ANALYSIS OF POTENTIAL SOCIO-ECONOMIC INCENTIVES FOR MANAGEMENT OF KONDOA REHABILITATED AREAS, DODOMA, TANZANIA

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ABSTRACT

Communities need motivation in order to effectively participate in environmental conservation. However, potential socio-economic incentives for improving environmental conservation and livelihoods of communities surrounding Kondoa Rehabilitated Areas (KRA) are poorly known. The aim of this study was to analyze potential socio-economic incentives for effectively and sustainably improving environmental conservation and livelihoods of the communities surrounding KRA. The cross-sectional research design was employed. Simple random sampling technique was used to select 30 respondents from each of the four study villages, making a total of 120 respondent households. The study villages were Mafai, Ntomoko, Kalamba-Juu and Kalamba-Chini. Data were collected using questionnaires, focus group discussion and interviews. Ms-Excel and SPSS 20.0 computer programs were used to analyze data. Both descriptive and inferential statistical analyses were carried out. The findings revealed that 91% of respondents reported main socio-economic incentives available in KRA being provision of tree seedlings, fertilizer, improved seeds, beekeeping inputs and education programs. Binary logistic regression analysis indicated that statistically significant factors influencing adoption of socio-economic incentives in KRA are awareness ($P < 0.01$), land size owned ($P < 0.05$) and education level ($P < 0.05$). Roles of socio-economic incentives in improving conservation were improved afforestation, source of energy, controlled human activities and increased awareness. The study further revealed that 61% of the total annual household income was accrued from practicing activities related to socio-economic incentives. Chi-square test revealed that contribution of socio-economic incentive to total household income was statistically significant at $P < 0.05$. It was concluded that identified socio-economic incentives had a great potential of adoption in KRA. Beekeeping, tree seedlings and education programs were found to be statistically useful in both improving environmental conservation and livelihoods of KRA surrounding communities. The study

recommends capacity building interventions and incorporation of socio-economic incentives in national biodiversity strategies and environmental conservation policy frameworks.

DECLARATION

I, Avit Alex Chami, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

_____   _____

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The above declaration is confirmed

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DEDICATION

To my late father Mr. Alex Sarikoki Chami and my mother Mrs. Simphorose Reveta

Mosha. Their tireless efforts laid the foundation of who I am today!!

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LIST OF ABBREVIATIONS

ABARE	Australian Bureau of Agriculture and Resource Economics
CIFOR	Center for International Forestry Research
DALDO	District Agricultural and Livestock Development Officer
FAO	Food and Agriculture Organisation of the United nation
EMA	Environmental Management Act
FGDs	Focus Group discussions
GDP	Gross Domestic Products
GHG	Greenhouse Gas
HADO	Hifadhi Ardhi Dodoma
HASHI	Hifadhi Ardhi Shinyanga
HIMA	Hifadhi Mazingira project
HWK	Halmashauri ya Wilaya ya Kondoa
IGA	Income Generating Activities
IPCC	Intergovernmental Panel Climate Change
IUCN	International Union of Conservation Network
KEA	Kondoa Eroded Areas
KRA	Kondoa Rehabilitated Areas
MNRT	Ministry of Natural Resources and Tourism
NAFRAC	Natural Forest Resources and Agroforestry Centre
NAPA	National Adaptation Programmes of Action
NAPC	National Agricultural Policy Centre
NEMC	National Environmental Management Council
NBS	National Bureau of statistics
NRM	Natural Resources Management

NSGRP	National Strategy for Growth and Reduction of Poverty
PRSP	Poverty Reduction Strategy Program
REDD	Reducing Emissions from Deforestation and Forest Degradation
SCAPA	Soil Conservation and Agro-forestry Program
SECAP	Soil Erosion Control and Agro-forestry Program
SPSS	Statistical Package for Social Sciences
SUA	Sokoine University of Agriculture
TAS	Tanzania Shillings
TFS	Tanzania Forest Service
UN	United Nations
UNEP	United Nations Environmental Programme
UNESCO	United Nations Education, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
URT	United Republic of Tanzania
VEO	Village Executive Officer
VEC	Village Environment Committee
VNRC	Village Natural Resource Committee
WHO	World Health Organisation
WRI	World Resources Institute
WWF	World Wide Fund

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

The principles of sustainability require part of the earth's land to be set aside as Protected Areas (PAs). According to IUCN (1994), these areas are dedicated to the protection and maintenance of biodiversity and associated natural and cultural resources and managed through legal or other effective means. These areas make a contribution to human society by conserving the natural and cultural heritage and ensuring the ecological balances. There is an increasing appreciation of the economic importance that many PAs play by providing environmental services like water supply, flood control and mitigation of the effects of the climate change (IUCN, 1998; 2000). Overarching aim for significantly protecting and rehabilitating biodiversity conservation is to sustain ecological processes for the benefit of the surrounding ecosystem (Eagles, 1997; Eagles *et al.,* 2002).

Historically, conservation strategies in many areas in the world have been dominated by attempts to fence off or reserve areas for nature and exclude people from the reserved areas (Adams and Hulme, 2001). According to Guthiga (2008) this protectionist approach has been labelled as the 'fortress conservation', 'coercive conservation' or 'fence-fine' and it has dominated mainstream thinking in conservation for a long time.

Tanzania has been acknowledged as one of the most important nations in Africa for biodiversity conservation with more than 25% of the Tanzania mainland total area

been set-aside as a protected area (Monela, 1995). The initiatives of allocating protected areas in the country go in line with rehabilitation initiatives which partly enhance the existing biodiversity conservation including Eastern Arc Mountains, Wetlands, Marine and Fresh Water Areas, forest reserves and partly enclose, improve and establish new biodiversity conservation areas including eroded and infertile areas. There have been deliberate initiatives by the government and donors to rehabilitate, restore and promote the recovery of the degraded ecosystems in Tanzania (URT, 2004). Towards arresting environmental degradation, a number of national, regional and district level programs were established including the formulation of the Division of Environment in the Vice President's Office, the National Environmental Management Council (NEMC), and the Land Management Program for Environment Conservation (LAMP) in Babati District. Other programs are the Hifadhi Ardhi Shinyanga (HASHI) project, the Hifadhi Ardhi Dodoma (HADO) project, the Hifadhi Mazingira project (HIMA) of Iringa, the Soil Erosion Control and Agro-forestry Program (SECAP) in Lushoto District, and the Soil Conservation and Agro-forestry Program (SCAPA) in Arumeru District (URT, 1994).

Hifadhi Ardhi Dodoma (HADO) is a soil conservation project which started in 1973 in several areas of Dodoma Region, aiming at reducing land degradation in rapidly deteriorating areas through physical soil conservation measures such as afforestation, appropriate cultivation methods, control of run-off by contour band construction and planting vegetation in the river beds (Christiansson and Kikula, 1996; URT, 1998; Kikula *et al.,* 1999; Ligonja and Shrestha, 2013). Among other drastic measures, HADO project evicted all forms of human activities and all livestock from the 1256 km^2 of Kondoa Eroded Areas in 1979 (Ogle, 2001; Kangalawe, 2003). These led to

the quick land rehabilitation entailing high restoration of soil fertility and vegetation in the worst affected areas which later became known as Kondoa Rehabilitated Areas (Shao, 1999; Ligonja and Shrestha, 2013).

Moreover, the successful rehabilitation of Kondoa areas attracted many human activities including farming, house building (brick making and burning, building poles, thatch grass, ropes etc.), tree felling for fuel wood and farm expansion, and sporadic grazing of livestock (Madulu, 2001; Kangalawe and Lyimo, 2010). Literatures suggest successful rehabilitation constrains such as over extraction of the available resources, unsustainable land uses and poor institutional framework which exist along the resettlement process have made the resettlement process unsustainable (Mbegu and Mlenge 1984; Mbegu, 1996). The existing situation in the areas also demonstrates that farmers and livestock keepers grasp quickly whatever chances happen to make use of new land-use opportunities, unlike early 1970s when intensive conservation efforts existed in the areas (Madulu, 2001; Kangalawe *et al.*, 2012).

In contrast to the prevailing situation in Kondoa Rehabilitated Areas, various approaches of environmental management measures have been employed to protect the natural resources and ensure sustainable livelihoods in the area. Traditional environmental management approach namely command and control measures has been practiced unsuccessfully, whereby enacted legislations, policies and regulations in place provided little control on existing rapid human activities and unsustainable land uses (Shao, 1999; Madulu, 2001; Ligonja and Shrestha, 2013). Equally, the measures implicate minimum legal measures against the offenders on various issues mentioned in the district environmental protection by-laws due to poor and weak

institutional framework (URT, 1982, 1997; HWK, 1990). Meanwhile, application of economic incentives approach of environmental management has been used in the area with little knowledge and information on the potential useful socio-economic incentives towards complementing other existing approaches in place.

1.2 Problem Statement and Justification of the Study

1.2.1 Problem Statement

According to Mbegu and Mlenge (1984), Mbegu (1996) and Madulu (2001), most of rehabilitated protected rural areas are exposed to a risk of destructions and degradation from human livelihood activities which are triggered by surrounding communities and are in the form of unsustainable land-uses, resources over-extraction and other livelihoods strategies. Communities living within and outside the vicinity of protected areas are widely acknowledged to be essential factor to the success of conservation efforts (Agrawal and Gibson, 1999; Ostrom, 1999; Ferraro, 2002; Wiggins *et al.*, 2004; Robertson and Lawes, 2005). Consequently local communities are thought to have the knowledge, information and incentives required to manage and conserve the surrounding resources on which their livelihoods depend upon (Johnson 2001; White and Martin, 2002).

Available literatures substantiate the existing wide understanding of the significant merits of economic incentives measures over command and control measures of environmental management measures (McNeely, 1980; Panayotou, 1994; Emerton, 2000; UNEP, 2004). It is further asserted that one of the economic incentives' significances is its least-cost efficient means of achieving environmental conservation objectives as they drive up the cost of environmentally harmful social, economic and livelihoods activities and increase the returns from conservation activities (Panayotou, 1994: IUCN, 2000; CIFOR, 2001; Comerford, 2004).

Economic incentives refer to specific inducements designed and implemented to influence government bodies, business, non-governmental organisations, or local

people to sustainably and responsibly conserve, utilize and manage environmental resources where as socio-economic incentives mostly reflect livelihood measures that strengthen and diversify the livelihoods of biodiversity users or residents of biodiversity areas (Emerton, 2000). They aim at influencing people's behaviour by making it more desirable for them to conserve, rather than degrading or depleting environmental quality through communities' course of their livelihoods' activities (McNeely, 1980; Panayotou, 1994; IUCN, 2000; UNEP, 2004).

According to IUCN (2000) many of the most biodiversity rich ecosystems and species in Eastern Africa lie in remote rural areas that are physically or financially beyond the reach of government environmental and protected areas agencies. Their conservation depends primarily on the actions of local communities. Meanwhile, many of these communities are poor, must cope with a limited and insecure livelihood base, and often have few alternatives but to depend on biodiversity for their day-to-day subsistence and income. The provision of socio-economic incentives for these community members to conserve biodiversity is of paramount importance since community economic incentives are based on allowing local communities opportunity to benefit from conservation (Panayotou, 1994 and McNeely, 1980).

Kondoa Rehabilitated Areas (KRA) are among rehabilitated protected rural areas found in the central of Tanzania. The present situation in KRA indicate that they face enforcement and administration inefficiency towards handling exploitation pressures from local communities surrounding the rehabilitated protected areas (Madulu, 2001: Ligonja and Shrestha, 2013). This is due to the fact that KRA hold the entire source of livelihoods for the surrounding rural communities hence subjects the rehabilitated

protected areas to an intensive reliance and dependence on the resources for sustaining their livelihoods (Östberg, 1985; Madulu, 2001). In line with weaknesses and deficiencies of the existing command and control measures in place, there has been an experienced rampant increase of unsustainable land-uses and other human activities in the areas (Madulu, 2001; Kangalawe *et al.,* 2012; Ligonja and Shrestha, 2013).

Despite the widely known roles and merits of economic incentives approach of natural resource management and biodiversity conservation (McNeely, 1980; Panayotou, 1994; Emerton, 2000; IUCN, 2000; UNEP, 2004), little is known on the potential and useful socio-economic incentives for effectively and sustainably improving environmental conservation and livelihoods of the communities surrounding Kondoa Rehabilitated Areas. This study was designed to explore the potential applicable socio-economic incentives to sustainably improve environmental conservation, resources management and livelihoods of the communities surrounding the rehabilitated protected areas of Kondoa.

1.2.2 Justification of the Study

The study findings are appropriate inputs for conservationists, environmentalists and policy makers in designing effective environmental conservation measures. The revealed potential socio-economic incentives will influence the surrounding communities to sustainably and responsibly conserve, utilize and manage environmental resources in Kondoa Rehabilitated Areas. The revealed potential socio-economic incentives are expected to enrich and enhance the existing conservation initiatives including the implementation of REDD[+] activities. Since

some accounts indicate that REDD$^+$ programs have resulted into positive impacts on livelihoods at the household level (Bond *et al.,* 2009), the study findings will be useful in helping REDD$^+$ projects to be able to integrate the revealed potential socio-economic incentives in their activities hence scaling-up the provided livelihoods options to communities and household level.

Furthermore the revealed study findings are expected to efficiently and sustainably enhance the distribution and use of the limited environmental resources and services in most of communities sorrounding rehabilitated protected rural areas similar to KRA. Furthermore the derived knowledge inputs the initiatives of attaining the Millennium Development Goal seven (7) of ensuring environmental sustainability (UNEP, 2008).

1.3 Objectives

1.3.1 Main objective

The main objective of this study was to analyze potential socio-economic incentives for effectively and sustainably improving environmental conservation and livelihoods of the communities surrounding Kondoa Rehabilitated Areas.

1.3.2 Specific objectives

The specific objectives of this study were:

i.   To assess the available socio-economic incentives for improved environmental conservation and livelihoods in Kondoa Rehabilitated Areas

ii.   To assess the roles of socio-economic incentives for improved environmental conservation in Kondoa Rehabilitated Areas

iii.   To examine the contribution of socio-economic incentives on the livelihoods of the communities surrounding Kondoa Rehabilitated Areas.

1.4 Research Questions

This study strived to answer the following research questions:

i.   What are the available socio-economic incentives for improved environmental conservation and livelihoods in Kondoa Rehabilitated Areas?

ii.   What are the roles of socio-economic incentives towards improving environmental conservation in Kondoa Rehabilitated Areas?

iii.   What is the contribution of socio-economic incentives on the livelihoods of the communities surrounding Kondoa Rehabilitated Areas?

iv.   What are the community's perceptions towards the available socio-economic incentives in Kondoa Rehabilitated Areas?

1.6 The Conceptual Framework for the Study

Figure 1, shows a conceptual framework underlying the present study. This conceptual framework was used to determine the study variables. According to Linda (1999), cited by Lusambo (2009), the conceptual framework acts as a basis for discussing the relationships between different groups, individuals or issues and can always be progressively revisited as further information relating to the study variables becomes available. Maxwel (2006) further suggests that a conceptual framework justifies the entire research process by providing the necessary pieces of arguments.

The conceptual framework underlying the study in Fig 1, highlights the relationship and interrelationship among direct economic incentives namely independent variables (tree seedlings, health services , water services and income generating activities) and

indirect incentives (training and education programs, price supports in form of subsidies, and tenure) are useful in motivating and influencing the communities (individual and households) as well as institutions (schools, religious, saving and credit societies and youth and women groups).

The study posits that the successful adoption and application of potential mixture of socio-economic incentives to the communities and institutions in the study area would result to motivating and integrating the existing actors and authorities in the conservation practices as well as the surrounding communities'to actively participate in environmental conservation initiatives. The socio-economic incentives available in the area were envisaged to sustainably influence and strengthen community's participation in conservation of the available natural resources and hence resulting to sustainably improved livelihoods which is reflected in the presented sustainable improved livelihoods proxies namely improved household income and support social infrastructures in the study area as presented in Fig 1.

Furthermore the motivation and influence from the socio-economic incentives adopted in the area would result to the sustainable environmental resources management such that improved conservation activities and practices and improved management authority's institutional strength in the study area would be enhanced. These could be reflected through controlled grazing, efficient energy sources, optimal resource extraction and sustainable land uses and sustainable harvesting and conservation agriculture. This study envisages that the adoption of potential and useful socio-economic incentives by the community and the institutions available in

the KRA will significantly improve the existing conservation initiatives in the area as well as the livelihoods of the surrounding communities.

Economic incentives	Community	Sustainable Improved Livelihoods
• *Direct Incentives* - Tree seedlings - Improved seeds - Fertilizer - Beekeeping inputs - Income generating activities • *Indirect Incentives* - Education and Training programs - Price supports (*Subsidies*) - Land tenure	• Individuals • Households **Institutions** • Schools • Religious institutions • Saving and Credit Societies • Women and Youth Groups	-Improved household income -Support social infrastructures • **Sustainable environmental conservation** - Improved conservation activities/practices - Improved management authority's institutional strength

Figure 1: Conceptual framework underlying the study

1.7 Limitations of the Study

1.7.1 Inaccurate official and personal information

During the time of undertaking the study, the official and personal information such as the current total number of the households as well as the current total population available in the particular study villages were difficult to obtain. To overcome this limitation the information which were not found in the official government statistics sources were provided by the village officials of the particular areas. Also the number was compared to the recently available information from the official sources such as the 2012 Tanzania National Census (URT, 2013). This helped to establish the actual number for computation of various study basic variables.

Also information such as the actual sizes of farms, total land owned and the actual quantities of annual yield and income by the respondents were difficult to obtain. This was experienced due to lack of documentation hence inappropriate measurements provided by respondents. Towards overcoming these constrains, the sizes of the farms and total land owned by the respondents were determined by estimation from the units given by the respondents. Also the measurements of annual yield and annual income were determined by estimation basing on the latest number of bags harvested, number livestock and other assets owned by the respondent.

1.7.2 Unwillingness to give information

The study observed that most of respondents found it difficult to disclose information relating to the estimates of their total household annual income. In such cases, household annual incomes were estimated through income from sales of cash crops from the total yield and converted into the current prices of the particular crops and other off-farm income sources based on market values.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter presents summary of relevant scholarly perspectives on protected rehabilitated areas, biodiversity conservation in Tanzania, economic incentives and types of incentives for biodiversity conservation. This chapter also sheds light on the theories pertaining the evolution of community behaviour towards adopting socio-economic incentives and making them participate in various biodiversity conservation initiatives partaning in KRA. The theory of planned behaviour was reviewed to widen the understand of how people's (adoption decision) behaviour can be influenced.

2.2 Rehabilitated Protected Areas

Rehabilitated PAs present the heart of the world's political and economic commitment to conserve biodiversity and other natural and related cultural resources. They are major component of official conservation policy and practice. The United Nations Environment Programme's World Conservation Monitoring Centre (UNEP-WCMC) has recently calculated that there are more than 102,000 protected areas throughout the world covering more than 11.5% of the terrestrial and 3.4% of marine surfaces of the total earth (UNEP, 2004). These sites have been established virtually by all countries of the world and are managed through special rules and for conservation goals. Conservation approaches, however, are evolving rapidly, responding to social and economic changes as well as advances in natural and social sciences (Chape *et al.,* 2003).

Rehabilitated PAs are important due to the fact that they increase income, stimulate new enterprises through tourism, improve living standards and increases jobs for local residents, stimulate and diversify the local economy to people like farmers and pastoralist. In addition rehabilitated PAs encourage local manufacture of goods such as curio shops, improves local facilities, transportation, communications and social services through benefit sharing. Furthermore, rehabilitated PAs support environmental education for visitors and locals, establish attractive environments for residents and visitors. They also improve intercultural understanding; encourage development of culture, crafts, arts and increase education level of local community (Eagles *et al.,* 2002).

The concept of rehabilitating PAs is good for the benefit of the present and future generation. However increasing demand of natural resources from the rehabilitated PAs by the adjacent communities creates more challenges to conservationist and policy-makers. The intensive reliance and dependence on the resources for sustaining their livelihoods are due to the fact that rehabilitated PAs hold the entire source of livelihood for the surrounding rural communities (Östberg, 1985; Madulu, 2001).

Historically, the protection strategy was based on a "fence and fine" approach (Hutton *et al.,* 2005). This measure has experienced little control on existing rapid human activities and unsustainable land uses in rehabilitated PAs (Shao, 1999; Madulu, 2001; Ligonja and Shrestha, 2013). The ability of this strategy to deliver effective conservation and equal social outcomes has been seriously questioned and has been under considerable scrutiny since the mid 1980´s in most African countries (Humle and Murhpree, 2001). The exclusion approach has been criticized being

costly, not providing adequate conservation, socially unjust, leaving local people deprived and bound to bear the real conservation cost (Vedeld, 2002).

2.3 Rehabilitated Protected Areas in Tanzania

Tanzania mainland has set-aside 25% of her total area as protected area including forest reserves (Monela, 1995). This among many other things has made Tanzania one of the most potential and important nations in Africa for biodiversity conservation. Most of the accounted major biodiversity conservation include Eastern Arc Mountains, Wetlands, Marine and Fresh Water Areas and partly are enclose, improve and establish new rehabilitated biodiversity conservation areas including eroded and infertile areas. The initiatives of allocating PAs and rehabilitate them in the country go in line with rehabilitation initiatives which partly enhance and partly protect existing biodiversity resources in the designated PAs (Monela, 1995).

Following the Environmental Management Act of 2004, Tanzanian government has deliberately joined donors' initiatives to rehabilitate, restore and promote the recovery of the degraded ecosystems. There were established several conservation sites such as Hifadhi Ardhi Dodoma (HADO), Hifadhi Ardhi Shinyanga (HASHI), Soil Erosion Control and Agro forestry Project (SECAP) in Western Usambara and Soil Control and Agroforestry Project (SCAPA). Other sites include the National Genetic Repository in Arusha, Forestry Resources Management Project Tabora and Mwanza and Indigenous Natural Resources Management System in Shinyanga (NGITILI) (URT, 1998).

Hifadhi Ardhi Dodoma (HADO) is a soil conservation project started in 1973 in several areas of Dodoma Region, aiming at arresting land degradation in rapid deteriorating areas through physical soil conservation measures such as afforestation, appropriate cultivation methods, control of run-off by contour band construction and planting vegetation in the river beds (Mung'ong'o, 1991; URT, 1998; Christiansson e*t al.*, 1999; Ligonja and Shrestha, 2013). With other drastic measures, HADO project evicted all forms of human activities and all livestock from the 1256 km^2 of Kondoa Eroded Areas in 1979 (Ogle, 2001 and Kangalawe, 2003). These led to land reclamation, soil fertility restoration and quick rehabilitation of the vegetation in the worst affected areas which later became Kondoa Closed Areas (Shao, 1999; Ligonja and Shrestha, 2013).

There have been reported a prevalence of unsustainable human activities in the areas such as over extraction of the available resources, unsustainable land uses and poor institutional framework which exist along the resettlement process were due to unreliable over-reliance of livelihood activities from the surrounding communities (Mbegu and Mlenge 1984; Mbegu, 1996). The rehabilitation of Kondoa Closed Areas were successfully attained and started attracting many human activities including farming, house building (brick making and burning, building poles, thatch grass, ropes etc.), tree felling for fuel wood and farm expansion, and sporadic grazing of livestock (Madulu, 2001; Kangalawe and Lymo, 2010). In the most of the rural areas farmers and livestock keepers grasp quickly whatever chances they had to make use of new land-use opportunities, unlike early 1970s when intensive conservation efforts existed in the areas (Madulu, 2001; Kangalawe *et al.*, 2012).

2.4 Economic Incentives

IUCN (2000) defines economic incentives as specific inducements designed and implemented to influence government bodies, business, non-governmental organisations, individuals or communities to sustainably participate in biodiversity and environmental conservation and management. Economic incentives measures usually take the form of a new policy, law or economic or social programme. They influence people's behaviour by making it more desirable for the surrounding communities' to conserve, rather than to degrade or deplete, environment resources in their course striving for the livelihood activities. Economic incentives enhance and promote environmental conservation initiatives by turning overexploitation to sustainable practices of biodiversity and environmental resources and quality (McNeely, 1988; Panayotou, 1994; UNEP, 2004).

CIFOR (2001) and ABARE (2001) assert the wide range of aspects in which incentives could equip, influence and induce communities with natural resource management attitudes and spirits. The aspects entail the expected costs and benefits, the expected effectiveness of the instrument in achieving the defined targets. Efficiency concerns relating to the administration, monitoring and enforcement costs and the level of information required, flexibility, acceptability and equity of the incentive scheme before and after adoption and implementation. A thorough analysis of these incentives provides justifiable economic inducements to communities and management authority's and becomes the best way to protect the viability of protected areas surrounding communities. The adoption of the incentive schemes ensures the future availability of environmental resources improved livelihoods among the communities (Baker, 1989).

2.4.1 Types of socio-economic incentives

Socio-economic incentives for biodiversity conservation must be chosen carefully so as to respond to the specific circumstances of different groups and economic activities at the same time as they address the causes of biodiversity loss (McNeely, 1993; Emerton, 1998). According to FAO (1987) and Randall (1993) there are three broad categories of socio-economic incentives for biodiversity conservation. These categories include market or monetary (direct and indirect); non-market and disincentives (Emerton, 1998).

2.4.1.1 Monetary incentives

Monetary incentives which also refer to market incentives for biodiversity conservation are the motivation given in form of cash (Emerton, 1998). Monetary incentives may include direct cash to individuals, profit sharing and bonuses (Benabou and Tirole, 2003). Emerton (1998) further argued that monetary incentives encourage compliance rather than risk-taking because most rewards are based only on performance. As a result, the sustainability of conservation activities ceases once the donors of the project withdraw from funding. Traditionally, these incentives help maintain a positive motivational environment for individuals, communities and conservation organizations to conserve biodiversity. However, monetary incentives have some shortcomings. Under monetary (market) incentives, two sub-categories of incentives can be identified, i.e. direct and indirect incentives.

Direct incentives are mechanisms that are targeted to specific objectives and encourage people to conserve biodiversity by providing rewards for changed behavior (Randall, 1993; Emerton, 1998), they are granted in cash, kind or combination of the two and mostly take place in form of grants, daily wages, loans, subsidies (FAO,

1987). Direct incentives usually aim at an immediate impact on individual or the community either because they are given directly in cash or in kind, or because they clearly improve rural life very quickly (FAO, 1987; Emerton, 1997, 1998).

On the other hand indirect incentives are mechanisms that are targeted to specific objectives and encourage people to conserve biodiversity by providing rewards for changed behaviour (Emerton, 1998). They mostly involve laws and regulations designed to benefit individuals and communities involved in conservation projects to set in place general enabling conditions that will make them change their economic behaviours. There are three major categories of indirect incentives used to conserve biodiversity namely fiscal, service and social (FAO, 1987).

2.4.1.2 Non-monetary incentives

Like monetary incentives, the purpose of non-monetary incentives which are also refered to non-market incentives is to encourage individuals, communities or organizations to carry out conservation activities sustainably. Non-monetary (non-market) incentives are devices composed of monetary rewards (which may be without tangible benefits) and a non-monetary reward (Benabou and Tirole, 2003). Non-monetary incentives may include education and training, study tours and short courses. Sometimes non-monetary incentives are given as reward to individuals, communities and organizations for excellent job performance.

However, monetary and non-monetary incentives vary in their roles, effectiveness and appropriateness. One of the shortcomings of monetary and non-monetary incentives is that they actually hamper individuals', communities' and organizations'

motivation, interest and satisfaction (Benabou and Tirole, 2003). The way these socio-economic incentives are given to the target groups may be not relevant and inadequate according to the set down objectives. That is being opposite of what incentives were created to do. Non-monetary incentives should be used to satisfy the diverse needs and interests of individuals, communities and conservation organizations. They should also be easily be converted into monetary form and bring balance between monetary and non-monetary. Therefore, incentives must take into account of the stakeholders for whom they were created.

2.4.1.3 Disincentives

FAO (1987) and Emerton (1998) posit disincentives as things that constrain people to manage biodiversity in a sustainable way. They encourage them to over-exploit biodiversity to meet their basic needs but the practices are not sustainable. Economic disincentives include shortage of farming land that lead to people expanding their farms at the detrimental of biodiversity (Emerton, 1999; Butuyuyu, 2003).

Also disincentives may include failure of conservation organizations to supply farmers with adequate assistance in tree nursery establishment and wide spread poverty which lead to unsustainable use of biodiversity and other natural resources in a given area (Mayeta, 2004). Other socio-economic disincentives include crop damage inflicted by vermin to local communities without any compensation. This leads to uncontrolled killing of wild animals and destruction of their habitats thereby leading to extinction fauna and flora (Emerton, 1998; 1999). The low value of animal biodiversity as compared to other land use options is another socio-economic disincentives to sustainable conservation of natural resources.

2.5 Economic Incentives' Roles on Environmental Conservation

The effort to reconcile the three objectives of increasing agricultural and livestock production, reducing poverty and ensuring sustainable use of natural resources has been a continuing conflict in the majority of rural areas in Tanzania and other developing countries (Gebremedhin *et al.*, 2004). This has called upon national governments, international agencies, communities and businesses initiatives to undertake various means and approaches to sustainably rehabilitate degraded areas (UNEP, 2004). Equally, the ever-growing rate of the environmental degradation in various areas, the pace of arable land degradation is estimated at 30 to 35 times the historical rate as UNEP (2008) suggests the rate to be worst in rural areas. This calls upon rehabilitation initiatives which could later allow the reintroduction of the existed human activities in the areas of rural setting.

Most of the rehabilitated areas in Tanzania, such as the Hifadhi Ardhi Dodoma and the rest are in the risk of being turned into its original state due to low adherence to sustainable managements practices (Madulu, 2001). This is due to the reintroduction of human activities in most of rehabilitated areas which needs to be sustainably managed. The current ongoing human activities in the Hifadhi Ardhi Dodoma (HADO) conservation areas specifically in Kondoa Enclosed Area are rapid, and the total cultivated area has increased considerably compared to the early intensive conservation efforts in 1970s (Mbegu and Mlenge 1984; Kangalawe *et al.*, 2012).

According to McNeely (1980) and Panayotou (1994), economic incentives aim at influencing people's behaviour by making their livelihoods' activities more desirable

for them to conserve, rather than degrading or depleting environmental quality. It was further argued that economic incentives act as specific inducements designed and implemented to influence government bodies, business, non-governmental organisations, or local people to sustainably and responsibly conserve, utilize and manage environmental resources through involving communities.

Poor mainstreaming of conservation activities on local production systems and lack of institutions in promoting conservation at the community level called for the long-term conservation investment for restoration, protection and socio-economic support which would contribute significantly in the sustainable land rehabilitation initiatives in KCA (Ligonja and Shrestha, 2013). The rampant ongoing human resettlement processes in the area goes along over-extraction and over-exploitation hence ultimate degradation in the conservation areas.

Despite the existing good conservation legislations, policies and regulations in place (HWK, 1990; URT, 1997), still the human activities which are accompanied by unsustainable land uses and poor institutional framework are rampant in the area, hence turning the reintroduction process unsustainable (Mbegu and Mlenge, 1984; Mbegu, 1996; Kangalawe *et al.*, 2012). It has also been found that the increased unsustainable land uses kept reducing the rehabilitated areas hence calling a more effective means of influencing the behaviour of the communities.

2.6 Roles of Economic Incentives on Communities' Livelihoods

Economic incentives for biodiversity conservation are derived from the economic instruments which are applied to the prevailing socio-economic situations in the

particular environment (McNeely, 1980). Economic incentives tend to have lower institutional and human resource requirements than command and control regulations, because they operate through incentives rather than coercion hence involving local communities more effectively (Panayotou, 1994). They are useful directly in influencing the nature of livelihoods of the adjacent communities since their livelihood strategies affect environmental quality (IUCN, 2000).

Its effective applications to the conservation projects provide incentives, motivation, and alternatives to destructive activities, education and compensation to the local communities around the area (UNEP, 1999). This influences high involvement, participation and commitment of the local communities as well as generating returns and revenues from the sustainable supply of resources for running conservation projects (Panayotou, 1994; Emerton, 2000). An incentive mechanism will perform best if careful thought has gone into its design. However, investment in design should be proportionate to available funding, and should not dominate the time and funds dedicated to the particular natural resource management problem in the area. If possible, towards designing of potential incentives lessons from other pilots and programs should be used in order to avoid repeating basic design work and making the same mistakes (Comerford, 2004).

Also according to Comerford (2004), incentives are of two basic types: direct and indirect ones, direct ones include grants which refer to a sum of money given to a group or individual that assists in undertaking on-ground work, subsidies which refers to payments that effectively reduce the price of goods or services that are seen as environmentally beneficial (eg: fencing of riparian zones) and so encourage their use.

Stewardship payments which are payments made to a landholder for carrying out actions that maintain current Natural Resources Management (NRM) values or improve NRM outcomes on their properties. The main benefit of a stewardship payment is that they can address more than one problem at a time (eg: address biodiversity and water quality outcomes concurrently) as well as passive management actions (eg: retention of native vegetation).

Also the direct incentives entail competitive tenders or suctions and assuasive instruments which aim at changing an individual or firm's perceptions and priorities about the environment through information provision, education programs and social recognition and pressure schemes. There are other incentives that natural resource management bodies could indirectly use such as fiscal policies, service and social policies, natural resources policies, price supports, land tenure but these are likely to involve, supporting another program in a more peripheral manner (Werner, 2004; UNEP, 2008).

ABARE (2001) identifies the following factors influencing the choice of policy options. Firstly, the expected costs and benefits (if cost is too high intervention may not be justified), the relative costs and benefits compared to other measures should be identified. Secondly, the expected effectiveness of the instrument in achieving the defined targets was also significantly stressed. Thirdly was on efficiency concerns relating to the administration, monitoring and enforcement costs and the level of information required.

Fourthly, flexibility and acceptability of the policy to deliver an optimal outcome in the face of changing conditions and the extent to which individuals can determine their response to the policy. Policy to stakeholders which is especially important with incentives, as the take-up of an incentives program may be low if the individuals or community do not welcome the policy. Lastly is on the equity concerns about the impact of the policy upon stakeholders.

The contribution of the intervention to the aimed stakeholders relates to the nature of poverty-environment inter-linkages in urban areas is somewhat different from that in a rural setting. There are many cases where local poverty and perceived lack of alternative income sources will lead to environmental degradation (Dasgupta *et al.*, 2005). The scenario is similar to the existing situation of rapid human activities and unsustainable land uses in the study area as it also reflects rural setting (Shao, 1999 and Madulu, 2001).

2.7 Adoption theory

Adoption refers to as the first or minimal level of behavioural utilization (Rogers, 2003). It is mainly determined by the perceived attributes such that comparative advantage which refers to the degree to which an innovation is perceived better than the idea it supersedes, complexity which refers to the degree to which a practice is perceived as relatively difficult to understand and to adopt negatively related to its rate of adoption, trialability which is the degree to which an innovation (comparative advantage) may be experimented at a limited basis also compatibility which is the degree to which sustainable practice is perceived as consistent with the existing

values, past experience and needs of potential adopters (Rogers, 2003 and Wauters, 2005).

Furthermore the adoption of any innovative idea including socio-economic incentives highly depends on the type of innovation decision process through which an individual passes from; knowledge to attitude and finally to adopting (individual or collective community). Rogers (2003) further argued that efforts of the particular technology promotion agent can highly influence adoption. It also depends on the communication channels which entails interpersonal or mass media, originating from specific or diverse sources. Adoption based on the social system such as norms, network interconnectedness, socio-cultural practices and norms that can inhibit or drive adoption.

Technology adoption and innovation have been the subjects of scholars in many fields including sociology, communication theory, social psychology, conservation and economics. The adoption of economic incentives requires a sound theoretical back-up. Cultural transmission is underpinned by imitation and teaching; culture accumulates over generations. Frost (1996) and Campbell (1996) reported that cultural practices play significant roles in deforestation and other degradation aspects in miombo woodlands.

2.7.1 Theory of planned behaviour

The theory helps to understand how people's adoption decision and behaviour can be influenced. According to Ajzen (1991) the theory of planned behaviour predicts deliberate behaviour, since behaviour can be deliberate and planned. In essence, the

theory uses knowledge of attitudes, subjective norms and perceived behavioural control to understand beliefs and thus predict behavior of the particular society. According to Jackson *et al.* (2006), the theory of planned behaviour uses perceived behavioural control to predict behaviour in two ways: through motivational factors and the intention to perform the behaviour via the *intention construct* and also through actual control via the direct link between the *perceived behavioural control* and *behaviour* constructs which is not mediated by intention (Ajzen *et al.,* 1991). This study posits socio-economic incentives as motivational factors which influence the behaviour of individuals and communities to engage themselves in environmental conservation practices.

According to Weir (2004), the theory assumes human action to be guided by three kinds of considerations: Firstly, behavioural beliefs (beliefs about the likely consequences of the behaviour-adoption). Secondly, normative beliefs (beliefs about the normative expectations of others). Thirdly, control beliefs (beliefs about the presence of factors that may facilitate or impede performance of the behaviour-adoption). The theory of planned behavior has been successfully used to understand people's ways and means of adopting environmental conservation behaviours. Lynne *et al.* (1995) studied the conservation behaviour of North American strawberry farmers and found that perceived socio-economic factors of the surveyed respondents were important factors in determining *intention* to participate in conservation. This study also found that all four constructs of the theory of planned behavior (attitude, subjective norms, perceived behavioural control and intention) are necessary for the practical application of the theory if the KRA surrounding communities' behaviours are to be targeted for change after adopting socio-economic incentives.

2.8 Adoption of Economic Incentives

For the merits of economic incentives to be significantly observed in the area, they should be effectively adopted in the particular area. For the community to adopt economic incentives instead of traditional environment management approach which is also known as command and control measures there should be supporting situation such that the economic incentives to be effectively and successfully practiced and to serve the objective (UNEP, 2004; Ligonja and Shrestha, 2013).

2.8.1 Socio-economic factors influencing adoption of socio-economic incentives

The integration of local communities emphasized the links between local communities characteristics and ecosystems, and the importance of involving these communities in conservation efforts. Socio-economic factors affecting adoption are education level, number of years liveed in the area (experience), land size owned (Adeola, 2010; Franzel, 1999). According to Musyoki *et al.* (2013), factors influencing participation in forest conservation are distance of homestead from the forest, land ownership,household size, level of education and experience.

Income is also considered as an important factor influencing adoption (Franzel, 1999). Mitinje *et al*. (2007) acknowledged that education is fundamental towards influencing individual's perception on conservation and particularly in the implementation of biodiversity related incentives due to the limited experience with use of economic incentives. Adebiyi *et al*. (2013) further posited that awareness, land size owned, education level and experience are the factors which influence the adoption of any technological intervention in conservation.

Following Comerford (2004) argument that the environmental conservation should be rooted in the communities' behaviours. This among others provides culture a very influential role towards strengthening environmental conservation behaviours sustainably. The canonical text rooted from meme theory examines sustainable adoption of cultural diffusion and transmission through the imitation and teaching of the community patterns on ideal and standard environmental conservation behaviours to sustainably respond to latest innovations and technologies. Following the review on the theory of planned behaviour and rigorous literature review, this study has pointed years the respondent has lived in the village, household size, education level, distance from forest, annual income, land size owned, awareness of socio-economic incentives as the factors influencing the adoption of socio-economic incentives in KRA.

It is further contended by Comerford (2004) that environmental conservation should be rooted in the communities' behaviours. The constructs provided by the theory of planned behaviour are attitude, subjective norms, perceived behavioural control and intention. The constructs are merely socio-economic and demographic factors hence being in a position to influence any of the socio-economic releated behaviour. Following the given constructs by the theory, the adoption of socio-economic incentives also depends on the socio-economic factors.

2.8.2 Constraining factors for socio-economic incentives adoption

Malimbwi (2002) and Kiss (2004) have reported problems constraining local communities to engage themselves in the management of forest resources including lack of incentives for the participating communities. Apparently to neo-market

natural resources economists, new ways and institutional set-ups to supply for such required incentives have to be developed. This implies that for environmental services to be provided by local actors, financial and non financial incentives have to be made available by international, national, regional and local actors to further strengthen environmental conservation initiatives (UNEP, 1992).

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology used in this study. It covers the description of the study area, research design, sampling procedure, data collection methods and data analysis techniques involved.

3.2 Description of the Study Area

3.2.1 Location

The study was conducted at Mafai, Ntomoko, Kalamba juu and Kalamba chini villages in Haubi and Kalamba wards respectively. The study villages and its human settlements are bordering Kondoa Rehabilitated Areas. The study area is found in Kondoa District, Dodoma Region in central Tanzania and it is located at $S4^0$ 43" 28' $E35^0$ 50" 2'. According to Mbegu and Mlenge (1984), the study area has semi arid climatic conditions and nearly ten percent of Kondoa District area with about 1256 sq. km. The study area was categorised as being severely degraded, and hence was referred to as the Kondoa Eroded Area (KEA). This calls sound rehabilitation measures which turned KEA into Kondoa Rehabilitated Area (KRA) (Ogle, 2001). Currently, human activities have been reintroduced in study area with high prevalence of livelihoods activities on the resources from the rehabilitated closed area (Mbegu and Mlenge, 1984). The fact that the selected study villages border some of the forest reserves found in Kondoa Rehabilitated Areas was the criteria for the selection of the study villages.
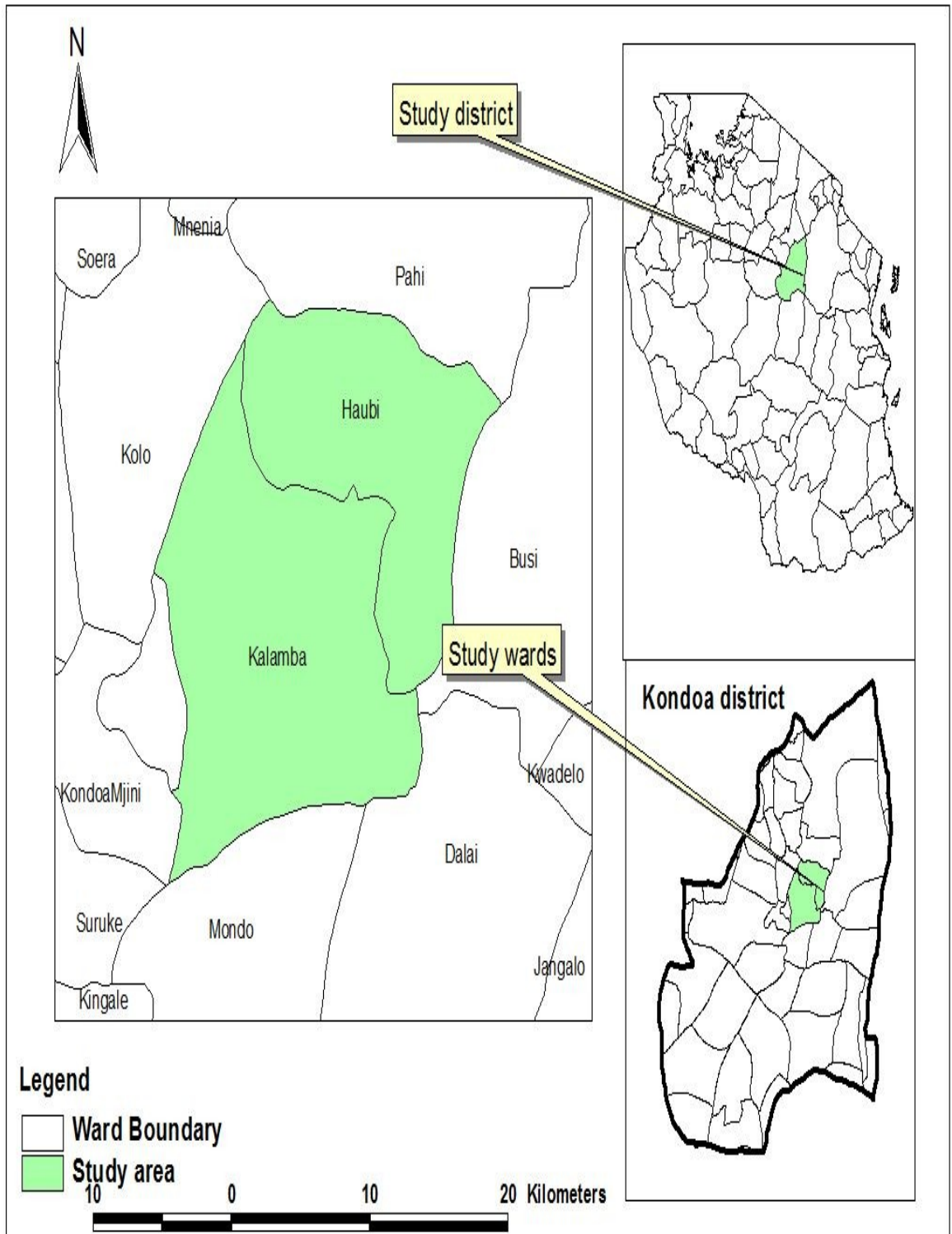
Figure 2: Map showing location of the Study Area.

3.2.2 Population

The population found in the villages surrounding Kondoa Rehabilitated Areas is mainly composed of Rangi tribe. Current the study area population is mainly dominated by male who account for 51 of the total population in the area as shown in Table 1.

Table 1: Population profile of the Haubi and Kalamba wards in KRA

Wards	Population		Total
	Male	Female	
Haubi	7027	6730	13 757
Kalamba	7023	6965	13 988
Total	14 050	13 695	27 745

Source: URT (2013)

3.2.3 Economic activities

The successful rehabilitation of the eroded areas which took place in 1970s attracted many human activities including farming, house building (brick making and burning, building poles, thatch grass, ropes etc.), fuel wood and fertile land for farm expansion and sporadic grazing of livestock hence high population and settlement increase (HWK, 1990; Madulu, 2001; Kangalawe and Lymo, 2010).

Subsistence farming is dominant in Haubi and Kalamba wards and it stands as the main economic activity and source of livelihoods. Food crops are maize, sorghum, pearl millet and sweet potatoes while cash crops include sunflower, groundnuts, simsim, finger millet and peas (Mwakipesile, 2012; Matunga, 2012). Livestock

keeping occupies the second important position to farming whereas cattle, goats, sheeps, donkeys and chicken are kept by the majority of the households in the area (Mwakipesile, 2012). Of recent, changes of climatic conditions and loss of soil fertility have led to low productivity hence exacerbating poverty among the majority of the households in the area (Ndanga, 2012).

3.3 Research Design

This study employed a cross-sectional research design. Under this design, data on the variables of interest were collected more or less simultaneously, examined once, and the relationship between variables determined (Bryman and Bell, 2011). The employed study design was advantageous as it was compatible to the available time and resources.

3.3.1 Sampling procedures

Two wards namely Haubi and Kalamba were purposively selected for this study. The study wards which were of two categories; Haubi was in the category of the ward bordering the protected Ikome forest reserves and sometimes referred to be inside KRA and the Kalamba ward was in the category of ward found outside KRA. In considering the time available for conducting the study as well as financial resources available, two villages were randomly selected from each of the study wards to constitute the sampling frame for the study. Using simple random sampling technique of drawing playing cards, four villages were selected from the study wards namely Mafai, Ntomoko, Kalamba Juu and Kalamba Chini. The study population was formed of the total number of households from the four randomly sampled villages. The households were randomly picked from the village register books in which all

households' heads were listed. In villages where register books were absent, the names of people residing in the particular village were recorded with the assistance of village leaders from each hamlet and simple random sampling was used through random generated numbers technique so as to avoid bias.

Key informants were purposively selected based on the positions they hold in relation to conservation and rehabilitation of KRA. These included HADO staff in KRA, village government chairpersons and executive officers, institutions representatives and village elders from the selected four villages in the study area.

3.3.2 Sample size determination

The households residing in each village were randomly drawn from the compiled list of village registers which was used as a sampling frame for the study. The study went across the sampling frame of the total number of the households available in the study area as proposed by the study such that the provided sampling technique gives a standard sample size which could reasonably represent the population in the question (Kothari, 2004; Babbie, 2007).

Boyd *et al*. (1981), cited by Njana (2008) recommended a sampling intensity of 5% of total number of households in a study site. Boyd *et al*. (1981) further posits that, the study sample size is considered adequate and able to fit statistical analyses if and only if it entails the reasonable proportion of the units from the sampling frame but being not less than 30 units. For the purpose of this study a sampling intensity of 5%

was adopted. This was equivalent to 120 households meaning that 30 households were randomly sampled from each of the four villages as presented in the Table 2.

Table 2: Distribution of respondents in the surveyed villages

Village	Total number of households	5% of the total number of households	Sampled households
Haubi	609	30.45	30
Ntomoko	590	29.5	30
Kalamba Chini	567	25.65	30
Kalamba Juu	496	24.8	30
Total	**2262**		**120**

Source: Estimates from village registers (February, 2014).

3.3.3 Data collection

Towards addressing the study specific objectives, both primary and secondary data were collected. A combination of both qualitative and quantitative data collection methods were used to achieve triangulation and complementary. The combination also increased the validity of results (Bryman and Bell, 2011). Before actual data collection, research instruments were calibrated by pre-testing and pilot testing of the questionnaires in the10 households; five households from each ward where actual data collection was to be done. The analysis of the tested instruments was done to improve the instruments' consistency, validity and reliability.

3.3.3.1 Household questionnaire survey

Household questionnaire survey was conducted where both closed and open ended questions were used to collect socio-economic, economic incentives, conservation, management and livelihoods-related data. The total of one hundred and twenty (120)

heads of households from the study area was surveyed. This method was undertaken to gather primary data from respondents from all of the study villages namely Haubi, Ntomoko, Kalamba Chini and Kalamba Juu.

3.3.3.2 Key informants interview

A checklist was prepared to solicit information from key informants (Appendix 2). A key informant is an individual who is knowledgeable, accessible and willing to talk about the issues under study (Mbwambo, 2000). Also Mettrick (1993) defines a key informant as a member of the study area who is found to be most informed about the issues being studied.

The key informants' interviews were conducted during the data collection process whereby more than 30 key informants were interviewed from all of the four villages were interviewed to reveal the specific information relating to the use of economic incentives in the KRA. The key informants included in this study were HADO Project Officers, Village Chairpersons, Village Executive Officers and Village Elders.

Plate 1: Key informant interview in Kalamba Juu Village (Photo by Research Team Member)

3.3.3.3 Focus Group Discussions

Focus group discussions were employed purposely to explore information from people of different ages, sex and occupation. This technique was complemented by direct observation where some existing features in economic incentives-related environmental conservation practices were observed. According to Kajembe *et al.* (1996) the combination of these techniques is necessary for data triangulation purposes aimed at facilitating validation of data through cross verification from more than two sources.

Towars undertaking FGDs, a group of 5 experienced and knowledgeable individuals who were accessible and willing to talk about the issues under study participated in the study. A checklist was prepared to solicit information from the proposed members (Appendix 1). The prepared list of 15 questions which were reflecting the study

objectives were posed to the Village Environmental Committee, Village Natural Resources Committee, Village elders and Environmental conservation committees. The detailed discussions were used to reveal important aspects underlying the study and to learn about rural conditions in relation to conservation practices in an intensive and interactive manner.

3.3.3.4 Literature survey

Survey on the literatures related to economic incentives, biodiversity and community participation in conservation was conducted so as to collect secondary data to supplement the primary data. Reports on related studies were gathered from Sokoine National Agricultural Library (SNAL), National Environmental Management Council, The Mwalimu Nyerere Memorial Academy and University of Dar es Salaam Library were the major sources of information and relevant information collected in order to supplement collected primary data.

Documented information related to the resource management problems and the useful economic incentives in the environmental and conservation were reviewed including official government documents like the URT (1998), EMA (2004). The collected secondary information was used to supplement the collected primary data from the study area. Also environment-related acts, conventions, policies and programmes documents, reports, journals, newspapers, articles, dissertations and all other relevant literatures related to the economic incentives for environmental conservation and management were collected and reviewed.

3.4 Data Processing and Analysis

3.4.1 Data processing

After data collection exercise, primary data were checked for completeness before coding, entering and verification for analysis. The filled questionnaires were cleaned to remove all unintended information and were made ready for coding. The coding process resulted to the data entry exercise. The entered data were cleaned to resemble the collected information. Microsoft Excel and Statistical Package for Social Sciences (SPSS 20.0) computer programs were employed for proper housekeeping, arrangement, management and analysis of the collected data.

3.4.2 Data analysis

Microsoft Excel and Statistical Package for Social Sciences (SPSS 20.0) computer programs were employed for data analysis. Both descriptive and inferential statistical analyses were employed to reveal the aspects relating to socio-economic incentives and environmental conservation practices from the collected data. Data analysis for each objective was rigorously performed, presented and discussed. Data analysis procedures for each objective are detailed below;

3.4.2.1 Available socio-economic incentives in KRA

The first objective was on assessing the available socio-economic incentives in KRA. It covered three aspects namely; the awareness of socio-economic incentives, available socio-economic incentives and factors influencing the adoption of socio-economic incentives. Data analysis for the first two aspects was carried out through content analysis and descriptive statistics while binary logistic regression analysis

was used to reveal the significant factors influencing the adoption of socio-economic incentives in KRA.

In response to the socio-economic characteristics prevailing in the community in the study area, in relation to specific circumstances of different groups and economic activities, the binary logistic regression analysis hypothesized seven socio-economic factors which influence the adoption of socio-economic incentives in the study area as described in the Table 3.

Table 3: Description of variables used in the Binary Logistic Regression

Variables	Description
Y	If respondent practice economic incentives (1=Yes, 2=No
X_1	Years the respondent has lived in the village
X_2	Household size
X_3	Education level (1= No formal schooling, 2= Primary education, 3=Secondary education, 4=Tertiary education)
X_4	Distance from forest
X_5	Annual Income
X_6	Land size owned
X_7	Awareness of economic incentives (1=Yes, 2=No)

Following the through review of the theory of planned behavirour in section 2.7.1, the theory helps to understand how people's (adoption decision) behaviour can be influenced. It predicts deliberate behaviour, since behaviour can be deliberate and planned. This study aligns to what Lynne *et al.* (1995) contented on the perceived socio-economic factors of the surveyed respondents to be an important factor determining intention as adding it as a construct to the model provided as presented in Table 3. The factors were entered sequentially in the binary logistic regression model, checked and the insignificant factors were removed from the prediction model. The binary logistic regression model was then employed to assess the significant socio-

economic factors influencing the adoption of socio-economic incentives in the study area consistent to Giliba *et al.* (2011).

3.4.2.2 Roles of socio-economic incentives on environmental conservation

Content analysis, descriptive statistics and binary logistic regression analysis were used to reveal the roles of socio-economic incentives towards influencing sustainable environmental conservation practices in KRA. Descriptive statistics were also used to quantify the revealed roles in encouraging communities to participate in environmental conservation while binary logistic regression analysis revealed significant roles played by socio-economic incentives towards influencing the awareness of environmental conservation in the area.

The study objective covered two aspects namely the roles played by the socio-economic incentives to improve awareness and the roles played by socio-economic incentives to encourage communities to participate in environmental conservation. The presence of socio-economic incentives practices in the study area hypothesized to have implications towards any of the biodiversity conservation aspect. Towards revealing significant roles played by socio-economic incentives towards influencing the awareness of socio-economic incentives in the study area, the binary logistic regression analysis was used. The variables used in the logistic regression analysis were clearly described in Table 4.

Table 4: Description of variables used in the Binary Logistic Regression

Variables	Description	Measurements
Y	Aware of environmental conservation initiatives	(1=Yes, 2=No)
X_1	Tree seedlings available	(1=Yes, 2=No)
X_2	Fertilizers available	(1=Yes, 2=No)
X_3	Improved seeds available	(1=Yes, 2=No)
X_4	Beekeeping inputs available	(1=Yes, 2=No)
X_5	Education programs available	(1=Yes, 2=No)

3.4.2.3 Contribution of socio-economic incentives on the KRA livelihoods

Towards attaining the third objective of the study, the contribution of economic incentives on the livelihoods of the KRA surrounding communities was revealed by using Chi-square test, content analysis and descriptive statistics. The comparison of the percentage proportion of the income accrued from practicing activities related to the available socio-economic incentives to the total annual income earned by the household head.

Further, content analysis and descriptive statistics were deployed to reveal the existing community's perceptions towards the contributions of available socio-economic incentives on the livelihoods of the KRA surrounding communities. The perception levels were ranked from very useful to not useful and the descriptive statistics were employed to rank and reveal highly perceived opinions towards the existing socio-economic incentives and their roles to them and to their surrounding communities. Chi-square test was used to further analyse the contribution of economic incentives to total household income.

3.7.5 Binary Logistic Regression Model:

Binary logistics regression has been successfully employed in social sciences, biostatistics, genetics and demographic issues (Saha, 2011). Other authors e.g Whitehead (1998), Mendoza (2006) and Giliba (2011) argued that applications of binary logistics regression analysis depend on the nature of the dependent variable of the particular study inquiry. According to Saha (2011) the goal of logistic regression is to correctly predict the category of outcome for individual cases using the most parsimonious model. Binary logistics regression technique was used to determine the impact of the independent variables on aspects such as factors influencing the adoption of socio-economic incentives, roles of socio-economc incentives towards influencing awareness of environmental conservation.

Binary logistics regression applied in this research is interpreted with respect to the nature of the dependent variables with reference category of the independent variables. According to Pallant (2005) and Akankali *et al.* (2011) significant value should be less than 0.05. The independent variables are categorized into two distinct groups based on the discretion of the researcher and study instrument. These two categories were coded into 1 and 0. The category coded 1 therefore becomes the reference category upon which the logit inference is drawn. If the sign of the logit is negative (- ve), this implies less likelihood of the event defined by the reference category occurring. For binary logistic regression, the formula given below as cited from Agresti and Finlay, (2009) was used:

$$Logit(Y) = \ln\left(\frac{p}{1-p}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_n X_n + \varepsilon_i$$

In this research: P(event= 1) = the probability of the socio-economic incentive to actually improve awareness of environmental rehabilitation conservation activities.

Where: p = probability of the event,

ln= the natural log

α = the intercept of the equation

β_1 to β_k= coefficients of the predictor variables

X_1 to X_k= The predictors to be included in the logistic regression model i.e

are given in Table 3 and 4.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 Socio-Economic Characteristics of Respondents

Relevant social-economic characteristics of the 120 respondents who took part in this study include age, sex, education, marital status and occupation. These are summarized and presented in Table 5. Others including household size, income levels and distance from the rehabilitated reserved areas are also presented. Respondents' characteristics were important in order to provide a snapshot on the background of the respondents and their suitability for this inquiry.

Table 5: Socio-economic characteristics of respondents (n=120)

Characteristics	Distribution	n	%
Age	20-41 years	45	37.5
	41-60 years	73	60.8
	61 years and above	2	1.7
Sex	Male	72	60
	Female	48	40
Education	No formal schooling	37	30.8
levels	Primary education	50	41.7
	Secondary education	32	26.7
	Tertiary education	1	0.8
Marital status	Single	9	7.5
	Married	105	87.5
	Divorced	4	3.3
	Widowed	2	1.7
Main occupations	Crop farming	42	35.0
	Crop farming and livestock keeping	77	64.2

Employed	1	0.8

4.1.1 Age of respondents

The respondents involved in the study were of different ages. 37.5% of the heads of household in study villages were aged between 20 and 41 years of age, 60.8 % of the heads of respondents were aged between 41 and 60 years and 1.7% respondents aged above 60 years old as indicated in Table 5. The fact that most (60.8 %) of the heads of respondents were aged between 41 and 60 years and 37.5% of the heads of household in study villages were aged between 20 and 41 years which is considered as the productive or working age, it implies availability of the workforce in various economic and conservation activities. Since the study found that many heads of household in the study villages were aged within the productive age, the study finding is in line with Giliba (2011) assertion that most of people found in the study villages can effectively participate in environmental conservation activities, adopt and utilize the economic incentives available in the study area. This suggests that age is useful socio-economic characteristic in influencing sustainable management of biodiversity conservation initiatives.

Also this study finding suggests the availability of supportive workforce for effective and sustainable adaptation and adoption of sustainable environmental conservation initiatives including adoption, participation and utilization of economic incentives. This finding supports Njana's (2008) assertion, that the respondents aged between 20 and 60 years provide a workforce in various economic and conservation activities. It further concurs with (URT, 2013) that the population aged 15 to 64 years entail a working age population hence becoming the community's workforce for various

livelihoods activities. Hence the revealed findings suggest the availability of supportive workforce for biodiversity conservation initiatives in study villages.

4.1.2 Sex of respondents

The study sample comprised of both male and female respondents. Results presented in Table 5 showed that, male household heads were 60% of all household heads interviewed in the questionnaire survey while the female household heads were 40% of the all household heads interviewed during the questionnaire survey. The study findings presented in the Table 5 imply patriarchy kinship and it mostly reflect African traditions setting where majority of the households follow patriarchy kinship where by men are the heads of the households and women headed households exists if and only if the women are divorced or separated also when the women's husbands have died. Furthermore the study findings that 60% and 40% of the total households are the male and female headed households respectively suggests the presence of encouraging level of participation in varous household responsibilities.

The study findings of 60% and 40% of total male and female respectively in the study area is widely supported by Stiglitz (1997); URT (2013) and Njana (2008) as they are quite revealing and depicting usefulness of sex of household heads towards adaptation of sustainable environmental conservation initiatives including the adoption of economic incentives in the study area. Stiglitz (1997) considered high level of women participation useful towards achieving sustainable development and poverty alleviation through high level of community participation. Also the finding is in line with Ockiya (2000) and Adhikari *et al.* (2003), who found that the presence of majority of both sex i.e. 60% and 40% male and female headed households in the study area respectively suggests high level of community participation and hence suggests a supportive condition for sustainable adaptation of sustainable

environmental conservation initiatives including the adoption of socio-economic incentives in the study area.

4.1.3 Respondents' education levels

Education level of individuals within a particular community is an indicator of the level of community's human capital. Study findings in Table 5 showed that the education levels of household heads who took part in the study were 30.8% with no formal schooling, 41.7% had acquired primary school education, 26.7% had acquired secondary school education while few (0.8%) of the household heads had acquired tertiary education. The revealed high number of people who had no formal schooling (30.8%) was due to the fact that the number included people with adult education in the study area which entails members of population who had indigenous knowledge which equips them with basic life skills including environmental conservation and seasonal farming.

According to URT (2001, 2007) and TDHS (2010), poverty level strongly relates to the education levels of the head of households. This implies that the more the household head lacks access to basic education, the higher the possibility he or she becomes poor since education is very important for acquisition of relevant information on skills related to livelihood strategies likewise to engagement to conservation practices. Furthermore, the study findings concurs with what was reported by Kessy (1998) and Njana (2009) that higher level of education puts households in better understanding of existing livelihood challenges, better decision making ability to choose better alternative solutions to existing problems and undertake household livelihood strategies which are environmentally friendly. Also

Maro (1995) and Kamwenda (1999) argued in line with the study findings that the level of education is considered as an important factor at household level, because, the higher the literacy rate of the household head, the higher the probability the household head is able to make sensible decisions regarding household livelihoods in relation to the sustainable utilization of the available natural resources.

Contrary to what was posited by Lusambo (2009) that the higher the education level of the household head the more is the preference of charcoal to firewood as well as other efficient energy sources, the study findings revealed level of education as a contributing factor for people to establish their own tree farms which could sustainably provide firewood. The high literacy level of the household heads of more than 69.2% revealed from the study area (Table 5) was a sufficient precursor of high level of awareness in many aspects hence becoming an influential socio-economic character which can highly influence the community to sustainably adopt effective and sustainable environmental conservation initiatives including economic incentives in the study area. The revealed respondents' education level was envisaged to be a useful determinant of the level of understanding of the merits and demerits of adopting and utilizing economic incentives.

4.1.4 Marital status of the respondents

The study findings revealed 7.5% of the heads of the households in the study area were single, 87.5% were married, 3.3% were divorced and 1.7% was widowed as presented in the Table 5. The fact that the majority of respondents from the study area were married, the results support the African traditional setting that for the household

to exist there should be a couple of married individuals. This implies the presence of families with a good number of children and siblings in a particular community hence an indicator of the level of family workforce to support several economic activities.

4.1.5 Economic activities

The findings reveal that the household heads participated in answering survey questionnaires are mainly engaged in three economic activities namely crop farming, livestock keeping and formal employment. Following the results presented in the Table 5, the following subsections are discussions of the presented results.

4.1.5.1 Crop farming

The study revealed that 35% of the household heads participated in the study were crop farmers as presented in the Table 5. The average size of the farms owned by the respondents was found to be 3.8458 acres with minimum 1.50 acres and maximum of 8.00 acres respectively as presented in Table 6.

Table 6: Farm sizes of the respondents

Category	Size in acres
Maximum	8.00
Minimum	1.50
Average	3.8458

The majority of the households in the study villages were involved in farming maize, beans, sunflower, groundnuts and vegetables. The farming activity in the study area was found to be very subsistent since almost all famers in the study area were found

using hand hoes in their farming. This finding is in line with Kessy (1998); Njana (2009) and Giliba (2011), who found that the majority of farming activities in rural areas is subsistent. This implies high reliance and dependence to other economic activities to support their livelihoods.

4.1.5.2 Crop farming and livestock keeping

The study revealed majority of the households in the study area (64.2%) were involved in both crop farming and livestock keeping as presented in Table 5. These activities engage many people in the study area as they also apply in-house livestock feeding system. In-house livestock feeding system was reported to be practiced by using the residuals from the harvested crops from the owned farms to feed livestock. The in-house livestock feeding system reduces the encroachments to the forest reserves in the study area.

The study found that the number of livestock allowed to be kept in the particular households was 4 cows and 6 goats, the tendency which was instituted in the study area since the existence of HADO project in 1973[1]. The revealed findings from the study area are in line with Ogle *et al.* (1996) and Kangalawe (2003) who reported that the controlled forms of human activities in the then Kondoa Eroded Areas in 1979 had made significant contribution to the conservation initiatives. The prevailing controlled environment for all forms of human activities which has been laid by the

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[1] Hifadhi Ardhi Dodoma (HADO) is a soil conservation project which started in 1973 in several areas of Dodoma Region

HADO project provides sustainable conditions for sustainable environment conservation in the study area (Giliba *et al.* 2011).

4.1.5.3 Formal employment

The study found 0.8% of the total number of households in the study was engaged in the formal employment as presented in Table 5. The formal employed respondents were teachers and executive officers at wards and village levels. Despite of being formally employed the respondents were engaged in the subsistent farming and rearing of livestock for supporting their livelihood needs since they were done in the households premises.

The study findings on the prevailing main activities in the study area concurs with what was reported by Abdallah and Sauer (2007) that, farming employs over 80% of the rural households. The reported 0.8% of the households' heads who are engaged in the formal employment implies that farming is the dominant livelihoods activities for the majority of the community members in the study villages.

4.1.6 Household size

The size of the households ranged from 1 to 11 people in the study area. The average size of household was found to be 6 people per household as presented in the Table 7. The revealed average household size was more than the current national average household size of 4.8 according to the 2012 Tanzania National Census (URT, 2013). According to African family settings, large size of household members implies adequate size of its manpower which could be engaged in productive activities contributing to the household income.

Table 7: Household sizes in KRA

Category	Size in number of people
Minimum	1
Average	6
Maximum	11

The revealed study finding of 6 people per household implies the availability of the amount family labour required for household livelihood activities, although it is not usually the case as household numbers includes even children and dependants who are not involved in the income generating activities (IGAs). Lusambo (2009) asserted that the higher the household size the higher the consumption of charcoal and firewood in the particular household. The found high number of people per household among other things suggest high population growth rate and implies high utilization of forests resources in the study area. It has also an implication to the distribution and acquisition of social services and the burden of dependencies within the population found in the study area.

4.1.7 Distance from homestead to the forest reserve

The study revealed 3.6 km as the average distance from homesteads of the households in the study area to the forest reserve surrounding the study villages. The majority of the households were located to reside in a more than 1 km from the protected areas which is considered to be far from the protected areas hence implying low accessibility to the forest reserves in the area. These findings are in line with a

study in Miombo woodlands in Kenya by Oyugi *et al.* (2007) which suggests that the shorter the distance from homestead to the forest reserve the higher the rate of livelihood activities such as livestock keeping and charcoal extraction which significantly impact tree abundance and diversity in Miombo woodlands.

According to Oyugi *et al.* (2007), the shorter distance of less than one kilometre (<1 Km) may significantly influence and contribute to the high pressure of human activities to the forest resources. Also the study finding aligns to the study findings by Giliba *et al.* (2011) who argued that the distance from household forest is a significant factor for deforestation in the Uluguru Mountain forest in Tanzania since it easily attract and make people to destroy forests surrounding forest resources. The fact that the majority of the households in KRA were located in the average distance of 3.6 km from the forest reserve which is a long distance (> 1Km) according to Mtinje *et al.* (2007); Oyugi *et al.* (2007) and Giliba *et al.* (2011), the study result implies low prevalence of destruction activities in the forest reserve from the surrounding communities in the study villages.

4.1.8 Income levels of respondents

It was revealed from the study findings that the majority of the respondents (57.5%) in the study area have an income ranging between 180 000 and 500 000 TAS annually. The revealed income levels of the respondents in the study area shown in Table 8. The study further found that a small number of the respondents (2.5%) earn income above 1 500 000 TAS annually.

Table 8: Respondents' income levels (n=120)

Annual Income levels in (Tshs)	n	%
180 000 - 500 000	79	57.5
501 000 - 1 000 000	40	33.3
1 001 000 - 1 500 000	8	6.7
Above 1 500 000	3	2.5

The revealed low level of income among the communities sorrounding the study area implies a need of developing livelihood strategies to combat such vulnerability as some households engage themselves in unsustainable economic and livelihoods activities such as firewood collection, charcoal making and lumbering for the households to earn supplementary income to make their ends meet. The finding implies the existing livelihood needs being supported by the only nearby forest reserve resources hence implying a need for the better understanding of how to choose better alternative solutions and livelihood strategies which are environmentally friendly conservation initiatives including economic incentives in the study area.

This study finding is consistent to what was reported by Maro (1995), Kamwenda (1999) and Kessy (1998) who reported that low levels of income in rural areas makes households highly exploiting on the available natural resources to meet their livelihood needs. This findings is also apparent to what has been reported by Lusambo (2009) and Adhikari *et al.* (2003) that households with higher income prefer efficient sources of energy rather than charcoal and firewood. The revealed study

finding that the majority of the surrounding communities have low level of income suggests overdependence of the environmental unfriendly economic activities in the surrounding environmental resources in the KRA.

However, the income level of the particular household is relative to the location; the majority of higher income households are found in urban areas while majority of low income households are found in non-urban areas. In this study, the findings show that the majority of people in the study area are using firewood obtained from their tree farms. Furthermore the fact that the majority of IGAs such as tree nurseries and beekeeping provides income as they are practiced in small scale, they are useful to the surrounding communities' to be scaled out in the area to improve the livelihoods among the community in the study area.

4.2 The Available Socio-Economic Incentives in Kondoa Rehabilitated Areas

The first objective was to assess the available socio-economic incentives for improved environmental conservation and livelihoods in Kondoa Rehabilitated Areas. The study findings revealed various incentives available for biodiversity conservation and improved livelihoods in the study area. The fact that the socio-economic incentives under study meant specific inducement designed to influence local people to conserve biological diversity or to use its components in a sustainable basis, the study has shed light on three aspects, namely: awareness of socio-economic incentives in the study villages, available socio-economic incentives and practiced socio-economic incentives in the study area.

4.2.1 Awareness of socio-economic incentives in Kondoa Rehabilitated Areas

The study revealed that 90% of the study respondents were aware of the socio-economic incentives. The levels of awareness presented in the Figure 3 indicate that the high level (93.3%) of people aware of socio-economic incentives are found in Mafai and Ntomoko villages while 90% and 83.3% of respondents who are aware of socio-economic incentives are found in Kalamba-Chini and Kalamba-Juu respectively. The results further revealed that 16.7% of the respondents found in Kalamba-Juu village are not aware of socio-economic incentives due to the fact that the village is located far from the Ikome forest reserve.
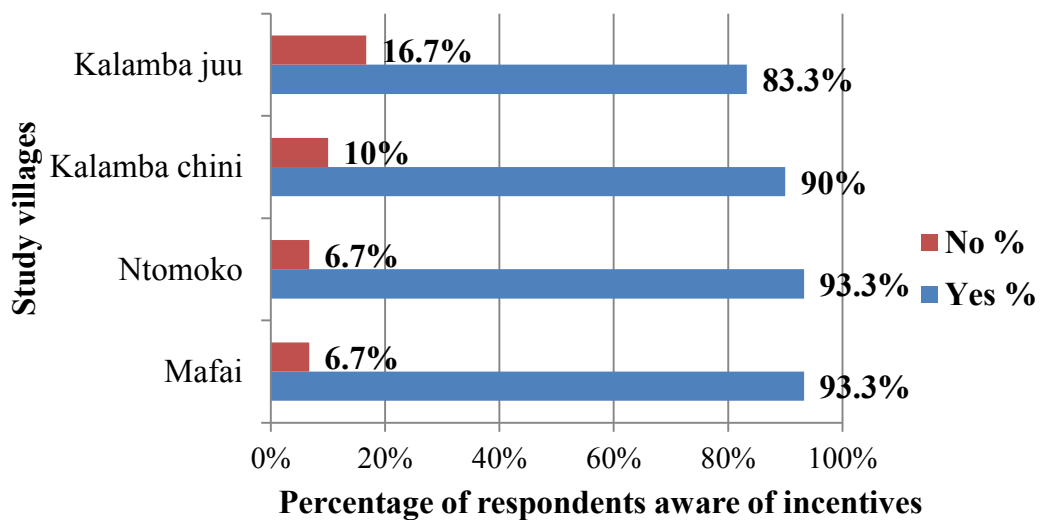
Figure 3: Respondents aware of economic incentives

The higher level of awareness found in Mafai and Ntomoko villages were highly influenced by the presence of the forests reserve in the nearby Mafai village and water sources in the Ntomoko village.

4.2.2 Available socio-economic incentives in Kondoa Rehabilitated Areas

Socio-economic incentives practices have taken place in the area in form of creation and adoption of new technologies which were needed to systemically change consumption and production patterns, and might entail significant price corrections; encourage the preservation of natural endowments; reduce inequality; and strengthen economic governance of the communities in the area hence sustainable conservation. The study revealed five main socio-economic incentives available in all of the four study villages in Kondoa Rehabilitated Areas. The reported prevailing socio-economic incentives are provision of tree seedlings, fertilizer, improved seeds, beekeeping inputs and education programs. The number of respondents who were aware on the given socio-economic incentives are presented in the figure 4.
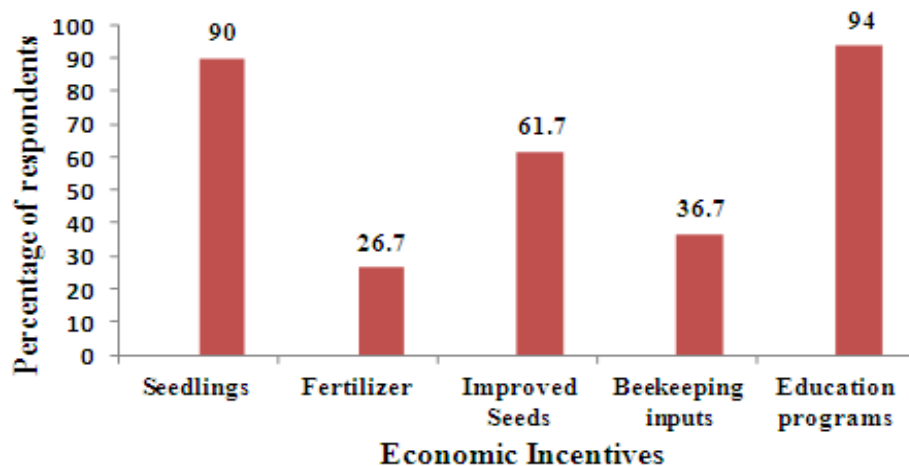
Figure 4: Available economic incentives in the study area.

The existence of the HADO project in the study area since 1973 has provided a base for the existence of environment conservation initiatives including socio-economic incentives in the area. This has helped in reducing the rate of encroachment in forest

reserves and other protected areas hence attaining sustainable environment conservation in the study area.

4.2.2.1 Tree seedlings

Tree seedlings serve as an important component in tree planting. The study found the supply of tree seedling to the communities as the main incentive towards encouraging them to participate in tree planting and hence biodiversity conservation in the study area. The fact that tree planting serves a number of ecological and service functions in the ecosystem, it has been reported by 90 percent of the respondents in the study area as presented in Figure 4. The supply of free tree seedlings influence respondents to plant or retain trees since rural communities have little financial and material resources for preparing their own tree nurseries.

The study findings concur with findings by Lalika (2006), who reported that there was a positive correlation between supply of free tree seedlings and the number of planted trees. It was also further posited that, despite the significance of tree seedlings towards environmental conservation, the too little resource available to afford the costs of tree nursery inputs (such as tree seeds, polythene tubes and watering canes) constrains the initiative as it is directed to cover subsistence needs in majority of rural areas.

Furthermore, the findings are similar to the findings reported by Kiwale (2002) and Butuyuyu (2003) who found that tangible incentives in form of free tree seedlings significantly influenced the number of planted trees in Magu and Same districts respectively. The respondents in the study area reported that tree seedlings increase

the willingness of people to plant more trees if they are supplied free of charge. The supplies of free tree seedlings in the study area was found to influence many farmers and other community members to plant trees in their farms and reduce reliance on natural forest products. It was also found to earn income from selling the tree seedlings for the few individuals who had private tree nurseries as one seedling was worth up to 1000 TAS depending on the age, size and height.

Plate 3: Private owned tree nursery in Kalamba-Chini village (Photo by Research team member)

4.2.2.2 Fertilizer

The study found that the supply of fertilizer to the communities in the study area could serve as an incentive since the community is composed of more than 99% people who are engaged in farming related economic activities as presented in Table 5. It was found that 26.7% of the respondent from all of the study villages prefer fertilizer as it is useful in improving their crop yield and hence income. This study finding is concurring to Giliba *et al.* (2011) that the inadequate land for producing sufficient food to feed a mean household size of 6 individuals requires technology for improving the land productivity. Besides, it was observed that the use of fertilizer results to good harvests and hence being one of the plausible reasons for encouraging the small sizes of cultivated land and meeting the rapidly growing population needs in the study area.

4.2.2.3 Improved seeds

Improved seeds were found as a useful economic incentive by 61.7% of the respondents in the study area. The fact that 99% of all people are engaged in farming related economic activities, improved seeds could be useful in improving farming yield and hence raising productivity and income. The study finding are similar to that by Lalika (2006) and Giliba *et al.* (2011), who reported that that improving farming technologies for farmers essentially makes them not relying too much to the expanding farming lands to the forest reserve. The study finding suggests that supplying improved seeds to the communities can serve as an incentive. Since the improved seeds increase yields from the same farm sizes, the communities continue

cultivating the existing land sizes without expanding them to the forest reserves. The adoption of the improved seeds can work as one of technological interventions towards improved farming productivity in the study area hence resulting to the improved livelihoods and environmental conservation initiatives.

4.2.2.4 Beekeeping inputs

The study findings revealed beekeeping inputs as a useful economic incentive as 36.7% of the respondents involved in the household questionnaire survey mentioned it to be useful in their areas. Honey collection was one of the economic activities undertaken in some of the areas in the study villages. Beekeeping and honey hunting were practiced in most of Mafai and Ntomoko areas as they have a long history of traditional beekeeping and honey hunting practice. Beekeeping and honey hunting was found useful in both conservation and improving livelihoods in the study area as they were done in the general land forests, protected areas, farmlands and woodlands.

The study finding concurs with the Kowero and Okting'ati (1990), and Fischer (1993) findings that beekeeping and honey collection activities in the forest reserve are friendly activities which encourage regeneration of plant species as they also protect forest from degradation in the same time. However, honey collection was not an important income generating activity in the study area, as local people are not mainly practicing beekeeping but if well promoted and modernized beekeeping inputs can work positively towards improving conservation practices and income generation for the livelihoods for the communities surrounding the forest reserve.

Plate 1: Traditional beekeeping practices in Mafai village (Photo by Avit Chami)

4.2.2.5 Educational and training programs

Education and training programs were found to be useful socio-economic incentive towards making people engage in environmental conservation practices. The study findings revealed 94% of respondents mentioning it as useful socio-economic incentive as presented in Figure 4. According to Benabou and Tirole (2003), education and training programs are non-monetary incentives that may include study tours and short courses. Like monetary incentives, the purpose of non-monetary incentives is to encourage individuals, communities or organizations to carry out conservation activities sustainably. Sometimes non-monetary incentives are given as reward to individuals, communities and organizations for excellent job performance. Education and training programs is provided to raise level of awareness and build up their capacity to be able to undertake conservation practices sustainably.

These findings agree with observation by Bakengesa (2001) and Ndomba (2004) studies which indicated the need of education programs in influencing level of

awareness of the community to be able to adopt newly introduced interventions. This was vividly found in many aspects relating to economic incentives that tree seedlings and nursery management, use of improved seeds and fertilizers require a certain level of understanding to be workable for the community to conserve sustainably.

Furthermore, Giliba *et al.* (2011) findings were similar to the study findings, that regular education and training programs widen awareness on management of the forest reserve among the actors and the community itself. Awareness on reserve boundaries and the economic activity required to be carried becomes a potential socio-economic incentive for impacting the quality of the forest.

4.2.3 Adoption of socio-economic incentives in KRA

The study results showed 91% of the respondents involved in the household questionnaire survey conducted in the study area engage themselves in practicing socio-economic incentives. The reported socio-economic incentives available in the study area were tree seedlings, improved seeds, fertilizer, beekeeping inputs and education programs. On the other hand 9% of the respondents admitted not to engage themselves in practicing any of the revealed socio-economic incentives as presented in Table 9.

Table 9: Respondents adopted economic incentives (n=120)

Category	n	%
Adopted	109	91
Not Adopted	11	9

The prevailing level of adoption of socio-economic incentives in study area suggests best practice to activities geared towards sustainable environment conservation in the study area. This study finding is contrary to what was reported by Lalika (2006), who reported low adoption of socio-economic incentives practiced by majority of people in the household level among the communities in the general lands of Uluguru Mountains.

The revealed status of the high level of adoption of socio-economic incentives (91%) in KRA is rooted from the then HADO project since 1973 which instituted economic incentives in the study area and successfully motivated the local community to effectively participate and design proper measures of eliminating economic disincentives. Due to the existence of the HADO project in the study area since 1973, there have been an encouraging number of community members who practice the introduced socio-economic incentives in the KRA.

4.2.3.1 Factors influencing the adoption of socio-economic incentives in KRA

Towards establishing the likelihood factors that influenced the socio-economic incentives in KRA, the factors were entered sequentially in the logistic regression model, checked and the insignificant factors were removed from the prediction model. The logistic regression model was employed to assess the significant factors influencing the adoption of socio-economic incentives in the study area as presented in the Table 10.

Table 10: Variables used in the Logistic Regression

Variable	Description
Y	Adoption of incentives (0 = Not adopted, 1 = Adopted)
X_1	Years of residence
X_2	Household size
X_3	Education level
X_4	Distance from forest
X_5	Annual income
X_6	Land size owned
X_7	Awareness of socio-economic incentives

The results of the logistic regression indicate that the goodness of fit of the model was found to fit well with the findings of this study (88.8%). A chi-square value of 67.88 with a degree of freedom of 7 was highly significant at 5% probability level (P<0.001), meaning that the dependent variable was affected by the independent variables (socio-economic factors) as followed by the results in the Table 11.

Table 12: Analysis of factors influencing the adoption of incentives in KRA

Variables	B	S.E.	Wald	Sig.	Exp(B)
X_1	.026	.052	6.251	.051	1.027
X_2	-.048	.201	2.057	.061	.953
X_3	-.754	.692	3.186	.037[*]	.471
X_4	-.387	.271	2.045	.065	.679
X_5	.000	.000	5.415	.051	1.000
X_6	-1.073	.442	5.875	.029[*]	.342
X_7	4.180	1.053	12.747	.008[**]	65.374
Constant	-1.660	3.258	1.260	.061	.190

*Statistically significant at α = 0.05; ** Statistically significant at α = 0.01*

The Binary Logistic Regression model with seven predictors namely years the respondent has lived in the village, household size, education level, distance from

forest, annual income, land size owned, awareness of socio-economic incentives respectively revealed only three variables to be statistically significant towards influencing the adoption of economic incentives in the study area. It was observed from the results that education level, land size owned, awareness of socio-economic incentives of respondent were statistically significant towards influencing the adoption of economic incentives in the study area.

According to Norusis (1990) and Powers and Xie (2000) as cited by Lusambo (2009), the non-zero Wald statistic values indicate the presence of relationships between the dependent and explanatory variables. Thus, the results of Table 11 show that Wald statistics are non-zero values, which implies that there is high interaction between the dependent and independent variables in the model. The adoption of specific socio-economic incentive lay on various factors.

For the socio-economic incentives revealed in the study area as highlighted in the previous sections to be successfully adopted and effectively practiced in an attempt of controlling biodiversity degradation in KRA, the factors were sorted through the help of logistic regression model. The identified factors were mainly of socio-economic nature and they were chosen based on their usefulness towards influencing people's economic behaviour and promote biodiversity conservation. The fact that socio-economic incentives for biodiversity conservation can take various forms (Lalika, 2006), the proposed circumstances which are likely to be most effective or appropriate in a given situation depends on a wide range of factors, including social and political determinants as well as socio-economic characteristics.

However, McNeely (1993) and argued that socio-economic incentives for biodiversity conservation must be chosen carefully so as to respond to the specific circumstances of different groups and economic activities at the same time as they address the causes of biodiversity loss. In response to the socio-economic characteristics prevailing in the community in the study area, in relation to specific circumstances of different groups and economic activities, seven socio-economic factors were hypothesized to influence the adoption of economic incentives in the study area as presented in Table 11.

Furthermore CIFOR (2001) and ABARE (2001) assert the wide range of aspects in which incentives could equip, influence and induce communities with natural resource management attitudes and spirits. The aspects entail the expected costs and benefits, the expected effectiveness of the instrument in achieving the defined targets. These conditions can not satisfy the environment for socio-economic incentives to effectively influence the behaviours of indigenous communities to start conserving satsfactorily. The role of socio-economic factors could be useful in making them comply to the characteristcs of the particular community. The adoption of the incentive schemes ensures the future availability of environmental resources improved livelihoods among the surrounding communities (Baker, 1989).

4.2.3.1.1 Awareness of economic incentives of respondent

The results indicate awareness of economic incentives as an important factor towards influencing the adoption of economic incentives in the study area. It was found that

high level of awareness of economic incentives among respondent in the study area is statically significant at 5% level (P=0.008) in influencing the adoption of economic incentives in the study area. The awareness can be built by conducting education programs to make the community aware on how to practice the revealed economic incentives. These findings imply that the high level of education programs and awareness creation programs in the area can result to the high level of adoption of economic incentives in KRA.

4.2.3.1.2 Land size owned by the respondent

Land size owned by the respondent was also found to be statistically significant at 5% level (P=0.029) hence being an important factor influencing the adopting of socio-economic incentives in KRA. Since land was the resource which holds the majority of economic activities including the operation of the livelihood activities in the area, it was found to significantly influence the majority of people in the area to adopt socio-economic incentives.

4.2.3.1.3 Respondent's education level

The binary logistic regression results revealed education level as one of the factors which influences the adoption of socio-economic incentives in the study area significantly. It was observed to be statistically significant at 5% level (P=0.037) hence found to significantly influence the awareness of the majority of people in the area to adopt economic incentives. In line with the other revealed potential factors, education level of the people play many roles towards attaining the adoption of any intervention such that they will understand what to do and what not to do, likewise in influencing the adopting of socio-economic incentives in KRA.

4.3 Roles of Socio-economic Incentives in Improving Environmental Conservation

The second objective was to assess the roles of socio-economic incentives for improved environmental conservation in Kondoa Rehabilitated Areas. Towards revealing the roles of socio-economic incentives towards environmental conservation awareness, binary logistic regression model was employed. The socio-economic incentives revealed in the study area were entered sequentially in the binary logistic regression model, checked and the insignificant factors were removed from the prediction model as presented in the Table 12. The model was purposely employed to assess the significant socio-economic factors influencing the adoption of socio-economic incentives in the study area.

From the previous sections, it was postulated that the five main socio-economic incentives were available in all of the four study villages. The adoption of the socio-economic incentives namely tree seedlings, fertilizer, improved seeds, beekeeping inputs and education programs was high due to the existence of the HADO project in area. The study further revealed the incentives being practiced by the study respondents in the area in an average time of 16 years. The successfully adoption of specific economic incentive had various roles on environmental conservation hence serving as a potential attempt towards controlled biodiversity degradation in the study area.

Table 13: Variables used in the Logistic Regression

Variable	Description
Y	Conservation awareness (0 = Not aware, 1 = Aware)
X_1	Tree seedlings
X_2	Fertilizer
X_3	Improved seeds
X_4	Beekeeping inputs
X_5	Education programs

The goodness of fit of the model was found to fit well with the findings of this study (88.8%). A chi-square value of 67.88 with a degree of freedom of 7 was highly significant at 5% probability level (P<0.001), meaning that the dependent variable was affected by the independent variables (socio-economic factors) (Table 13).

Table 14: Roles of economic incentives in environmental awareness in KRA

Variables	B	S.E.	Wald	Sig.	Exp(B)
X_1	4.238	1.422	8.878	.003[**]	.392
X_2	15.364	6519.279	.000	.098	45.62
X_3	1.640	1.381	1.410	.235	5.156
X_4	-3.091	1.791	2.979	.084	.045
X_5	-.861	1.602	6.289	.041[*]	.423
Constant	-36.372	13038.559	.000	.998	.000

*Statistically significant at $\alpha = 0.05$; ** Statistically significant at $\alpha = 0.01$*

From the variables employed in the binary logistic regression model namely tree seedlings, fertilizer, improved seeds, beekeeping inputs and education programs, the binary logistic regression analysis revealed only two significant economic incentives namely tree seedlings and education programs. Similarly to Powers and Xie (2000) argument as cited by Lusambo (2009) argued that the non-zero Wald statistic values indicate the presence of relationships between the dependent and explanatory

variables, hence the binary logistic regression analysis employed in the study found tree seedlings and education programs being statistically significant towards influencing the awareness of environment conservation in the study area.

4.3.1.1 Tree seedlings

Basing on the results presented in the Table 13, provision of tree seedlings has shown to have high influence towards enhancing environmental conservation awareness in the study area. The adoption of tree seedlings as an economic incentive was reported to be high in the area as it was observed from the presented binary logistic regression results in Table 13. This has made people in the area to closely link them with environmental conservation initiatives in the study area. The fact that tree seedlings were found statistically significant at 5% level (P<0.05) towards influencing the awareness of environmental conservation initiatives among the communities surrounding KRA, it has been an adoptable intervention in KRA since the inception of HADO project in the area.

4.3.1.2 Education programs

The study findings revealed environmental education and training programs to be useful in influencing environmental conservation in the areas. It was showed to be statistically significant at 5% level (P<0.05). This study finding is in line with Ndomba (2004) assertion that education and training programs are useful towards equipping people with skills and know-how of adopting any newly introduced interventions. The fact that most interventions involve laws and regulations designed to benefit individuals and communities involved in conservation projects,

environmental education and training programs set in place general enabling
conditions that will make them change their economic behaviours. It is also consistent
to FAO (1987) and Emerton (1998) assertions that environmental education and
training programs stand as indirect incentives which are also the mechanisms that are
targeted to specific objectives and encourage people to conserve biodiversity by
providing fiscal, economic and social rewards for their changed behaviour.

4.3.2 Roles of economic incentives on environmental conservation

As stated in earlier sections, the existence of the HADO in the study area since 1973
has provided a base for the existence of environment conservation initiatives
including socio-economic incentives in the area. The revealed roles played by socio-
economic incentives are presented in Table 13. This has highly helped in reducing the
rate of encroachment in forest reserves and other protected areas hence attaining
sustainable environment conservation in the study area. Economic incentives have
taken place in the area in form of creation and adoption of new technologies which
were needed to systemically change consumption and production patterns, and might
entail, inter alia, significant price corrections; encourage the preservation of natural
endowments; reduce inequality; and strengthen economic governance of the
communities in the area hence sustainable conservation.

Table 15:The roles of the revealed economic incentives

Role	Economic Incentives Perceived Roles in %				
	TS	IS	FERT	BI	EDU
Afforestation	61.4	-	-	11.3	4.7
Reduce drought	17.3	-	-	-	-
Supportive source of energy	11.0	-	-	-	-
Improve yield	-	71.7	38.3	9.7	-
Increase income	5.3	10.9	-	61.7	4.3
Improve food security	-	17.4	61.7	-	-
Control human activities	6.0	-	-	21.3	9.2
Increase awareness	-	-	-	21.3	81.8

TS = *Tree seedlings;*   *IS*= *Improved seeds;*   *FERT*= *Fertilizer;*

BI= *Beekeeping inputs;*   *EDU*= *Education and training programs*

Provision of socio-economic incentives to the local communities residing adjacent to forest reserves is a strategy for enhancing biodiversity conservation. The organizations provide socio-economic incentives as motivations for effective local community involvement in conservation activities outside forest reserves. The basic aim of setting in place socio-economic incentives for biodiversity conservation is to influence people's behavior by making it more desirable for them to conserve, rather than degrade or deplete biodiversity in the course of their economic activities (Emerton, 1998; 1999).

However, the revealed socio-economic incentives contribute to the restoration of forest loss and fragmentation and consequently leading to sustainable conservation of the biodiversity they play the following roles: Afforestation, Reduce drought, Supportive source of energy, Improve yield, Increase income, Improve food security,

Control human activities, Increase awareness as their perception responses are presented in Table 14.

The study findings align the Lalika (2006) findings on the application of socio-economic incentives in reducing the problem of biodiversity loss in Uluguru Mountains Forest Reserves, such that more or less the same roles revealed by this study were significantly played by the socio-economic incentives in the Uluguru Mountain Biodiversity Conservation Project (UMBCP) under Wildlife Conservation Society of Tanzania (WCST), Uluguru Mountain Agriculture Development Project (UMADEP) and the Morogoro Regional Catchment Forest Office towards carrying out biodiversity conservation activities in Uluguru Mountains. The existence of HADO project in the study area imposed the same towards realizing the usefulness of the socio-economic incentives.

4.4 Roles of Economic Incentives to the KRA Communities' Livelihoods

The third objective was to assess the roles of socio-economic incentives for improved livelihoods of Kondoa Rehabilitated Areas surrounding communities. Two aspects were viewed from the view of the significant socio-economic factors influencing the adoption of economic incentives in the study area. The third objective examined the contribution of economic incentives on the livelihoods of the KRA surrounding communities and the local community perceptions on the contribution of available economic incentives to livelihoods in KRA and the factors that influence perceptions was important for designing environmental conservation management.

4.4.1 Contribution of economic incentives to the livelihoods

The study findings revealed the contribution of economic incentives to the livelihoods of the KRA surrounding communities to be high. The fact that livelihood aspects are mostly applied at the household level, the revealed variations in wellbeing and access at an individual or intra-household level was highly depending on the practicing socio-economic incentives.

The revealed socio-economic incentives in the study area were directly related to various components of a livelihood, of which the most complex is the portfolio of income and assets out of which people construct their living including annual income the households head earns, tangible assets such as stores, resources as well as intangible assets such as claims. The study revealed 61% of the total annual income of the heads of households in KRA being accrued from practicing economic incentives. This imply high level of contribution the practiced socio-economic incentives have in improving household livelihoods as presented in Table 15.

Table 16: Contribution of socio-economic incentives to the income (n=120)

Category	% Income
Income earned from practiced incentives	61
Income earned from non- incentives	39

From the results presented in Table 15, it is reasonable to argue that income accrued from practicing activities related to economic incentives have sizeable contribution to total household income. Using income as a *proxy* of livelihoods it is arguable that the adoption of economic incentives is useful towards influencing household livelihoods.

The fact that income earned from practicing activities related to socio-economic incentives was reported to be high (61%) implies that the adoption of socio-economic incentives is quite useful towards improving the livelihoods of the households in KRA. This study findings implies high usefulness of economic incentives among the expected outcomes of livelihood activities prevailing in the area. High prevalence of economic incentives practiced in the area provides opportunity in practice to restore general forest and the entire biodiversity resources.

4.4.1.1 Chi-square test

It was therefore reasonable to use chi-squared to further analyse the contribution of economic incentives to total household income. Prior to analysis, the quantified contributions (Table 15) were re-organised into Chi-squared frequency Table namely: (a) contribution of economic incentive to total household income—with expected frequency, f_e, of 50% and observed frequency, f_o, of 61%, (b) contribution of non-economic incentive to total household income —with expected frequency, f_e, of 50% and observed frequency, f_o, of 39%. Then, the chi-squared (χ^2) was computed:

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e} = \frac{(61-50)^2}{50} + \frac{(39-50)^2}{50} = 4.84$$

Therefore, χ^2 ($df = 1$, n = 120) is 4.84. The critical value of χ^2 at $\alpha = 0.05$ ($df = 1$) is 3.84. Thus, there is statistical evidence to support the argument that contribution of economic incentive to total household income is statistically significant at p < 0.05.

Following the study findings that 61% of the total annual income of the household heads is accrued from practicing socio-economic incentives related activities and the Chi-square results that that contribution of economic incentive to total household income is statistically significant at $p < 0.05$. It is arguable that the adoption of socio-economic incentives can positively influence conservation initiatives due to the fact that the livelihoods of the majority of rural communities depends on available natural resources which presume high reliance of natural resources particularly the resources from the forest hence severe environmental degradation (Lalika, 2006; Lusambo, 2009; Giliba *et al.,* 2011; Kajembe *et al.,* 2012). However this study finding is contrary to what was reported by Lalika (2006), who reported the adoption of socio-economic incentives practiced by majority of communities in the general lands of Uluguru Mountains are not significant in enhancing livelihoods at the household level.

In line with this study finding, Scoones (1998) postulates that livelihood strategies themselves must consist of combinations of activities which calls 'livelihood portfolios'. A portfolio may be highly specialized and concentrate on one or a few activities, or it may be quite diverse, so unraveling the factors behind a strategy combination is important. Moreover, different 'livelihood pathways' may be pursued over seasons and between years as well as over longer periods, such as between generations, and will depend on variations in options, the stage at which the household is in its domestic and indigenous cycle, or on more fundamental changes in local and external conditions. Livelihood strategies frequently vary between

individuals and households depending on differences in asset ownership, income levels, gender, age and social or political status (UNDP, 1997).

Furthermore the study results showed that education and training programs were significant incentive towards equipping communities with knowledge and skills to effectively transform the economic incentives in the area namely tree seedlings, improved seeds, fertilizer and beekeeping inputs into income. This was supported by Mwakalobo *et al.* (2011) and Kajembe *et al.* (2012), who reported that inadequate awareness hinders majority of wood fuel users from owning plantation forests and continue preferring wood fuel from miombo woodlands (natural forests). Also the study results are in line with Lusambo (2009) who reported that equipping people with adequate knowledge and skills will be able to innovate various production technologies which will make the substitute to unsustainable energy sources.

4.4.2 Community's Perceptions on Socio-Economic Incentives in KRA.

The study shed light on the community's perceptions on the roles of the available economic incentives towards improving livelihoods of KRA surrounding communities. The understanding of local community perceptions on the contribution of available economic incentives to livelihoods in KRA and the factors that influence perceptions was important for designing environmental conservation management policies that are sensitive to the needs of the particular community.

The study results showed three main perceived roles which resulted from practicing the economic incentives. The roles were perceived to be very useful in both influencing community to participate in environmental conservation practices and

improving the livelihoods of the communities. The investigated perceived useful roles on the available economic incentives were namely; discouraging destruction of environmental resources, motivating people to engage themselves in environmental conservation and lastly they result to earning income and hence improving their livelihood as presented in Table 16.

Table 17: Perceived roles of socio-economic incentives (n=120)

Roles	% Responses
Discourages environmental destruction	21
Motivate people to conserve	39
Earning income	40

The study findings posit that the perceptions of the roles played by the available economic incentives towards improving both conservation initiatives and livelihoods of the communities are of significant role towards influencing the adoption of the said economic incentives. The influence of socio-economic incentives to the environmental conservation approaches was investigated during the undertaking of this study in KRA and supported by examining the perception of the economic incentives roles by the community members themselves. The study revealed 40% of the study respondents perceived socio-economic incentives as a means of earning income at the same time enhancing conservation practices, while 39% perceived economic incentives as a means of motivating people to conserve and 21% perceived economic incentives as a means of discouraging destruction of environmental resources in the study area.

The essence of understanding local community perceptions on the available socio-economic incentives as one of the prevailing environmental conservation approaches rooted from Guthiga (2008), who emphasized on the need of integrating the views and needs of local communities in conservation processes and mostly towards any introduced or existed intervention.
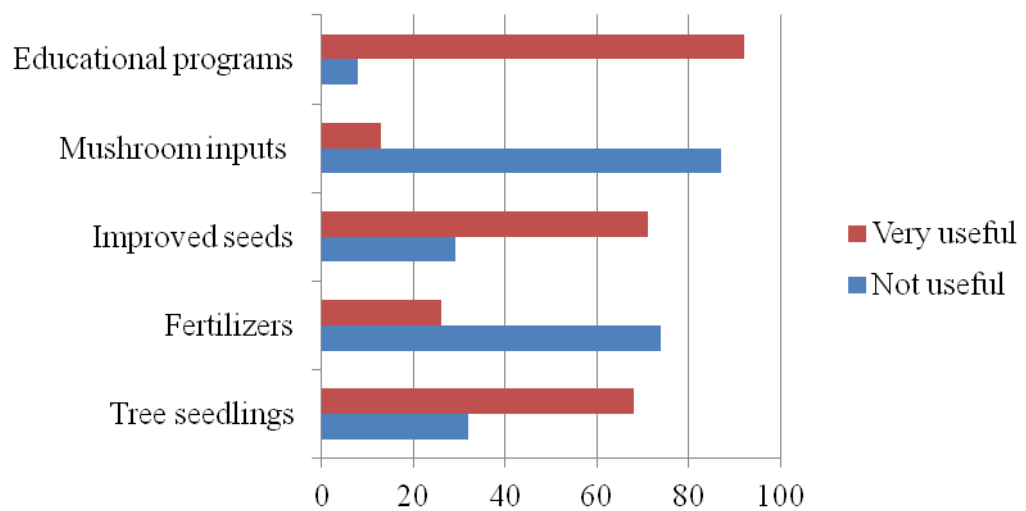
Figure 5: Community's Perceptions on the useful Socio-Economic Incentives.

The study further solicited community opinions on useful socio-economic incentives influencing communities to participate in environmental conservation and improving communities' livelihoods in the KRA as presented in figure 4. Of all the incentives revealed, the useful economic incentives were identified: tree seedlings, improved seeds, education and training programs. Tree seedlings were perceived by 71%, improved seeds by 78% and education and training programs were perceived by 96% respondents as the most useful incentives in influencing communities to participate in environmental conservation and improving communities' livelihoods.

4.5 Contribution of the study findings to the body of knowledge

The less known most potential and useful socio-economic incentives for effectively and sustainably improving environmental conservation and livelihoods of the communities surrounding the rehabilitated rural areas was a rationale of pursuing this study. The study revealed the most potential and useful socio-economic incentives for effectively and sustainably improving environmental conservation, resources management and livelihoods of the rehabilitated protected rural areas of Kondoa.

The study findings revealed provision of tree seedlings, fertilizer, improved seeds, beekeeping inputs and education programs as main socio-economic incentives available in the KRA while tree seedlings (P=0.003) and education programs (P=0.041) were found statistically significant improving awareness of environment conservation and communities' livelihoods. The study findings posit the provision education and training programs being the most useful socio-economic incentive since it enlighten the respondents to be able to turn the available socio-incentives into useful livelihood needs and serve the as a livelihood strategy. Socio-economic incentives practiced in the KRA were found highly useful in serving as a livelihood strategy due to the fact that the study findings revealed 61% of the total annul income earned by the households heads in KRA was accrued from practicing socio-economic incentives.

The fact that supply of the reveled socio-economic incentives serves a significant role in improving conservation practices and livelihoods of the KRA surrounding communities, the findings are useful inputs to the actors spearheading environmental conservation initiatives in the Kondoa Rehabilitated Areas and areas of similar

characteristics. These includea actors from Natural Resources and Environment Departments and programs dealing with environmental conservation in the course of implementing most sustainable conservation initiatives. Hence the study findings will serve as useful and appropriate inputs for conservationists, environmentalists and policy makers in designing effective environmental conservation measures.

CHAPTER FIVE

5.0   CONCLUSIONS AND RECOMMENDATIONS

5.1   Conclusions

This research was an attempt to reveal potential socio-economic incentives to sustainably improve environmental conservation initiatives and the livelihoods of the communities surrounding Kondoa Rehabilitated Areas (KRA). The findings indicated that 95% of the households in the study area were aware of the available five socioeconomic incentives namely tree seedlings, fertilizer, improved seeds, beekeeping inputs and education programs. Also the study revealed 91% of respondents practice the revealed socio-economic incentives while tree seedling and education programs were reported to be statistically significant in influencing the awareness of environmental conservation in the area. It was also found that education level, land size owned, awareness of socio-economic incentives were statistically significant towards influencing the adoption of economic incentives in the study area.

The study findings further revealed five main roles played by the reveled socio-economic incentives in the study area namely afforestation, control human activities, improve productivity, increase income and create awareness on environmental conservation. Chi-square test revealed that contribution of socio-economic incentive to total household income is statistically significant at $p < 0.05$. Socio-economic incentives were further concluded to contribute to 61% of the total annual income of household heads in KRA. The provision of beekeeping inputs, tree seedlings, education and training programs were concluded as potential and useful incentives

towards sustaining communities' livelihoods and environmental conservation initiatives in KRA.

5.3   Recommendations

Based on the study findings, the following recommendations have been put forward:-

i.   There is a need to deliberately conduct capacity building programs in the area to capacitate community members with an in-depth understanding of how to utilize the available socio-economic incentives for their livelihoods needs since the revealed socio-economic incentives are highly practiced in the area.

ii. The fact that supply of tree seedlings, education and training programs serve a potential role in the environmental conservation practices, it is hereby recommended that the actors spearheading environmental conservation initiatives in KRA including Department for Natural Resources and Environment of KDC and TFS to mainstream the use of tree seedlings, education and training programs in the course of implementing conservation initiatives.

iii. There is a need of highly integrating education and training programs in all conservation initiatives since it paves the way for the community to sustainably practice environmental conservation initiatives as they become equipped with skills and knowledge to effectively and efficiently undertake any intervention to be introduced.

iv. There is a need to highly integrate socio-economic incentives in the environmental conservation policies. The government is hereby recommended to mainstream their practical usefulness in the country's policy framework due to the fact that economic incentives play the dual roles: improving environmental conservation and communities' livelihoods.

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APPENDICES

Appendix 1: Questionnaire for Household Survey   Wealth Category: _____

PART I: DEMOGRAPHIC INFORMATION: Housing: _____

1. Ward: ……………........   Village: ……………………......

2. Sex   1 Male ☐   2 Female   ☐

3. Age of the head of household   ……………………………

    Years

4. How long have you lived in the village?

           ....Years

5. Marital status   ……………………….....

6. Total size of the household   ....…………….....

	<18years	*18-60years*	*60years>*
Male			
Female			
Total			

7. Level of education of the head of household   ....

8. What is your main occupation?   ....

9. What is your annual income?   ....

Household Members	*Monthly*	*Annual*	*Total*
Husband			
Wife			
Others			

Part Ii: Research Objectives:

A: Available Economic Incentives

10. How far is your homestead located from the Kondoa Closed Areas?
    ....Km

11. What products and services do you benefit from the closed areas before and after
    rehabilitation?

Products &Services	*Before rehabilitation*	*After rehabilitation*
Timber		
Firewood		
Poles		
Thatching materials		

Medicinal plants		
Mushrooms		
Indigenous fruits		
Honey		
Animal feed		
Others		

12. Are you aware of the environmental conservation initiatives in the rehabilitated Kondoa Closed Areas?   Yes ☐   No ☐

13. Are your household members aware of the environmental conservation initiatives in the rehabilitated Kondoa Closed Areas?   Yes ☐   ☐

14. If, yes, what are those initiatives?

....

....

15. Have you ever heard of economic incentives? Yes ☐   No ☐

16. Among the following economic incentives, which are available in your areas?

Economic incentives	Available	Not available
Tree seedlings		
Fertilizers		
Improved seeds		
Beekeeping inputs		
Mushroom inputs		
Educational programs		
Tree seedlings		

17. Can you mention other economic incentives which are available in your area?

....

18. Do you practice any of the mentioned incentives?   Yes ☐   No ☐

19. If yes, how long have you practiced them?   ....

B: ROLES OF ECONOMIC INCENTIVES

20. How much do you earn from practicing any economic incentives in place?..........Tshs.

21. Are the economic incentives in place useful in improving your livelihoods? Yes ☐

No

22. If yes, How? ...

....
....

23. How economic incentives in place encourage communities to participate in conservation activities?
....
....

24. What are the role(s) which economic incentives play towards sustainable conservation and management of the KCA? (*Please provide role(s) to each of the economic incentives respectively*)

Economic incentives	Role(s)
Tree seedlings	
Fertilizers	
Improved seeds	
Beekeeping inputs	
Mushroom inputs	
Educational programs	
Price supports (*Subsidies*)	
Land tenure	

C: COMMUNITIES' LIVELIHOOD IN KONDOA CLOSED AREAS

25. Do you own land?   Yes ☐   No   ☐

26. If yes in Qn 14, how many acres of land owned?..........................

27. Do you own livestock? Yes   ☐   No ☐

28. If yes in Qn 16, how do you feed your livestock?

29. What type and number of livestock owned?

Resource type	Quantity	Unit value (Tshs)	Total value (Tshs)	Ownership(1=husband 2=wife)
Livestock				
Cattle				
Sheep				

Goats				
Cow				
Donkeys				
Pigs				
Chicken				
Ducks				
Other (specify				
GRAND TOTAL				

30. Do you own other assets?   Yes ☐   No ☐

31. If yes what type and number of assets owned?

Assets	Quantity	Unit value (Tshs)	Total value (Tshs)	Ownership(1=husband 2=wife)
Tractor				
Ox-plough				
Radio				
Motor bike				
Phone				
Television set				
Hand-hoes				
Machetes				
Sickles				
Bicycle				
Solar panel				
Other (specify)				

D: PERCEPTIONS TOWARDS THE AVAILABLE ECONOMIC INCENTIVES

32. Are economic incentives useful towards influencing sustainable conservation and resource management in KCA?(*Please respond to following perception rankings respectively)*

Economic Incentive	Not useful	Useful	Very useful	Extremely useful
Tree seedlings				
Fertilizers				
Improved seeds				
Beekeeping inputs				
Mushroom inputs				
Educational programs				
Price supports (*Subsidies*)				
Land tenure				

33. Are economic incentives useful towards sustainably improving the community livelihoods in KCA? (*Please respond to following perception rankings respectively)*

Economic Incentive	Not useful	Useful	Very useful	Extremely useful
Tree seedlings				
Fertilizers				
Improved seeds				
Beekeeping inputs				
Mushroom inputs				
Educational programs				
Price supports (*Subsidies*)				
Land tenure				

34. What is usefulness of economic incentives towards influencing communities towards environmental management in the KCA?

……………………………………………………………………......……………

………………………………………………………………………..……

………………………………………………………………......………………

………………

Appendix 1: Checklist for Focus Group Discussion

(VEC, VNRC and Village elders, conservation committees)

a. What goods and services obtained from the KCA?

b. What are the economic activities available in the village level/KCA?

c. What are the major environmental problems prevailing in the area?

d. What environmental conservation initiatives taking place in the village level/KCA

e. Which one seems to be more effective than the other?

f. Which one is highly known and adopted by the community?

g. What do you understand by the term economic incentives?

h. What are the available economic incentives in your area?

i. Would you please mention the highly known and commonly adopted incentives in your area?

j. How do economic incentives contribute to the conservation initiatives KCA?

k. How do economic incentives contribute to the community livelihoods?

l. What are the usefulness/significances of the economic incentives in your area?

m. Among all economic incentives which are more useful and potential towards improving conservation initiatives and community livelihoods in your area?

n. What economic incentives would you prefer most towards enhancing conservation initiatives?

o. What economic incentives would you prefer most towards livelihoods activities?

Appendix 2: A checklist for Key informant interview

(VEO&KCA Officers)

1. Village population

2. Number of households

3. What goods and services obtained from the KCA?

4. What are the economic activities available in the village level/KCA?

5. What are the major environmental problems prevailing in the area?

6. What environmental conservation initiatives taking place in the village level/KCA

7. Which one seems to be more effective than the other?

8. Which one is highly known and adopted by the community?

9. What do you know about the economic incentives?

10. Would you please mention the highly known and commonly adopted incentives in your area?

11. How do economic incentives contribute to the conservation initiatives KCA?

12. How do economic incentives contribute to the community livelihoods?

13. What are the usefulness/significances of the economic incentives in your area?

14. Among all economic incentives which are more useful and potential towards improving conservation initiatives and community livelihoods in your area?