households' incomes.

Table 19: Overall income from various forest products among wealth groups

Type of forest product	Social economic group Rich	Intermediate	Poor
Timber		40 000	
Ropes		540 000	
Wild fruits	400 000	60 000	130 200
Charcoal	19 500	480 000	
Fuel wood		69 000	385 000
Hoe handles, wooden spoon		1000	26 000
Mushroom		72 000	40 600
Wild vegetable		12 000	25 000
Poles		462 500	25 000
Mortar and Pestles		36 000	30 000
Honey	944 000	396 000	425 000
Total income (TAS)	**1 363 500**	**2 169 000**	**1 087 000**

In Mgori, about 36% of the total environmental income came from honey business. Income from honey contributed about 3% of the total household income. About 1276 litres of honey were produced by 45.4% of the respondents. The 39.4% of high wealth group that practised beekeeping earned TAS 944 000 while low wealth group (33.3%) earned 425 000 TAS and intermediate and wealth group (27.3%) earned TAS 396 500. The average prices per litre range between TAS 1250 and 2750 and the total income from honey production in the last year was TAS 1 765 500. The challenge to honey production was increased theft events and destruction by honey badgers.

Fuel wood constituted 12.1% of the total environmental income. The price per head load ranged from TAS 400 to 600 and one push-cart was sold at TAS 10 000. About 8882 head loads of fuel wood worth TAS 454 600 were collected. The results show that fuel wood sales benefited 84.8% of poor social economic group. The intermediate group that benefited from collection and sales of fuel wood constituted 15.2%. On the other hand, the rich do not engage in fuel wood sales. The main customers are villagers, private companies, businessmen and passers by.

About 6% of the respondents reported to engage in the collection of wild fruits. The average price per kg of wild fruits ranged from TAS 50 and 500. The total income earned was TAS 590 200 which contributed about 13% of the total environmental income. Wild fruits were used as one of daily meals in some of the poor households. Wild fruits were mostly preferred by the young ones despite income disparities among social economic groups.

Wild vegetables offset the costs of purchasing food supplements to a great extent. About 46% of the respondents collected wild vegetables during rainy season and dried out so as to use it in dry season. Only 3% of respondent sold wild vegetable at TAS 37 000 contributing 0.8% of the total environmental income. Since, wild vegetables were important as food and income sources, quantity harvested has reduced substantively due to increased threats by wildlife. Mushroom was also one of the favourite foods in every household. Income from mushroom contributed about 2% of the total environmental income. About 269 kg of mushroom were collected by 50.5% of the respondents for domestic use and 308 kg were collected for commercial purposes. The average prices per kg ranged from TAS 250 to 500 and the total income from mushroom sale was TAS 112 600.

4.5.2 Wealth distribution and forest income

There is high disparity between different wealth groups in the study area. The poor earns 9.3%, the intermediate earns 14.2% and the rich earns 77.5% of the total household income. Gini coefficient was used to examine the relationship between forest income and income inequalities across households in villages. Results for the Gini

coefficient for household income both with and without forest income per village are presented in Table 20.

Table 20: Gini coefficients for total and without forest income in Mgori

Villages	Gini coefficient for total income	Gini coefficient without forest income	Change (units)
Mughunga	0.12	0.22	0.1
Ngimu,	0.25	0.26	0.01
Pohama	0.36	0.37	0.01
All three villages	0.57	0.65	0.08

Table 20 reports that forest income reduces income inequality between households, deliberate efforts should be taken to avoid the increase in Gini coefficients (increased income inequality between households). In Mughunga village the Gini coefficient without forest income was 0.22 and value decreased to 0.12 when forest income was included. This implies that forest income has a significant contribution in the household income. Marginal effect was observed in Ngimu and Pohama village with a unit change approximate zero; the villages have a relatively smaller forest income than one percent. However, Pohama had larger Gini value (0.37 without forest income and 0.36 for total household income) than the rest. This means that there is higher income inequality compared to Ngimu and Mughunga.

For all villages, the Gini coefficient was found to increase by 0.08 units when forest income was omitted (Gini value decreased from 0.65 to 0.57 when forest income was included). These findings reflect similar argument by Velded *et al.* (2007) that forest income has a significant contribution in household's total because it reduces income inequality between households. In most African countries the Gini coefficient decreased from 0.51 to 0.41 when forest environmental income was included, which is a rather significant increase. Only in one case (from India) did income inequality

increased slightly when forest environmental income was excluded (*ibid*). Gini coefficient values in Ngimu and Pohama villages were higher than that in Mughunga. Nonetheless the Gini was calculated using annual data, it reflected findings by Gibson *et al.* (2001), cited by Lusambo (2009) which cautioned that when using monthly income data, income inequality values tend to be higher by 17% to 69% than when annually collected. This indicates income variations among villages that jointly manage Mgori forest. Establishment of organ that promotes equitable access to natural resources among participating villages will motivate surrounding communities and strengthen conservation efforts.

The overall Gini coefficient for the three villages (increased from 0.57 to 0.65 when forest income excluded) corresponds with argument by Carter (2000), cited by Lusambo (2009). According to Carter (2000), the value of the Gini coefficient usually varies around 0.25 in Scandinavian countries to a little over 0.6 in the most of developing countries Tanzania inclusive. From the findings in the current study, it can be suggested that remedial joint actions be undertaken by multi sectors to rescue the local communities adjacent Mgori VLFR who are currently considered as the losers.

4.5.3 Poverty traps

4.5.3.1 CBFM contribution to poverty reduction

Contribution of CBFM to household's cash income to Mgori ruraldid not sufficiently (R^2= 0.16, p=0.3) reduce poverty. After computing the Gini coefficients, it was observed that income varied among individuals and villages. Results were similar with the analyses by Ferraro (2008) in Costa Rica and Gabon. However, there is a problem of measuring outcome variables that require pre- and post-establishment observations to estimate the welfare effects of protected areas on the neighboring communities and

the control populations (Ferraro, 2008). This requires models that measure the impact of protected areas and explain causal mechanisms of realized impacts in order to allow simulation of alternative policies.

About 73.8% of the respondents replied that CBFM had a significant contribution to the forest regeneration but not to the livelihoods of local communities. As Andam *et al.* (2010) argued, it is possible for the protected areas to alleviate poverty among the rural communities living in or adjacent to these reserves as it were experienced in Thailand and Costa Rica. CBFM has not imparted skills among the local people on such matters as the use of local herbs, how to add value on forest products, improved sawing technologies and silviculture. As Schreckenberg *et al.* (2007) observed, despite that individuals, households and the communities vary from each other on the improvement of livelihoods. There were no equitable benefits sharing among villages due to selfishness and corruption (Table 21).

Table 21: **Rationale on access and use of forest products**

	Social economic group		
Individual responses	**Rich**	**Intermediate**	**Poor**
Village leaders	6	5	8
Some district officials	4		11
Businessmen from Singida and Manyara	5		3
Poachers and illegal hunters	3		2
Carpenters		1	
Both well-off men in the village and Singida	6	1	2
Forest Guards	2	4	1
Total	**26**	**11**	**27**

Findings in Table 21 mean that village leaders have more access and use of forest products than other villagers. Majority of the poor households reported that some

district officials access and use forest products. The other groups benefited on forest products include well-off men from the villages, Singida town and Manyara town. Decentralization as a core aspect of community conservation aimed at reducing corruption by allowing local actors more authority over the use and management of resources. It is expected that CBFM would have reduced poverty among the neighboring communities (Ferraro, 2005; Ferraro and Pattanayak, 2006; Ferraro, 2008).

Similarly, a study by Abdallah (Undated) revealed that sustainable conservation faces challenges such as ensured sustainable exploitation, benefit sharing, clear distribution of roles and responsibilities among actors. Inability of the local communities to shift from on-farm activities to other alternative economic activities, lack of access to land as well as livestock are strongly linked to rural poverty (Ellis and Bahiigwa, 2001). Thus, some of the villagers cut down poles and harvest timber illegally and sell them to rich villagers or people from Singida.

Another obstacle for community development in the area is poor infrastructures. The area lies in the rift valley, the roads are highly degraded (Plate 2a); gravel and silt washed down the valley side are clogging fertile lowland areas. Poor soils with low fertility rate do not give high yield to many crops except drought resistant crops such as sorghum, millet and sunflower which are also highly destructed by wildlife (Plate 2b). Apart from infertile soils, market unavailability is another obstacle. High costs of agricultural inputs such as fertilizers, dips and ploughs threaten livestock health and lower crop production. Wildlife are among the sources of poverty traps because they are causes of disease outbreaks, they limit people’s ability to work by raiding crops and

killing cattle as well as threatening the lives of people and thus accelerate vulnerability to poverty.

Plate 2a: Road degradation caused by soil erosion

Plate 2b: Stressed plants as a result of soil infertility
(Photo 2010)

Therefore, the results from this study indicate that CBFM is keeping local communities poor and it will be impossible for them to escape from poverty, if there will be no equitable benefit sharing, proper management plans and inclusion of local communities in decision making processes. This conforms to the findings by Brockington *et al. (*2006) and West *et al.* (2006). According to West *et al.* (2006), protected areas cannot be separated from people and make their surroundings have categories of nature, culture, environment and society independently. For sustainable conservation of natural resources, all the categories need to be tied up with multi stakeholders through involvement.

Brockington *et al.* (2006) insisted that without considering economic and socio-cultural costs and the impacts arising from the establishment and maintenance of protected areas, natural resources will be degraded. Ignoring local conservation initiatives; rural groups will engage themselves in an unsustainable resource use. Understanding the link between conservation and rural livelihood is very important not only on what is already in place but also on the future of the protected areas. Therefore, considering indigenous people by encouraging policies that prioritise indigenous peoples' rights and needs is unavoidable. It is imperative to understand and take into consideration the ecological coexistence between people and ecosystems so as to manage resources and reduce poverty in the surrounding communities.

4.6 Wildlife Conflicts

4.6.1 Wildlife status in the forest reserve

The current study findings show that the number of wildlife is increasing. Communities adjacent to Mgori have started to bare costs of this successful conservation. The study results show that 87.6% of the respondents reported conflicts between wildlife and the communities adjacent to forest reserve. Elephants can be seen more than once a week as opposed to the time where the forest wasn't in a good condition i.e. before establishment of CBFM approach. The following statement was given by one of the key informant to explain the status of wildlife in the area:

"You can see a range of seven to nine elephants per day" [5]

The rate of wildlife prevalence was as follows: 58.1% of the respondents indicated as high, 27.9% indicated as medium and 10% indicated as low extent of wildlife conflicts in the area. Wildlife population has enormously increased due to the recovering and increasingly well-protected miombo (Nelson and Blomley, 2007). Elephants have been reportedly destructing crops as well as threatening people's lives (*ibid*). Households whose farm plots are closer to the forest were the most affected ones. Even though lions and hyenas kill livestock frequently, villagers had no rights to kill, harvest or manage the wildlife in their village forest reserve.

[5]Interview with Key informant at Mughunga village on 15 Nov, 2009

Figure 4: Responses on conflicts between wildlife and the local communities

An inventory carried out by CAWM (2002) in determining the status of game species in Mgori community forest revealed an increase of wildlife due to improved condition of the forest (Table 22). Wildlife number was obtained in two ways; interviews with the sampled villagers and animal survey (counting). Interviewees ranked wildlife from frequently, rarely seen game species and the not seen game species whose scores are added and then divided by the number of the respondents. Most of the species mentioned by the villagers corresponded to those observed in the field.

Table 22: Game species in Mgori village land forest reserve

Frequently seen game	Respondents (%)	Rarely seen game species	Respondents (%)	Not seen game species	Respondent (%)
Elephant	87	Lion	38	Rhino	81
Kudu	80	Leopard	36.2	Bushbuck	34
Impala	76	Buffalo	31.4	Buffalo	34
Giraffe	54	Giraffe	29	Eland	9
Dikdik	50	Eland	28	Giraffe	5
Hartebeest	47	Zebra	18.6	Zebra	4
Zebra	44	Hyena	14	Porcupine	2
Pi/hog	33	Elephant	10.5	Hartebeest	2
Baboon	31	Porcupine	9.3	Klingspringer	1
Eland	28	Warthog	7	Warthog	1

Lion	14	Hartebeest	5.8	Wild dog	1
Hyena	12	Kudu	5.8		
Warthog	12	Impala	4.7		
Velvet monkey	12	Wild dog	3.5		
Leopard	9.3	Pig/hog	3.5		
Buffalo	9.3	Roan antelope	2.3		
Roan antelope	8.1	Baboon	2.3		
Black jackal	2.3	Velvet monkey	1.2		
Common duiker	2.3	Dikdik	1.2		

Source: CAWM (2002)

4.6.2 Linking wildlife conflicts to poverty

Wildlife conflicts were directly linked to poverty because of reduced productivity among many villagers especially those in the poor social economic group. Kideghesho (2008) reported that majority of poor Tanzanians in the local communities can be vulnerable to abject poverty because of low crop productivity, livestock killings, increased threats, destructed infrastructures and injures which result from wildlife conflicts. Jeffrey, *et al.* (2004) also reported that one of the sources of poverty traps is low-productivity in economic activities. Crop raiding by elephants is a major consequence of wildlife conflicts as was reported by 48.8% of the respondents. Livestock predation was another problem as was reported by 26.4% of the respondents. Human killings are very rare but people's lives are highly threatened.

Both men and young men spend nights during rainy seasons in protection of their crops more than production activities. A study by Ashley *et al.* (2002) reported a potential link between wildlife conflicts and poverty among the communities surrounding the forest reserves. Since, infrastructures such as water wells are not well protected, destruction of wells is frequent especially during dry seasons when elephants compete

for drinking water with human beings. Women are the most vulnerable group among household members because they sometime fetch water even in the mid of the night. Reduced access to forest products to those who rely on them for subsistence needs worsen life their situation. As for beekeepers, these are also discouraged because honey badgers destroy beehives to get honey as a source of food.

Furthermore, after re colonisation of wildlife, grazing land was reduced due to increased threats in the forest leading to animal starvation and reduced milk production among some of the villagers, although some of them thought that milk production depends on seasonal variability, pasture availability or long distances between homes and the forest. Increased tick borne diseases and tsetse flies are the result of wildlife being closer to the residential areas leading to increased costs of livestock medication.

4.6.3 Factors influencing wildlife conflicts

A number of factors were mentioned to accentuate wildlife conflicts in Mgori (Table 23). Most of them are directly connected to improved condition of the forest reserve. Since, the area experiences drought season each year, a scramble for this invaluable resource is fairly common due to its scarcity. About 11.7% of the respondents reported to have seen the elephants polluting the water after drinking it and other respondents reported to have collided with hyenas while on their way to fetching water.

Table 23: Factors influencing wildlife conflicts in Mgori

	Social economic group		
Factors	**Rich**	**Intermediate**	**Poor**
Increased number of wildlife	9	6	7
Turning the village land into forest reserve			2
Improved condition of the forest harbour wildlife	5	2	1

No protection to people and their property			1
Unavailability of water and pasture	3	5	12
Lack of conservation education	2	1	4
Lack of demarcation between village land and forest reserve		3	2
Poor response from Game Department	3		
Seasonal variability especially harvesting and drought season	2	3	2
Limited number of prey to predators			1
Bushfires force them get out of reserve	1		8
Total	**25**	**20**	**40**

Results in Table 23 imply that majority (25.8%) of the respondents indicated increased number of wildlife being the major accentuating factor. Unlike intermediate and rich economic brackets, poor group reported that unavailability of water and pasture led to conflicts. Poor households also pointed out that bushfires set by illegal hunters; timber harvesters; honey collectors as well as saboteurs displacing the wildlife and making people suffer the consequence.

Lewis (1996) elucidated that wildlife conflicts are accentuated by establishment of protected areas. Other factors include: lack of protection for the people and their properties while forest boundary is very near to residential areas, agricultural expansion and population increase (Kisoza *et al*., 2004). A reduced number of poachers due to protection of wildlife lead to increase in number as well as seasonal variability especially harvesting and drought seasons.

4.6.4 Impacts from wildlife conflicts

From a win-lose perspective, prior to the establishment of a forest reserve villagers experienced few problems from wildlife. To date, problems have increased tremendously as a result of conservation, leaving the majority of villagers as losers. The study results reveal substantial loss of crops which would have contributed to food

security to most of the villagers. The poorer were subjected to abject poverty as a result of reduced access to forest products which was very important for their subsistence needs (Table 24).

Table 24: Impacts resulting from wildlife conflicts in Mgori forest reserve

Type of impact	Wild animal species involved	Crop/ Livestock/ Human	Extent of destruction (No/ ha)
Crop raiding	Elephant	Millet	91.5
	Birds, bush pig	Maize, sorghum	40
Livestock	Lion	Cows	20
killings	Leopard/ hyena	Cattle calves	27
	Leopard/ hyena	Goats	201
	Foxes/ wild dog	Sheep	5
	Polecat	Chicken	203
Injury	Hyena	Cows	24
	Leopard	Goats	25
	Hyena, elephant	Human being	5
Deaths	Elephant	Human being	2

Findings in Table 24 imply that millet, one of the drought persistent crops is highly preferred by elephants. The following quotation came from a village game scout:

> "*Elephant prefer millet than other crops because of the sugary taste present in millet stems"*[6]

Millet is the most destructed crop by elephants; other mixed crops include maize, sorghum, groundnuts and sweet potatoes. The study results conform to the result of a

[6] Personal conversation with Mughunga Village Game Scout on 8th April, 2010

study by Philip (2005) in the central part of Zambezi in Zimbabwe. Up to three-quarters of all crop damage were estimated to be caused by the elephants in Zimbabwe. Millions of money is lost due to livestock loss. The livestock killed include cows, calves, goats, chicken[7], sheep and donkeys.

Leopards, hyenas and lions were reported to be the most threatening wildlife in the area. Leopards and hyena invade homes and captured both goats and sheep. Many livestock keepers are scared of taking their livestock to the forest for grazing because of frequent cases of injures and killings. There had been massive killings of chicken by fowl typhoid and polecats simultaneously but the data for the exact figures were not available. Wildlife not only impoverishes local communities through crop destruction and livestock killings but wild animals also caused injuries and deaths.

4.6.5 Conflicts mitigation measures

There were several measures taken to mitigate wildlife conflicts. However, villagers in Mgori were unable to kill destructive wildlife because of stiff protection regulations rather they either reported the matter to the village or district council for a more sounding mitigation measure. Killing wildlife is considered to be an incentive to local communities who bare the costs of the destruction made by the wildlife (Nelson and Blomley, 2007). A study by Naughton *et al*. (1999) conform to current study findings that in any society, local farmers would have killed all elephants provided they were mandated to do so (Table 25).

[7] Chicken were not considered as livestock in the study

Table 25: Local communities' conflicts mitigation measures in Mgori

	Social economic group		
Individual responses	**Rich**	**Intermediate**	**Poor**
No where to take their problems	4	6	12
Reports to the district council	2	1	
Unable to kill elephants		1	1
Put snares/traps or poison the carcass	1	1	
Doesn't report due to poor response	1		
Chasing wildlife by making noise	2	3	2
Reports to the village govt but no action taken	8	6	11
Did not report anywhere (they are desperate)	8	2	6
Bad luck/it is common (notion)	1		3
Thought that reporting wasn't important (Unaware)			1
No any action taken	1	2	1
Total	**28**	**22**	**37**

Table 25 shows that many people in the area live in appalling conditions due to acute shortage of food and water. Another cost includes loss of sleep in protecting themselves and their properties. Poor households are the most affected group as majority (20.6%) of them were desperate and had nowhere to take their problems. Others (13%) reported to the Village Government but no action was taken. This is because of poor cooperation between local communities and the Government. The Government officials used to appear in the areas during critical moments. This necessitates a strong link between communities and the Government in mitigating the prevailing wildlife conflicts in Mgori forest reserve.

4.7 Community Conservation and Rural Livelihoods Balance

Mgori Village Land Forest Reserve was established solely for the purpose of addressing the trade-offs between community conservation and rural livelihoods. Among the steps taken to ensure sustainable conservation and utilisation included demarcation of village forest reserves, preparation of village forest management plans and by laws, formulation of village environmental committees, village land use committees and village game scouts. Initially, villages demarcated the forest through marking boundaries between VFRs using paints on trees and rocks. With government support, the forest boundaries were marked with permanent beacons. This gave a sense of ownership, legal basis to protect this invaluable resource and reduced resource use conflicts.

To ensure sustainable management, Mgori VLFR was mapped, zoned and given entitlement. Forest and Beekeeping Division in collaboration with villagers and donors (LAMP) prepared Village Forest Management Plans (VFMP). The plans describe the VLFRs location, boundaries and zones for collecting forest products. The plans were then used as guiding tools for the management of the forest reserve. Although, the emphasis in the plans was on protection, the villagers were allowed to harvest some of the products from the reserves under technical guidance from District forestry staff. The VFMP had a section guiding on how to handle issues related to offences. The formed VEC took forest management responsibilities through the law enforcement processes.

Kajembe *et al*. (2003) reported the existence of village environmental committee (VEC) in Duru-Haitemba reduced the number of offences. At first, the performance of

VEC at Mgori was the same as that of VEC at Duru-Haitemba. Later, VEC members were implicated in corruption which was linked with the corrupt leaderships. The following quote was the statement given by a village game scout:

> *"We are fed up of volunteering to protect the forest, because we catch illegal timber harvesters and hunters but the whole money goes to the village and eaten by few leaders. We risk our lives but we are not given any incentives, rather we use our own money to buy food and field gears".*[8]

However, for more than fourteen years since its establishment, there are neither plans nor arrangements for legal harvesting of forest products in near future in Mgori VLFR. The forest has not served as an incentive to local communities because power and ownership are not yet fully devolved to the local people. As Blomley (2006) observed, unwillingness of the Government to let the power, ownership and benefit go to the local levels is an obstacle to successful CBFM. This has totally disappointed local communities who have been protecting the forest for all this long period of time. As Galvin and Haller (2008) argued, loss of access to these resources can lead to poverty and livelihood insecurity in the area. Local communities had a negative perception towards forest conservation that leads to improved livelihoods of community members at an individual level.

Furthermore, some influential businessmen and officials from Singida are engaged in illegal hunting and timber harvesting. Villagers responded that there was absolute no equality in terms of access and use of forest. 27.8%, 19.4%, 16.7% and 13.9% of village leaders, businessmen from Singida and Manyara towns, some district officials

[8] Interview with a Ngimu Village Game Scout on 14 Nov, 2009

and politician/ influential people in that order were ranked as the one having more access to forest resources.

Thus, the misuse of power for personal gains benefits a minority with positions in the system while the majority are impoverished. As Robbins (2004) argued, natural resources both in terms of quality and quantity are mainly utilized by a world minority. A small group of villagers (typically the Village Natural Resource Committee or other village leaders can be the beneficiaries of forest products at the expense of others (Blomley *et al.*, 2008). The reasons for this include poor facilitation and implementation of participatory forest management planning and establishment processes. "The same leaders ensure that the monopoly over benefit flows on matters such as illegal charcoal making or timber harvesting are maintained through limited patrols and exclusion of other potential competitors" (Blomley *et al.*, 2008).

Consequently, Mgori VLFR is perceived as a land where the Government has denied its people the right to use and control while their needs for land and forest products keep on rising day and night. About 20.6% of the respondents complained of shortage of land due to the presence of forest reserve due to most of them saying that crop harvests have been lowered and the income has decreased due to reduced grazing land. The district officials gave the following argument:

> *"Some selfish people wanted more land for their personal interests but the local community does not face shortage of land due to presence of the forest reserve".*[9]

[9] Interview with Singida District Forest Officer on 6 April, 2010

This statement conforms to the study findings where 79.4% of the respondents said that they don't face any shortage of land, but a reduced access to forest products was the major problem. Fifty respondents (making up a total of 59.5%) felt that they subsidize to the forest revenues than they benefit from it. They only protected the forest but they have no power in making decision on the uses of forest products. Hence, there was a mixture of perceptions about the presence of village land forest reserve.

4.8 Ecoscarcity and Demography Linkage

The study results show that in the year 1996 during the establishment of Mgori VLFR the population in Ngimu village was 2671 but by 2009 it increased to 4758. From this perspective, demand-induced scarcity persists due to the enormous increase of population causing pressure on forest resources in Mgori community forest. This is supported by a dominant narrative of environmental change and ecoscarcity which elucidated interrelation between human and environment for a couple of years (Robbins, 2004). From Malthus argument, ecoscarcity is when population growth outweighs environmental carrying capacity (Robbins, 2004).

Environmental problems encompass many factors one being "desertification or degradation". Desertification has been accompanied with the narratives enthusiastically used by active actors to exaggerate its meaning so as to keep soliciting funds for planting trees, conduct researches and justifying Government control of land and resources (Swift, 1996). Based on Swift's argument, the narrative creates a gap between winners (conservationists) and losers who are the local communities who have to bare the costs of stiff policies due to imposed fines and restrictions.

Blaikie and Brookfield (1987) underlined that the term “degradation” is defined differently depending on the prevailing circumstances. It is connected to the usual attitudes towards environmental issues mainly involving different actors to describe science-policy linkages. The challenge is that land degradation is considered to be a single factor while there is a chain of explanation. Therefore, CBFM has to tie up socio-economic, cultural and ecological factors by involving various stakeholders. Scaling up of agroforestry technologies is another challenge of CBFM approach because people’s dependence on natural forest is still high. Also, ensured equitable resource utilisation is another challenge to sustainability of CBFM which can lead to environmental conflicts and degradation due to encroachments by the local communities (losers).

A study by Homer-Dixon (1994) indicated that environmental conflicts are a result of supply induced scarcity in the form of degradation of land resources. Supply induced scarcity is one of the sources of scarcity leading to resource use conflicts (*ibid*). An argument based on environmental conflict thesis of political ecology: the driving force of conflicts between and within groups (gender, class or ethnicity) is a misuse of resources by state authorities, private firms or social elites leading to increased scarcity of the resources. The problems are a result of the changes in conservation policies (Robbins, 2004).

Benjaminsen (2008) pointed out, stricter policy and lack of conversation caused misunderstanding between local communities and Forest Service in Mali. The modernization policy which considered nomadism undesirable was perceived by Tuareg as a new form of colonization. In Tanzania, conflicts are not elucidated by

scarcity narrative, rather by both modernization policies that marginalise pastoralists and issues of governance and corruption (Benjaminsen *et al*, 2009). As Khal (2006), cited by Benjaminsen (2008) observed, population pressures, poor land use practices, desertification and freshwater scarcity are serious problems that result into resource use conflicts.

Khal (2006) assumed that demographic and environmental stress was a significant factor behind Tuareg rebellion. Also Bächler (1998), cited by Benjaminsen (2008) used Tuareg rebellion as an example of a resource use conflict caused by environmental degradation. According to Benjaminsen (2008), the droughts of the mid-1970s and 1980s forced pastoral and Tuareg farmers especially men to migrate into neighbouring countries both in the North and West Africa looking for work. Thus, increased population density and reduced access to forest products to the surrounding local communities. Mgori will end up in environmental degradation and resulting into resource use conflicts.

4.9 Community's Perceptions on the Performance of CBFM Approach

This section focused on the perceptions of local communities toward improved livelihood through sustainable forest conservation. There were four options of answering this question, namely agree, partially agree, and disagree or no answer. The results show that 99% of the respondents anticipated seeing community forest conservation integrate livelihood needs of the local people. This implies that people were so positive to conservation that would ultimately improve their livelihoods. The local community's expectation were in line with Schreckenberg *et al.* (2007) who observed that successful CBFM would positively impact on people's livelihoods by

ensuring constant flow of benefits (such as fuel wood, timber, water) or attracting ecotourists and researchers.

The constant flow of these benefits can be achieved through proper harvesting plan, addressing any trade-offs between forest conservation and people's livelihoods and mitigating wildlife conflicts. However, this was contrary to majority's expectation whereby local communities were not involved in management and use of the forest resources. Most of the villagers claimed:

> *"We are not involved in decision making processes. The decisions came from the District and other higher levels while local people remained as forest guards"*[10].

The above quotation implies that local communities are not involved in decision making processes. Similarly, in all the three villages, decisions were disregarding opinions of the poor as opposed to the elites who had strong voice in village governments. As Schreckenberg *et al.* (2007) pointed out, poor people as a disadvantaged group can be highly affected by not being involved in decision-making. The same happened in Nepal whereby the poorest were unable to access forest products due to lack of positions in the system in deciding their welfares (Schreckenberg *et al.,* 2007). Therefore, deliberate measures should be taken into account not only in making sure that the poor are adequately represented in decision making and benefit-sharing systems but also the surrounding villages be considered in decision making to avoid forest destruction.

[10] Interview with respondents from poor households in Ngimu and Pohama villages from 9 to 13 Nov, 2009

Community conservation improved forest condition that harbours a number of wildlife, yet access to purchasing or trading wildlife products legally was limited. These results conform to the ones in a study by Nelson and Blomley (2007) who argued that Mgori villagers have no legal right to reap fruits of their success in conservation. During focus group discussion, group members raised a concern about the use of wildlife resources:

> "*Wildlife is only for conservation, though people from the District hunt them*"[11].

This was also confirmed by both district forest and game officials:

> *"Bush meat has a good market in Singida town, for instance, topmson gazelle which are hunt freely were being sold by business men at a price of TAS 10 000 and 20 000 each while local communities who bare the cost of protection consume wild vegetables and mushrooms as sources of protein*"[12].

Furthermore, purchasing or trading of forest products especially timber and poles is not adequately free. The same business is carried out in Singida were business men buy a (2 x 3 cm or 2 x 4 cm) piece of timber for TAS 2 000 from a local illegal timber harvester and sell the same at a price of TAS 10 000 each piece in town.

> *"Timber harvesting is not yet started but wealthy business men harvested to benefit themselves"*[13].

The above quote entails that local communities are not benefiting from the forest despite the cost incurred by them, rather very few people benefit from forest resources. Lack of proper financial reports, proper arrangements for getting natural resources, prevalent of corrupt village leaders and game scouts and lack of freedom to get

[11] Interview with Village leaders and Aged groups in Mughunga, Pohama and Ngimu villages on 11, 16 and 20 Nov, 2009 respectively
[12] Interview with Game and Forest Officer on 3 Nov, 2009
[13] Interview with a District Forest Officer on 6 April, 2010

resources are the reasons for community's negative resource outlook. There are other problems which include lack of protection of people and their properties and delayed timber harvesting. Conversely, legal access to gathering non wood and non timber forest products is satisfactory (Nelson and Blomley, 2007).

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study attempted to examine sources of poverty traps and wildlife conflicts by looking into access to livelihood assets, a balance between community conservation and Mgori rural livelihoods, contribution of CBFM to poverty alleviation and the impacts of wildlife conflicts to the communities' livelihoods in Singida District. Livelihood assets focused were natural capital, financial capital, human capital as well as physical capital. Agriculture is the main livelihood strategy of every household in Mgori despite the income disparity among three social economic groups. Poor soils, drought, low productivity and pests (wildlife, insects and birds) affect mostly the poor because these are ones who are unable to buy manure from rich farmers. They also cultivate in small farm sizes.

Moreover, delayed planting and weeding among the poor result from spending more time in casual labours than devoting full time in their own farm plots. Also, market unavailability, lack of financial access, poor infrastructures (roads, water projects, power, and machineries), disease outbreaks, large family sizes and unskilled personnel among the households were the sources of poverty traps. Most of the villagers from poor households live below poverty line. Wildlife conflicts have been a major driving

factor to most of the mentioned poverty traps and thus CBFM approach was once considered as a solution to improving people's livelihoods, yet it has not been an incentive to the surrounding local communities as a whole. Since, the local communities are the losers of wildlife conflicts, compensation mechanisms should be in place to assist these people from falling into abject poverty.

The study reveals differences of opinions regarding the presence of Village Land Forest Reserve. Even though lack of balance between community conservation and rural livelihoods and wildlife conflicts contribute to reduced access to natural capital, forest products contribute to about 65% to the household incomes among the poor. On the other hand, the rich mostly depend on the producer goods such as milling machines, means of transport, video shows and crop sales to obtain their incomes. Income diversification has been more predominant among the rich than it has been among the rest of the people.

5.2 Recommendations

The following are recommendations of the results and discussions in this study:

(a) There is a need of practical implementation of participatory forest management policy to address clear benefit sharing patterns that would prevent the ongoing destruction and accelerated overuse of resources. Inventories should be done to check the possibilities of pilot timber harvesting as it has been done in SULEDO and Duru-Haitemba VLFR. Forest income will reduce income inequality between households by decreasing in Gini coefficients (reduced income inequality between households) among villages.

(b) Compensation to families whose family members were killed or injured, crops raided and livestock predated by wild animals is important.

(c) Availability of various species of wild animals provides investment opportunities. Thus, this study suggests establishment of tourism centers so as to create business and employment opportunities.

(d) Investment policies should promote and empower rural enterprise developments such as beekeeping activities which contributed significantly to the households' income in the area. Focus should be to the poor households who can easily be trapped in poverty cycles because they had less diversifying economy.

(e) A tendency of poor households to clear bushes to increase the sizes of cultivation land may result into increased forest degradation. Thus, law enforcement to control unsustainable means of acquiring land as is the case for shifting cultivation is inevitable.

(f) Both formal and informal institutions should be empowered and strengthened (financial support and capacity building). Informal institutions were found to be very useful and effective in resource management by modifying access to livelihood assets. They were very important organs in regulating or maintaining dignity among the members in the surrounding societies.

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APPENDICES

Appendix 1a: Livelihood Information

1. Do you pay for use of forest products? Yes/No[ ]
2. If yes, which forest products are you paying for? …….
3. Which forest products are you not paying for? …….
4. How do the institutions and organisations modify access to forest products?
5. How much do you earn from the sale of forest products per month?
6. How much did you earn from the sale of forest products last year?
7. Which forest products bring more money?How much per unit (Bag, lot etc)?
8. Is market for the forest products available?
9. Where do you sell these forest products and who are the main customers?
10. What is the distance between forest products and your home place?
11. Do other villagers access, use forest and water for irrigation equally?[ ]
12. If No, what group of people have more access than others?
13. Are you involved in beekeeping practices? Yes/No [ ]
14. How many litres of honey did you get last year? How much is one litre of honey?
15. How much did you earn from selling bee products last year?

16. What is the expected production this year? a) Increasing b) Moderate c) Decreasing
17. Where do you get water for domestic purposes?
    a.)In nearby river b) Community tank c) Natural wells d) Drilled wells e) Dams
18. Do you pay for use of water? Yes/No[ ] If yes how much do you pay per bucket.……
19. How long do you take to go to fetch water and come back? ……
20. If you had to buy water or pay someone to go fetch water for you, how much would you pay per bucket? ……
21. What is the distance (in km) between water source and your home place?
22. Do you own live stocks? Yes/ No[ ]. If Yes which kind of animal species?
    a)……b)…….c)…….d)…….e) others……
23. Which model of feeding livestock are you using? a) Zero grazing b) Nomadism c) On-farm grazing d) Off-farm grazing [ ]
24. If you had to go to a far distance how much would you incur to feed your livestock? …….
25. If you had to go to a far distance how much would you incur to buy clean drinking water for your livestock? …….
26. Which type of animal species are allowed to graze in the forest, which ones are not allowed for why? .....
27. Are there any payments for you to take livestock to the forest for grazing? Yes/ No[ ] If yes how much per each?
28. Do you graze your livestock in the forest throughout the year? Yes/ No [ ]
29. If No which months are you allowed to graze them?
30. Is milk production improved after having enough pasture from the forest?

31. How many litres were you getting before allowed to graze in the forest reserve? …….
32. How many litres do you get per day? ……
33. How much did you pay as a contribution to development activities in your village? ……..
34. How do revenues from VLFR help you in compensating costs incurred to developmental activities? ……
35. Do you face shortage of land due to the presence of forest reserve? Yes/No[ ]
36. If yes, to what extent have you been affected? a) harvests lowered b) Income decreased c) grazing area reduced [ ]
37. Do you have access to loans in any financial institution? Yes/No[ ]
38. If yes, how much have you acquired? What did you do with that loan?
39. If no, what are the reasons for you not to have access to loans?
40. Are there conflicts between wildlife and local communities? Yes/No[ ]
41. What is the extent of wildlife conflicts? a) High b) Medium c) Low [ ]
42. How do wildlife conflicts link to poverty?
43. What are the factors influencing these conflicts? Mention
    - ……..
    - ……
44. What are the impacts resulting from these conflicts? Mention
    - ……..
    - …….
45. Have you encountered number of cases such as injures, death, fire and disease outbreaks? How many are they?
46. How are you managing these conflicts?
47. Are there institutions in the area that assist in managing wildlife conflicts?
48. How do these institutions available in the area assist in managing conflicts?

Appendix 1b: Household and Socio-economic Information

Answered by household head												**HH No.**	**SEL:**
Demography			Ethnicity:	Marital status				Land tenure:	1	2	3	4	5	Annual income (TAS):	
Male	F	Age	Religion:	1	2	3	4	Main livelihood strategy:							
			Education	Occupation:											
			1, 2, 3, 4	Farm technology		1	2	3							
			Farm size(Ha) Total:	Type of house	1	2	3	4	Farming system:	1	2	3	4	5	Harvest in the past three years:

Resource outlook	Agrees	Partially agree	Disagree	No answer	Comments in brief
1. It is important that biodiversity conservation is integrated with the livelihoods needs of local people					
2. It is important that biodiversity conservation involves all local communities in management					
4. NRs are most important to my household's food and monetary needs.					
5. Access to purchasing or trading wildlife products legally is satisfactory					
6. Legal access to gathering non timber forest products is satisfactory					
7. Purchasing or trading timber & non timber forest products legally is satisfactory					

N.B: Social Economic Level (SEL)* a) Higher level b) Middle c) Lower level; Marital status: 1.Married 2.Single 3.Divorced 4.Widowed; Farm technology:

1. Hand hoe, no use of fertilizer 2. Hand hoe/ Plough, use of fertilizer &chemicals 3. Plough/ Tractor, use of fertilizer &chemicals; Education: 1.Primary 2.Secondary 3.College 4.Others (Specify); Land tenure: 1.Bought 2.Rented 3.Inherited 4. Allocated by village govt 5. Other (specify); Farming system: 1.Rain fed agriculture 2.Irrigation 3.Both rain fed and irrigation 4.Shifting cultivation 5.

Others; Type of House: 1. Poles & stick wall, roofed with thatch grass 2. Mud wall, roofed with thatch grass 3. Mud wall, roofed with iron sheets 4. Brick walled, roofed with iron sheets; Key: HH No.-House Hold Number, NRs-Natural resources

Appendix 1c: Household FP, NTFP & NWFP list

Key: FP-Forest Products, NTFP- Non-timber forest products, NWFP- Non-wood forest products

Household FP, NTFP & NWFP list						**HH No.**			**SEL:**
List of FP, NTFP & NWFP by rank	**Method of obtaining**	**Amount collected or produced**		**Means of exploitation**		**Utilization**			
						Domestic	**Non-domestic**		**Total net income**
		Before conflicts	**After conflicts**	**Direct**	**Purchased**		**Traded out**	**Sold**	

Appendix 1d: Income from Other Sources

Source/ Type of work **List by rank**	**Who in HH?**	**Employer**	**Wage**	**Total income**

Appendix 1e: Income from Livestock and their Products

Answered by Household head						**HH No.**			**SEL:**
Type	**Total number produced (Last year)**	**Utilization distinction**							
		Domestic		**Non-domestic**					
				Traded out (Units)		**Sold (Units)**		**Price/ Unit**	**Total income in the year 2008**
		2008 (Units)	**2009 (Units)**	**2008**	**2009**	**2008**	**2009**		
a) Livestock									
Cows									
Goats									
Sheep									
Donkey									
Chicken									
Ducks									
Pigeons									
Others:									
Total									
b) Products									
Meat (Kg)									
Milk (Litres)									
Hides									
Butter									
Eggs									
Others:									
Total									

Appendix 1f: Household Income from Agricultural Products (Last year)

Answered by Household head	**HH No.**	**SES:**

List by ranking (Most to least important)	Expected total harvest	Damage/ Loss due to conflicts	Total harvest this season	Stock		Derivative(s)		Means of exploitation		Utilization distinction			
										Domestic	Non-domestic		Total net Income (2008)
				2008	2009	Cultivation	Forest	Direct	Purchased		Traded out	Sold	

Appendix 2a: Village Checklist

General information

Name of village……..

Ward……...

District……

Demographic data

Total village population…….

Man power (male …….; female……)

Aged group (> 60 yrs)……

Number of households……...

Average family size……...

Main economic activities in the village

Farming……..

Livestock keeping……..

Pit sawing……

Mining……

Beekeeping…….

Others (specify)

……

……

……

……

Appendix 2b: Checklist for Key informants (Village leaders, Village elders, Religious leaders and Political leaders)

1. Who are stakeholders underlying use and management of forests?
2. What is the communities' perception towards forest conservation that leads to improved livelihoods of community members at individual level?
3. What are the local communities' attitudes to the performance of CBFM approach to Mgori community forest?
4. What is the contribution of forest products to the income of local community?
5. Are there conflicts between wildlife and local communities? Yes/No[ ]
6. What is the extent of wildlife conflicts? a) High b) Medium c) Low [ ]
7. How do wildlife conflicts link to poverty?
8. What are the factors influencing these conflicts? Mention
    i. ……..
    ii. …….
    iii. ……
    iv. ……
    v. ……..
9. What are the impacts resulting from these conflicts? Mention
    i. ……..
    ii. …….
    iii. ……
    iv. ……
    v. ……..
10. Have you encountered number of cases such as injures, death, fire and disease outbreaks? How many are they?
11. How are you managing these conflicts?
12. Are there institutions in the area that assist in managing wildlife conflicts?
13. How do these institutions available in the area assist in managing conflicts?

Appendix 2c: District checklist

This checklist will be answered by District forest officer, game officer and LAMP Project manager.

District name……Officer's name…….

1. Are some wealthy businessmen benefiting from the forest while the majority of the people are farmers and livestock keepers who need land, water, pasture and protection from vermin are starving?.....
2. Do the villagers are facing a shortage of land due to presence of forest reserve?

…….

3. Is Mgori VLFR perceived as land that the village and central governments have denied them the right to use while their needs for land and other resources increase day and night?.....
4. Are the villagers feel that they subsidize it more than they benefit from it and wish the borders could be moved? ……
5. Does Mgori VLFR perceived by surrounding communities to be an obstacle to their development…….....
6. What is the extent of wildlife conflicts? a) High b) Medium c) Low [ ]
7. How do wildlife conflicts link to poverty?
8. What are the factors influencing these conflicts? Mention
    - ……..
    - …….
9. What are the impacts resulting from these conflicts? Mention
    - ……..
    - …….
10. Have you encountered number of cases such as injures, death, fire and disease outbreaks? How many are they?
11. How are you managing these conflicts?
12. How do institutions available in the area assist in managing these conflicts?

Appendix 3: Summary of variables and their expected outputs

Variables	Expected output
Household size	Household size will be recorded with respect to the number of people (number of household members, total number of man power) living in the same house
Population size	Data on increasing or decreasing number before and after establishment of VLFR will be collected. Also population size will be analyzed to get the trend before and after the establishment of Mgori VLFR
Household environmental income	Type of livelihood strategy. Household having high annual environmental income compared to other income generating activities relies on the forest reserve. Income from the sale of forest products will be recorded in sampled household
Forest tenure	Rights of every community member to use available resources
Machinery and technology	Number, value and type machinery in the area around Mgori will be collected to get total crop production for each household
Education level	Education level will be recorded with respect to the number of years that a respondent has spent in school
Distance between market and resource base	Distance between market and resource base will be recorded with respect to the number of kilometres from resource to the market
Wealth category	Economic groups (Poor, intermediate and rich) and household livelihood strategy will be recorded
Household expenditure	Costs of purchasing products, curing diseases transmitted by wildlife, transport cost of injured, rehabilitating houses and protecting livestock
House value	Type and nature of a house.
Involvement in resource	Conservation activities done by the community

Variables	Expected output
management	living adjacent to resource base
Land tenure	Information on whether the land is owned, rented or borrowed by the village government.
Farm size	Households' access to the village land, number of acreage each household posses
Farming practice	Types of farming practices (shifting cultivation and irrigation farming) around Mgori VLFR and their effects in conservation
Types of crops grown	Types of crops which are mostly preferred by vermin and those which are not
Wildlife species found in the forest	Information on the extent of threat to communities and their property
Other income generating activities	Non-farm and off farm activities that the respondent is doing
Access to loans	Number of institutions providing loans, number of community members granted, amounts of loans granted and regulations (stiff or not) to access the loans
Access to forest products and water,	Frequency of going to collect forest products and fetch water before and after wildlife conflicts
Farm location	Total number of farms bordering the forest and those which are far from the forest will be recorded
Food stock	Number of bags kept by each sampled household
Livestock ownership and income	Total number owned and annual total income obtained from the sales of live animals, their products and animals born in the last year
Income from beekeeping practices	Number of bee hives owned, total litres of honey sold, price per litre, income from bee wax and other products and the annual total income after the sales
Benefits accrued from conservation activities	Bundles of firewood, number of building poles, charcoal making (in bags), timber, sticks,

Variables	Expected output
	mushrooms, wild vegetable, fruits and other timber and non timber forest products
Impact of conservation to household livelihood	Reduced farming land, reduced access to natural resources, dangerous wildlife prevent them from accessing resources, vermin, crop destruction or stiff regulation posed
Extent of wildlife conflicts	State of conflicts; high, moderate or low
Trend of conflicts	Records of events whether increasing or decreasing
Amount of crop damage	Total area in acreage damaged, number of bags expected to be harvested and types of crops from least to most damaged
Number of cases such as injures death, fire and disease outbreaks	Data for total number of people's deaths and injures since VLFR began to date and their trend. Fire outbreaks and diseases transmitted by wildlife to livestock.
Competition for pasture land	Availability of pastures, alternative ways of feeding livestock, number of animals lost or died due to loss of enough water or predated
Conflicts mitigation measures	Ways in which conflicts are mitigated
Regulations (By laws) on crop protection	If villagers are allowed to kill vermin or wildlife are protected more than community welfares.
Defence mechanisms	Approaches used by people to protect themselves either by killing dangerous animals, shouting on them or any other local technologies
Socio economic activities	Number of main economic activities being done by local communities
Community's role in decision making	Records on numbers of meetings attended
Market opportunities	Types of market available for the sales of people's products

Variables	Expected output
Benefit sharing patterns	Methods used for equal benefits sharing of revenues from forest conservation
Social relation	Ways in which institutions in the area interact with communities