ASSESSMENT OFPOST-EVICTIONCHOICES ONLIVELIHOODDIVERSIFICATION STRATEGIES OF HOUSEHOLDS IN MAU FOREST, KENYA

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DECLARATION

This research work is my original effort and has not been presented for a degree at any other University.

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Dedication

With sincere appreciation, I dedicate this thesis to my family, my university supervisors, and friends for the unwavering support.

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ABSTRACT

Conservation of natural resources is vital to ensure that there is sustainable use. Natural resources are important in the contribution of the livelihoods of rural households. Globally eviction has been one of the conservation efforts. However, the conservation of natural resources has not been achieved sustainably due to the neglect effect it has on livelihoods. Thus the research focus was aimed at understanding how the effect of eviction with its levels of displacement influenced the alternative choice sets of livelihood strategies in Nakuru County, Njoro Division. Njoro division in Nakuru County is located in the Eastern Mau block which is one of the eight blocks of the Mau forest. The study also characterized the livelihood strategies of households and analyzed the household attribute determinants that influence the selection of a strategy. Using the Negative Binomial regression model, the study analyzed data collected from a sample of 364 households. The sampling technique used was the purposive sampling and random systematic technique whereas the sample determination was byuse of the Cochran formulae. The study found out that households were either evicted or non-evicted. Evicted households were categorized into 3 displacement levels: economically and physically displaced, physically displaced and economically displaced accounting for 86%, 3% and 11% respectively. Study findings showed that a household size; being a victim of eviction; physical displacement and both economical and physical displacement; wealth; income; distance to a primary school and distance to an input source were determinants that influenced a livelihood strategy.Results also indicated that households diversified both in off farm and on farm activities. The outcome of this study provides insights of how ongoing efforts to achieve double sustainability by balancing conservation with livelihoods in Kenya. There is need to ensure that eviction policies align with the determinants of householdlivelihood strategies. The study recommends: interventions targeting large households should enable them to diversify from natural resources dependence strategies to non-farm; substitution between assets and activities should be in place with a well-functioning market to allow for livelihood resilience; implementations aimed at facilitating widening of income options will enhance households diversifying to reduce potential risks; infrastructural constraints should be dealt with selectively through improvement of access; displacement policy should engage on resettlement, monetary compensation and recovery. Conservation should prevent economic destitution of victims.

Key words: Eviction, levels of eviction, households and diversification

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LIST OF ABBREVIATIONS AND ACRONYMS

MDG	Millennium Development Goals
MNL	Multinomial Logit
MFC	Mau Forest Complex
PRM	Poisson Regression Model
PA	Protected Area
SSA	Sub-Saharan Africa
NB	Negative Binomial
NWFP	Non Wood forest products
Km	Kilometers
UNEP	United Nations Environmental Programme
FAO	Food and Agriculture Organization
NGO	Non-Governmental Organization
KFS	Kenya Forest Service
TNP	Tarangire National Park
OLS	Ordinary Least Squares
RUM	Random utility theory
DFID	Department for international development
KNBS	Kenya National Bureau of Statistics
RQ	Research question
SPSS	Statistical Packages for social sciences
KHIS	Kenya Integrated Household Survey
ICS	Interim Coordinating Secretariat,

CHAPTER ONE:

INTRODUCTION

1.1   Background Information

The protest against the experience of displacement, impoverishment, injustice, disempowerment and marginalization by protected areas has become one of the defining features of the politics of protected areas in the last two decades(Brockington et al., 2006). To understand the process of natural resource conservation from a household level perspective, studies on sub community processes such as social differentiation; growing poverty and a diversity of livelihood strategies are used to provide sufficient generalized community-level interpretations (Torben et al., 2001). The success stories that are written often focus on the outcome of success, while less attention is paid to the stories of: loss, marginalization, and poverty in the process. Despite the politics the concerns on protected areas the pressure escalating on natural resources as a result of human population growth, poverty and limited options for survival is also overriding (Cleaver et al., 1994). Cleaver et al., (1994) further states that households that are heavily dependent on natural resources as their main source of livelihood tend to be vulnerable. Thus this results in a "vicious circle" in which the rural poor are both agents and victims of resource degradation.These issues arise about the question as to whetherthe conflict between biodiversity conservation and poverty reduction, which frequently arises in park creation can be solved.

Forests in Sub-Saharan Africa provide for a number of ecosystem services which include: timber; non timber products (wild foods, medicines, pharmaceuticals, genetic resources); regulating services such as flood and climate regulation; cultural services such as spiritual and aesthetic; recreational and supporting services which include primary production, nutrient cycling and soil formation (International Assessment of Agricultural Knowledge, Science and Technology for Development IAASTD, 2009). It is important to note that the African continent contributes close to 50% of forest losses (Food and Agriculture Organization of the United FAO, 2007).Brockington et al. (2006) argues thatforests can be deduced as centers of disturbance. Coleman (2011) argues that disturbances alter the flow of forest resources essential

for community livelihoods.Schama (1996) establishes that the material loss to livelihoods or dwellings and symbolic obliteration from their landscape includes their removal from history, memory and representation.Baird et al. (2013) explains disturbances occur due to the disruption of the established relationships between resources and resource-users through: introducing new constraints and opportunities, recruiting new resources, creating the space for new learning, new relationships and new feedbacks. Conservation efforts ignore the impact on livelihoods thus result in failure of sustainably to conserving the forest. It is also imperative that conservation policies should include household factors that determine household selection of a livelihood apart from conservation measures.

Laura et al. (2011) states that forestsconservation efforts in Kenya using forest law were heavily criticized for transferring forest management away from the local communities and failing to recognize traditional management regimes and criminalizing local communities' resource use.Anderson et al. (2011) in their research, state that anotherconservation effortthat was done was through evictions in the year 2001. Forests are examples of protected areas where conservation efforts have not been achieved sustainably and a multifaceted solution is needed urgently.This study focuses on the recent eviction in the period of 2011 steered by the former Prime ministers' office. Eviction is the disturbance focused on this study and a there is need to look on how it has affected livelihoods.There is need also for policies on conservation to align with livelihoods. Laura et al. (2011) found there is need to harmonize Kenya's array of land legislation by the National Land Commission and the Parliament. This process was initiated by developing the National Land Policy that was promulgated in 2009. The policy gap that exists is the need for the development of a legislative framework to secure individual or collective rights to access and use land and land-based resources, and to handle land restitution.According to Netting (1993) local change and diversity and indigenous knowledge are increasingly emphasized with regard to conservation at the community level.Ellis (2000) and Chambers (1997) recognized that rural households diversify their livelihood strategies as a way to reduce their vulnerability and increase income. Further, Ellis (1998) and Barrett et al, (2001) found that rural households earn income from diverse allocations of their natural, physical and human capital assets among various income generating activities. Similarly Ellis (1998) notes that households may diversify as a strategy for coping with an unexpected shock or to minimize risk

by participating in activities that generate imperfectly correlated returns. Thus the understanding of linking the fate of livelihoods could assist in contributing to double sustainability of both biodiversity and livelihoods after eviction.

Success stories with restoration following rehabilitation of forests have been there for instance the Aberdare forest. Mau forest restoration is feasible though the political and social context make it complex. At the National level the government of Kenya has had wide guidelines with relation to Mau. A sessional paper on Environment and development set out a comprehensive guideline towards achieving sustainable development. The paper addresses mountain ecosystems and biodiversity. The vision 2030 environmental objective with a forest focus looked at various inputs such as forest cover, management of forest with combination of enhancing participation and ensuring forest cover makes contribution to poverty reduction.Interventions that have been done include the establishing of a task force in looking at multiple approach interventions focused on the rehabilitation process of Mau(Interim coordinating secretariat, 2009). Community forest association participation in forest management established through the forest Act 2005 has provided for important partnership with thelocals in Kenya.The National Environment Management Authority, Kenya (2013) states that the Interim coordinating secretariat has had several success which include: profiling of settlers in the Mau forest complex(MFC) this was to look on the validity of title deeds, supporting minority groups like the Ogiek by developing a council and a registry to facilitate in planning for their livelihood development and relocating of illegal settlers in 2009.

Vast research has been done on the Mauforest which includesassessing of the effective institutional framework for the management of forest (ESF consultants, 2009). Other research work include: the assessment on critical catchment areas (MoiUniversity, 2009) and biodiversity hotspots(National museum of Kenya,2009);the total economic valuation of the Maasai Mau, Transmara , Eastern Mau forest block (Andersom et al.,2011). There are several maps that have also been developed as a prerequisite for strategic management in addition to forest specific management plans examples include: soil errodability maps, rivers, contours, slopes, satellite images, aerial photographs,rainfall distribution and topographic maps (Interim coordinating secretariat,2009).The reason for focusing on the Mau forest is because of its vital

contribution to the economic, social and environment. Economically it supports key sectors such as energy, tourism and agriculture. The estimated potential hydropower generation in Mau complex ecosystem is approximately 535 Megawatts. In tourism the MFC is a source to Mara river that drains through the Maasai Mara national park. The environmental contribution include it being one of the major important water towers in Kenya and upper catchment of major rivers that feed partially Lakes such as: Victoria, Turkana, Naivasha and Nakuru. In addition the vital social and economic contribution of rural and urban water supply from springs, wells, boreholes, rivers that support rural livelihoods (Interim coordinating secretariat,2009).

The loss of the forest cover is as a result in various factors contributing in being an imminent threat which include:ill planned settlement, encroachment and illegal extraction. Out of the 416,542 hectares of protected forests 25% (107,000hectares) have been encroached (Interim coordinating secretariat, 2009). The effect on water resources both surface and underground has reduced following the degradation of the MFC.A marked reduction in River Sondu has irregular flow affecting the hydropower plant full capacity actualization. In addition perennial rivers like Lake Nakuru have become seasonal for instance in Njoro area, 13 out of 32 rivers have dried completely between 1996 and 2001(National Environment Management Authority, Kenya, 2013).Even with the excisions reversed and the deforested land reclaimed the high dependency on firewood and charcoal poses to be a major hurdle to deal with. The efforts to alleviate the pressure through eviction has been done but there gaps that arise on the livelihoods sustainability. The expense of organizing eviction process to protect forest cannot have its returns fully since households find their way back to the forest and this cycle of eviction and forest encroaching will go on and on. Household are in high poverty levels and their dependence on energy such as charcoal escalates the problem.The social infrastructure is a subset and factor that affects the livelihood of households and the formulation of Economic incentives is also important for assessment. Thus there is an urgency and need to save and reclaim the Mau forest.

1.2 Statement of the problem

The fate of local livelihood is an important issue to understand because it is linked to conservation measures in protected areas (PAs) around the world (Barrett et al., 2011). Cernea et al. (2006) and World Bank (2001) in their findings state that developing of an alternative course that pursues double sustainability to protect both the biodiversity and people's livelihoods is urgent. However, in Kenya conservation measures particularly of forests have been done frequently by an eviction process. This has been done despite the lack of an established eviction policy frameworkthus resulting insetbacks. Theresult of these setbacks include: conflicts with local communities; illegal encroachment; waste of public resources and degradation of the forest and water towers. Conservation policy measures need to contextualize the effect it has on the household livelihood opportunities and constraints.

Conservation policies need to be evaluated due to the failure where impoverished households have encroached the forest due to their limited livelihood options. Therefore the study seeks to fill the empirical knowledge gap onsustainable conservation considering the number of livelihoods affected by the effect of eviction and its levels of displacement and the factors that influence the choiceof a household alternative livelihood strategy.

1.3   Research Objectives

1.3.1   Overall Objectives

The main purpose of this study was to assess the determinants of livelihood diversification strategies of households and prospective strategies thatinfluencethe sustainableuse and sustainable conservation of the Mau forest.

1.3.2   Specific Objectives

i.   To characterize and describe the diversification strategies of households in Mau forest.

ii.   To assess the effect of eviction and its displacement level on households choiceof alternative livelihood strategies in Mau forest.

iii. To evaluate the influence ofhousehold specific and endowment characteristics on the alternative choice of diversification strategies in Mau forest.

1.3.3 Hypotheses

The following hypothesis will be tested:

1. Eviction and its level of displacement do not influence household choice of alternative livelihood diversification strategies.

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2. Household specific characteristics and endowment do not influence household choice of alternative livelihood strategies.

1.4 Justification of the Study

Maintaining natural systems that support agriculture, livelihood strategies, energy supplies and tourism is in line with vision 2030.Among other government complimentary strategies for achieving these goals are the following: promoting environmental conservation to help achieve the Millennium Development Goal (MDG) number 7. To achieve this, the country set a sessional paper number 6 of 1999 where the goal was to increase forest cover and ensure that forestry sector makes poverty reduction contribution.Other efforts set in the country are to harmonize environment related laws for better environmental planning and governance.

The study provides insights on how sustainable conservation can be achieved considering how household factors influence the number of livelihoods. It will also provide policy makers with insights on how the levels of eviction influence the alternative livelihood strategy. This will result in the understanding of how conservation policy interventions can be implemented to assist households in adapting their dependence away from forest resources. This is important in facilitating the promotion of reduced conflict due to the detriment of the forest resources by local communities. In addition the study will help policy makers to identify a sustainable conservation policy that takes into account on the livelihoods affected. Hence looking on how conservation policies do not contribute to poverty increment.

CHAPTER TWO:

LITERATURE REVIEW

2.1   Forest Cover in Kenya

Kenya's forest cover is 6% as per report done by FAO in 2010 on forest assessment report. Anderson et al. (2011) state in their work that forests are under increasing threat from irregular and ill planned-settlement, encroachments and illegal forest resource exploitation in Kenya. It is important to note that in Kenya most forested areas are under the management of the Kenya Forest service (KFS), which has made substantial steps towards addressing the degradation and deforestation threat to all major tower levels (Olang et al.; 2011).The five water towers in Kenya include Mau Forest Complex (MFC), AberdareRanges, Mt. Elgon, Cherangani Hills and Kakamega forest, which are critical water catchment areas. These are vital for tourism, hence policies involving the catchment areas facilitate achievement of the Kenya's vision 2030 (UNEP, 2009). The MFC is the largest closed canopy forest in Kenya with a covering estimated at400,000 ha making it one of the most critical water towers in the country (Olang et al.,2011).

According to a report by the Interim coordinating secretariat office of the Prime minister (2009) there are different categories of people in the Mau forest ranging from bona fide settlers to illegal squatters. The difference mainly is derived from the process through which they found their way in the Mau Forests Complex. Settlements in the Mau Forests Complex fall in the following five categories: Illegal squatters in protected forests with no documentation; settlements through the 2001 excisions of forest reserves; settlements on trust land beyond declared adjudication section boundaries, Settlements in gazetted forest reserve through land adjudication and ad hoc requests for land in protected forests. The main issues of Mau forest established by Andersonet al. (2011)comprise: lack of efficient investment in macro-economic policies which focus on the incentive to increase cash crop for export; thegrowing population and the shrinking productive agricultural land which has forced people to migrate from densely populated regions to less productive areas of the forest area; emergences of the value of products that were formerly unmarketable and poverty that have driven poor households into

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biomass energy sources, e.g. firewood and charcoal; poor implementation of existing laws and policies particularly in respect to providing incentives for communities to participate in conserving forests. The MFC is a key water catchment and is being deforested at an alarming rate due to charcoal production, logging, encroachment and settlements as an efficient sustainable solution is yet to be developed.

2.2 The scope of eviction and emerging issues

In line with Carina (2009), the level of evictions can be categorized as physically or economically displaced. It is important to consider both physical and economical displaced households which define the levels of eviction. The scale of economical eviction include: Loss of access to farming land ,loss of access to grazing land, loss of access to both farming and grazing land, loss of access to forest products and loss of access to non wood forest. Further Brockington et al. (2006) defines conservation displacement as a two folded process; the forced dislocation of local people from their homes and economic displacement, which implies the exclusion of people from certain areas they depend on in the pursuit of a livelihood.The study finds out that households living adjacent to natural protected resources areas experience reduced or loss of access to natural resources andloss of their economic activity.Brockington in their research work establishes that households who have their economic activity lost like those physically evicted from their home are entitled to receive the same assistance and entitlements as those being physically relocated. Carina establishes that local people are central in the eviction policy as they are the ones who actually have to carry out the change and who often carry the costs. Combining a rights-based approach with participation would encourage empowerment of local people to enable them to challenge existing power structures.

Castillo et al. (2000) explains that the International Covenant on Economic, Social and Cultural Rights, articles: 11, 1, 19, Dec. 19, 1966, provides that governments have the obligation to meet the requirements for adequate alternative housing and compensation for all those affected by forcible eviction regardless of whether they rent, own or occupy their homes on the land atissue. Castillo et al. further clarifies that International law further provides that, in case an eviction is inevitable, the process must include: an opportunity for genuine consultation with those affected, adequate and reasonable notice for all affected persons prior to the date of the eviction,

information on the proposed eviction should be made available in a reasonable time to those affected, government officials or their representatives should be present during an eviction procedure and the persons carrying out the eviction should be properly identified. Evictions should not take place particularlyin bad weather or at night, legal remedies should be available and legal aid should be available to those in need of seekingredress from the courts. In addition there should beprovision for fair compensation and resettlement.

Baird et al. (2013) in their research explains that eviction plays a role of disturbances or as a shock in shaping diversification strategies in the developing world. Baird states in his findings that the prospect of negative shocks caused by eviction can be alarming in areas where people live close to the subsistence level and a modest reduction in household income could be disastrous. Over time, this continual upheaval can cause households to seek toreduce variance in their own wealth and income and insulate themselves from future negative shocks by supplementing traditional economic activities with new less familiar activities that may serve to spread risk. Barrett et al. (2001) in his research work states that these activities comprise of: off-farm wage labor, migrant labor and remittances, and sharecropping. Miller et al. (2012) further establishes that social cost associated with biodiversity conservation have also had gaps on how protected areas (Pas) create opportunities and constraints for the locals, and how they adapt to the effects creating new conservation measures and development concerns.Andam et al. (2010) found out that currentstudies on poverty reduction near (PAs) however, lack convincing theories of change and have struggled to describe the mechanisms that underlie these phenomena.

There are many case studies of eviction apart from the Mau forest evictions in Kenya acknowledged by Anderson (2011). Other case studiesof evictioninclude: The documentation by Brockington (2002)provides much detail on the displacement and social impacts of people in Mkomazi National park in Tanzania. Neumann (1998) theoretically accounted richly of the displacement in Arusha National park. Feeney (1998) also documented the violent displacement of 35,000 people from Uganda Kibale Game corridor and forest reserve.Baird et al. (2013) explains of the upheaval and livelihood diversification in Tarangire National park in Northern Tanzania after displacement. Carina (2010) also explains the eviction process in Mount Elgon, Uganda.

2.3   Livelihood diversification

Livelihood refers to the access that individuals or households have to different types of capital (natural, physical, human, financial and social), opportunities and services (Ellis, 2000).A livelihood strategy encompasses not only activities that generate income but other kinds of choices, including cultural and social choices, that added together make up the primary occupation of a household (Ellis 1998).Ellis further explains that a livelihood strategy can be defined as a portfolio of activities and choices that people make to achieve their livelihood goals, including productive activities, investment strategies, reproductive choices, etc. Ashley (2000) argues that livelihood strategies in rural areas are typically a mix of natural resource use, employment and remittances. Barrett et al. (2001) establishes that livelihoods strategies cannot be identified by a single activity variable on2ly but as the diverse mix of assets available to individual households facilitate for a wide range of different asset allocation choices. For example, two households endowed with equal areas of land might choose to use that land differently depending on other factors such as human and financial capital at their disposition.

Ellis (2000) confirms that the diversification of rural livelihoods has important implications on rural poverty households. Livelihood diversification is defined as the process by which rural families construct a diverse portfolio of activities and social support capabilities in their struggle for survival and in order to improve their standards of living (Ellis, 1997). He further states that these choices are reflected in the way that households use their assets and assuch are an important part of household behavior, useful in determining well-being. Identification of assets that constrain access to more remunerative livelihood strategies is used to suggest appropriate targets of intervention. Carney (1999) in his research states that a livelihood is environmentally sustainable when it maintains or enhances the local and global assets on which the household depend. Carney further elaborates that a sustainable livelihood approach will be centered on people and their livelihoods. In fact the study adds that it will facilitate for: the prioritization of people's assets which may either be tangible or intangible. Carney adds that households' ability to withstand shocks especially those at context of vulnerability like eviction victims require policies and institutions that reflect community priorities. There are many ongoing efforts directed towards the need for sustainable environment conservation efforts through integration of social economic activities that support the survival of households.

Barrett et al (2001) establishes that research on the factors that influence the decision to diversify has tended to stratify them into two broad categories which refers to them to as push and pull factors. The livelihood strategy in the study context was based on the number of alternative choices of strategies a household participates in from the available options. Livelihood in this study evaluated a better outcome from a different choice or an improvement in the performance to reduce the risk and vulnerability from eviction. Household alternative livelihoods in Mau was distinguished into various components: Crop participation strategy wasdefined as the venturing in cash crops which included coffee and tea, food crops comprised of cereals, legumes, roots and tubers, and vegetable, Pastoralist occupation included all livestock participation which comprised of the net returns from traded livestock and livestock products with the value of livestock held for future use. This also included income earned from use of animal draft power and imputed values of home-consumed livestock and livestock products. Livestock components observed were local dairy cattle per head, improved dairy cattle per head, and nondairy cattle per head. Totalinformal wages were defined as earnings received by household members from informal labor activities (working on other people's farms and in other non-skilled or labor intensive off -farm activities).

Rental participation was evidenced from the income earned from rental property (rented land and buildings). Other earnings sources that were noted were remittances. Self-employment earnings included profits earned by household members from self-employment, dividends, etc. Formal wages were the gross value of wage earnings received by household members who were in regular formal sector employment in government and the private sector. Income from forest products included sale of timber, poles, charcoal and firewood and included the value of household forest products. Non wood products income include sale from medicinal plants, wild honey and wild fruits and household consumed products. Total off -farm income included all wage earnings from informal labour activities (excluding working on own land), government and private sector employment, transfers, property rent and profits from self -employment as described above.

2.4   Review of past studies on livelihood diversification

Most studies have been done on livelihood diversification in various parts of the country and the world. This section reviews relevant works undertaken and identifies gaps to be filled in the current study. Brown et al;(2006)in a study on livelihood strategies in the rural Kenyan highlands focused onevaluatingthe existence of outcome differences between livelihoods. To operationalize livelihood they used cluster analysismethods on household data and used the resulting specific income strategies to determine whether to test that the hypothesized outcome differences between livelihoods indeed exist. Findings of this study revealed that the five distinct livelihood strategies identified exhibited statistical significant differences in mean per capita income. From their results they find out that livelihood strategies offer high returns on investment of their assets resulting into welfare rankings among households. Brown et al. recommends that facilitating target interventions should be based on outcome differences to improve livelihood that will assist in improving the choice of outcomes of the poor.However the study doesn't identify or underline the issues or policiesthat result to restriction of use or access how it affects livelihoods.

Karugia et al. (2006) conducted a study on how to evaluate the access to land, income diversification and poverty reduction in rural Kenya. The findings indicated a high return to higher education and that education is important in accessing off-farm opportunities. Age of household head was found having a positive influence to the amount of off-farm earnings, perhaps reflecting the influence of assets accumulated over time on current incomes. The study in addition finds that land is an important source to income. The study recommends that a more integrative approach is need that targets the removal of entry barriers to remunerative livelihoods both at farm and off-farm level. Karugia recommends that a course of action must be done to improve a weak natural resource mainly soil via technology such as use of fertilizers, modern seed varieties and extension services since rural livelihoods depend on farming. The study was limited in explaining how restriction to access to land policiescan result to off farm and farm income activities.

Baird et al. (2013) study focused on the protected areas as centers of disturbances, uncertainty and upheaval. There was further examination of the character and incidence of livelihood

diversification within communities near and further from Tarangire National park in Northern Tanzania. The results indicated that proximity to the park is strongly correlated with livelihood diversification, suggesting that households near the park are adapting to opportunities and constraints and may be seeking to reduce variance in income and wealth in response to disturbances and uncertainty associated with the park. The study further recommends for the need to offer insights on underlying mechanism that shape household level outcomes such as income and wealth. In addition to the recommendation Baird states comparative studies need to examine multiple parks through time alongside control areas.

Carina (2010) research focus was on eviction process and its impact on local rural livelihoods in Mount Elegon, Uganda. Analysis was based on using a right based approach and a use of a sustainable livelihood framework to analyze the impact of eviction on local livelihoods. The objectives of this study included identifying the process and scope of conservation evictions in Mount Elgon and assessing the effect of eviction on rural livelihoods. The findings of the study presented that the planning and implementation process of eviction was not well executed. The impact of eviction on livelihood strategies is characterized by reduced access to forest resources, grazing land and farming land. There are limited strategies for diversifying for victims of eviction and the process of eviction remains one of the sources of conflicts. The study further recommends that: eviction should follow a right based approach comprising of planning, resettlement and compensation and lastly a balance between livelihood and conservation should be done to achieve double sustainability. A research gap in the study was the level and scope of eviction as an issue of concern whereby the uncertainty related to definition of concept creates confusion about the number of the evicted.

2.4.1   Review of models used in diversification strategies

Brown et al.,(2006) uses the Multinomial regression analysis, the researchidentifies geographic, demographic and financial determinants of livelihood choice. A summary of the empirical studies is shown in Table 1. TheMultinomial logit is most frequently used in livelihood diversification research. Brown et al. states that one of its shortcomings of the MNLis that it does not account for factors that contribute to a household choosing a specific set of strategies when clustering households to a particular livelihood strategy grouping. Another shortcoming of

the multinomial is that it assumes households are limited in choosing one specific strategy. In normal circumstances a household can participate in more than one strategy. Karugia et al. (2006) in his study uses the Tobit to determine the factors that explain off farm income. The Tobit model shortcomings in the study was selectivity bias due to its exclusion of households with no off -farm income as there was the truncation of dependent variables. Thus in line with this study which focuses both on farm and off farm activities the Tobit model would not be suitable for such a model.

Baird et al. (2013) establishes that OLS models were used to estimate the effect of proximity to the park on four measures of livelihood diversification while accounting for other factors. The measures of livelihood diversification included: percentage of total income from various livelihood strategies. Tobit and Poisson models were also estimatedand were appropriate in account for censoring or account distribution; however, results in each case were not meaningfully different than the OLS models. Thefindings also add that the Ordinary least squares (OLS) cannot be used in modeling for a count data since one of its assumptions is that the dependent variable should be continuous.

Carina V. (2010) uses a right based approach and a sustainable livelihood framework to analyze the impact of eviction on local livelihoods. His study doesn't use any empirical analysis to test the hypothesis and data analysis was based on descriptive presentation of data and theoretical arguments. Friedman (1953) states that a theory or hypothesis that is not verifiable by appeal to empirical evidence may not be admissible as a part of scientific enquiry.

RESEARCH METHODOLOGY

This chapter presents the conceptual and theoretical framework of this study. The subsequent sections outline the methodological approach,the specific empirical model used and exhausts information used in the sampling procedure.

3.1Conceptual Framework

Figure 1:Conceptual Framework on the post eviction factors influencing livelihood diversification
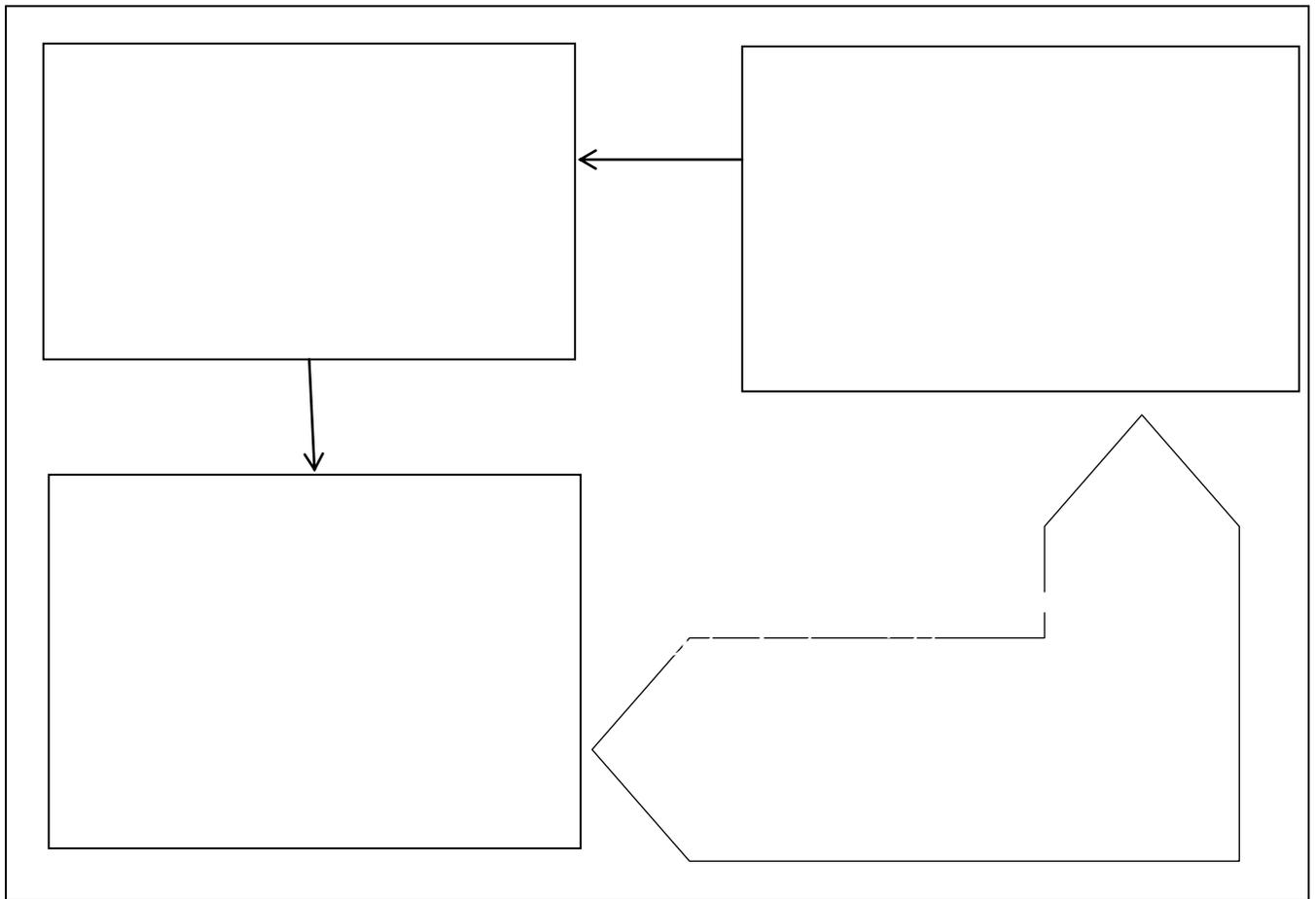
This conceptual model shown in Figure 1 views protected areas as centers of disturbances whereby the relationship between the resource and the resource users are disrupted (Brockington et al., 2006). There are many disturbances that occur that shape the diversification process, such as climatic and geologic shocks including droughts (Block et al., 2001).The

scholarship on the mechanism that affects the social consequence of conservation on protected natural resource areas has shifted attention to the sub community level which focuses on both the associated household level outcome and the conservation measure (Torben et al., 2001). The challenge of conservation measures has been on achieving the balance between biodiversityconservation and livelihood sustainability (Brockington et al., 2006). Thus there is need to understand the conservation process at a sub-community level while basing on the diversity of livelihood strategy (Torben et al., 2001). The framework cites eviction as the focused disturbance of the study; which introduces: new constraints and opportunities, recruition of new resources, the space for new learning, new relationship and new feedbacks. Thus one of the main objectives of the study was to characterize the livelihood strategies of the area so as to develop a comprehensive understanding of the community.

The study adopts the sustainable livelihood guidance sheet by the Department for international development framework (DFID),(1999) so as to identify the entry points that support livelihoods. The framework recognizes that livelihood support is not singularly influenced by a particular factor. Thus the study seeks to understand the prospects of negative shocks of eviction in combination with other factors that influence the livelihood of people. To comprehend on the eviction issue in abroad manner, the study considered all the levels of eviction in terms of displacement levels (Carina, 2010). Further to understand the nature of the upheaval of eviction on livelihoods, a comparative difference of the evicted and non evicted household wastaken into account and measured by the variable victim of eviction (Baird et al., 2013). Household are expected to reduce their variance in their endowment (wealth and income) for them to ensure that they will be able to diversify their strategies so as to cope with shocks from eviction (Barret et al., 2001). Opportunities and constraints from a household characteristics perspective such as: household size, education level, membership to a group can result to social differentiation. The differentiation at household level can result to the understanding of how livelihoods are affected by various factors hence comprehending ofthe conservation process (Torben et al., 2001). In addition the biophysical and Institutional factors such as distance to an input source or to a primary school also motivate households to new opportunities attracted to the area.

The adaptation to a more diversified portfolio of livelihood activities as a coping strategy to community near protected areas has not yet been understood (Baird et al., 2013). Based on the

livelihoods diversification strategies the context area alternatives included: income from crops; income from livestock; income from forest products; income from non wood products, rental income, income from self-employment and income from formal wages. Both the evicted and non evicted strategies were likely to reduce variance of their wealth and income after the negative shock of eviction by supplementing traditional activities with new less familiar ones so as to spread risk (Barret et al., 2001; Ellis, 2000). The DFID framework looks on the vulnerability context which frames the external environment in which people exist. The framework suggests that people's livelihoods are fundamentally affected by critical trends as well as shocks and looks on both the population trends and resource trends.The protected area of interest of the study was the Mau forest in Nakuru county, Njoro division. To address the stated concerns the study seeks to address the following research questions (RQ). (RQ1) What is the effect of eviction and its levels of displacement on measures of livelihood diversification when controlling for other factors? (RQ2) What is the effect of household specific and endowment characteristics on measures of livelihood diversification?

3.2   Theoretical Framework for analysis

The study model was based on the theory of the Random utility model (RUM). The theory states that households will choose to maximize their utility by choosing a maximum utility subject to the constraint they face. A household in a rural area decides on which livelihood strategy to select based on the option to maximize their utility, subject to internal and external factors. The presumption is that the choice to diversify is to cope with shocks and maintain or improve the standard of living (Ellis 1998).If the household alternative livelihood is associated with coping with shocks and maintaining or improving the standard of living; households will be encouraged to select the strategy. The decision maker has incomplete information and therefore uncertainty has to be accounted for. The utilityis therefore modeled as a random variable in order to reflect the uncertainty. The utility accruing to the nth household for choosing thex^{th} livelihood strategy can be expressed as:

$U_{nx} = V_{nx} + \varepsilon_i$ (3.2.1)

$\boldsymbol{V_{nx}}$is the deterministic component whereasε_i is the error term or stochastic term (Thurtsone, 1972). Thus the utility is a linear sum component of the deterministic and stochastic term. The choice that a set of alternative strategies will be chosen from$x_1$up to$x_n$number of alternative

strategies is based upon probability. It is expected that the choice utility will be greater than the maximum utility of the other alternatives which can be presented as:

$$P_i \left(\right) = P \left[V_{xn} > MaxU_{jn} \right] = P \left[V_{xn} + \varepsilon_i > MaxV_{jn} + \varepsilon_j \right] \forall j \neq x \qquad (3.2.2.)$$

3.3   Empirical Model specification

Livelihood choices, with zero to ten possibilities, were used as dependent variables. This included participation in livestock keeping, crop farming, wage from agriculture, wage from non-agricultural activities, transfers which included food aid and remittances, salary from skilled agriculture activities, salary from non-skilled agricultural activities, Petty business, income from forest products, income from non-wood products and income from other activities. The choice of livelihood strategies of non-evicted households was used as a base line. The specific objectives were attained through the analysis as discussed below:Descriptive statistics was used to characterize the livelihood strategies of households and determine any variation in interaction between the evicted and non-evicted. Descriptive statistics was computed using the Statistical packages for social sciences (SPSS) software. The results were presented in tables, pie charts and graphs. The main items considered also were the socio economic, biophysical and institutional factors, levels of displacement in the characterizing of households.

To achieve the second and third objectives, which were to test the hypothesis on the effect of eviction and levels of displacement on the selected livelihood strategies. The second hypothesis was to test the effect of household specific and endowment characteristics influencing the number of livelihood strategies.The Negative binomial model was thus used to quantify the factors that influence the alternative livelihood strategies. For the second and third objectives, the Negative Binomial regression model was estimated in STATA.

The PRM being the foundational building framework block in count data analysis could not be used. This is because the assumption of the Poisson model is that the mean and variance are assumed to be equal (equidispersion) (Greene, 2008).However, in this study there was no equidispersion as shown in the sub-section 3.4thus a Negative Binomial was adopted (Hilbe, 2007).

3.4 The Poisson regression model

The modeling of a choice study analysis where there is need for determining the probability of the nth household selecting an alternative livelihood strategy set, can be applied by using the Multinomial Logit (MNL), if the sets are unordered (Judge et al., 1985). Woldenhanna et al. (2001) and Rahut et al. (2012) establish that for one to use the MNL certain assumptions need to be taken into account.

Similarly the use of the Poisson regression model (PRM) allows for the relaxation of the assumption that various households cannot participate in some various livelihood strategies. Where there is no autonomy of various different strategies, households can have a multiple set of chosen livelihood strategies. The main weakness of PRM is the fact that it doesn't take into account that the same number count of livelihood strategizes opted by households cannot be interpreted having equal welfare measures. A count model was significant for this study to allow for the evaluation of the number of alternative livelihood strategies affected after eviction. The PRM is a count data analysis model (Greene, 2003). The Poisson although cannot take a normal distribution assumption for linear regression since it doesn't take on continuous variables but few variables (Wooldridge, 2003).

According to Greene (2003) the model can be represented as y_i(this were the income generating activity a household engages in) represented as:

$$E\ (Y_i|x_i)=X_i'\beta=e_i^{x\beta} \qquad i=1\ldots n \qquad i=1,\ 2,\ 3 \qquad (3.3.1)$$

The primary equation of the model can be represented as: where

$$P\ (Y=y) =f\ (\lambda|x) =(exp^{-\lambda}\lambda^y)/^{y!}\lambda\epsilon\mathbb{R}^+,y=0,\ 1,2 \qquad (3.3.2)$$

Greene (2003) explains that the most frequent used formulation is the loglinear.Where x_i includes covariates in the study which will include household size and all the variables explained in Table 1. Greene (2003) explains it is easy to estimate the parameter as shown in the equation using the maximum likelihood technique. Winkelmann et al. (1995) furtheridentifies the specific merits of Poisson which include: 1.It captures the discrete and non negativity nature of data in this case livelihood strategies take positive values and allows for inferences to be drawn on the probability of event occurrence. 2 It accounts for the heteroscedasticty and skewed distribution inherent to non negative data. 3. The log linear model allows for the treatment of zero occurrences in the data.

3.4.1. Limitations of Poisson regression with relation to the data

To use the PRM for empirical analysis certain assumptions need to hold, one is its implicit restriction on the distribution of observed counts. Secondly is that the variance of the random variable is constrained to equal the mean. This is referred to as the equidispersion aspect of the model (Greene, 2007). In this case the study violates the assumption and depicts a characteristic of under dispersion as shown in section 3.4.2 where the variance is less than the mean. In case of an over dispersion occurrence whereby a conditional variance exceeds the conditional mean in the PRM,result estimates will be inefficient leading to a biased inference (Winkelmann, 1994).

The PRM assumptions mentioned can result in misspecification.The first assumption is the intensity that the Poisson process is a deterministic function of the explanatory variables, no observed heterogeneity is allowed. The second assumption is that events occur randomly overtime. This assumption precludes that occurrences influence the probability of future occurrences (Winkelmann et al., 1995). These second assumption leads to the violation of the Poisson variance assumption. The cause of under dispersion occurs when events constituting the count are negatively related for example a household that chooses wage labour will be hindered from participating in salaried skilled livelihood strategy (Berk et al., 2007).

3.4.2   Statistical test for Under dispersionor Over dispersion

In a realistic manner the PRM assumption for equi-dispersion is rarely met this resulting in an unbiased estimation. Equi-dispersion is defined when the mean and variance are equal (Greene,2000). The consequences of under dispersion will result in: under estimating the true standard errors,t-values being low and finally resulting in an inference that is invalid. The consequence of standard errors and t values for over dispersion will be the opposite (Winkelmann and Zimmermann, 1995).If the variance is not equal to the mean, the estimates in PRM are still consistent but are inefficient, which leads to the invalidation of inference based on the estimated standard errors (Famoye et al., 2004). The score test that is popularly used to detect for either over-dispersion or under-dispersion, is the deviance and Pearson chi-square. Both the deviance and Pearson chi-square are divided by the degrees of freedom to test on the appropriateness of the PRM for analyses (Trentacoste, 2000). The decision rule is that the ratio

greater than unity indicates over-dispersion whereas ratios less than unity indicates under-dispersion. The following test can be shown as follows:

$$\frac{Deviance}{Df} > 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{over-dispersion} \qquad (3.3.4.1)$$

$$\frac{pearson\ \text{chi-square}}{Df} > 1 \ldots\ldots\ldots\ldots\ldots\ldots\text{over-dispersion} \qquad (3.3.4.2)$$

$$\frac{Deviance}{Df} < 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{under-dispersion} \qquad (3.3.4.3)$$

$$\frac{pearson\ \text{chi-square}}{Df} < 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ \text{under-dispersion} \qquad (3.3.4.4)$$

In the study the deviance was divided by the degrees of freedom whereby the results obtained were as follows: $\frac{139.3796}{364} = 0.3829$.

The Pearson chi–square was subsequently divided by degrees of freedom whereby results obtained were as follows: $\frac{131.7028}{364} = 0.3618$.

The results showed that the variance was less than the conditional mean indicating the data had under-dispersion (Trentacoste, 2000). The estimates were still consistent, were inefficient and biased and would lead to misleading inference (Famoye et al, 2004).The results of running the variables are shown in annex 4To allow for a corrective inference a negative binomial regression was employed.

3.5 Negative Binomial regression

The NB model is applied as a functional form that relaxes the equidispersion restriction of the Poisson model. A useful way to motivate the model is through the introduction of latent heterogeneity in the conditional mean of the Poisson model Winkelmann (2003). Thus we write:

$$\in \{Y_i \mid X_i E_i\} = (\propto + X'\beta + \in_i) = h_i \lambda_i \qquad 3.7.1$$

Where hi$= \exp(\varepsilon_i)$is assumed to have a one parameter gammadistribution,$G(\theta,\theta)$ with mean 1 and variance $1/\theta = \kappa$

$$f(h_i) = \frac{\theta^o \exp(-\theta h_i)\ h_i^{\theta-1}}{\Gamma(\theta)}, h_i \geq = 0, \theta > 0 \qquad 3.7.2$$

after integrating h_i) out of the joint distribution, we obtain the marginal negative binomial (NB) distribution,

$$\text{prob}(Y=\{y_i|x_i\}= \frac{\Gamma(\theta+y_i)r_i^{\theta}\{1-r^i\}^{yi}}{\Gamma[1+y_i]\Gamma\theta}. \qquad 3.7.3$$

$$y^i= 0,1\ldots\ldots\ldots\ldots\theta \geq 0 \,,\gamma_i = \theta/(\theta + \lambda_i) \quad . \qquad 3.7.4$$

The latent heterogeneity induces underdispersion while preserving the conditional mean;

$$E\langle y_i|x_i\rangle =\lambda_i \qquad 3.7.5$$

$$\text{Var}\langle y_i|x_i\rangle =(1+(1/\theta)\,\lambda_i=\lambda_i(1+ k\lambda_i) \qquad 3.7.6$$

Where K= Var (hi)   3.7.7

The linear model equation will be as shown below:

$$\ln (E(\mathbf{Y}|x_i^n))= \beta_o + \beta_1 x_1 +\ldots\ldots\ldots\ldots\ldots\beta_k x_k (3.7.7)$$

Maximum likelihood is used for estimating the parameters of the NB model (α, β, θ) (Greene, 2007). The restriction of equidispersionis relaxed by the functional form of the NB regression model (Greene, 2008). The inherent unobserved latent heterogeneity is accounted for by the introduction of a gamma-distributed stochastic term in the conditional mean of the Poisson regression (Greene, 2008).Berk and MacDonald (2007) state that the NB regression model takes care of any model misspecification.

Representing the model in equation form to fit the data an assumption is made that the nth household will participate in y_i strategies which are non negative and is Poisson distributed as shown below:

$$y_i =\beta_0 + \beta_1 \text{ Hholdsize} + \beta_2 \text{ Education} +\beta_3 \text{ p-evic} +\beta_4 \text{ E-evic} +\beta_5 \text{ P.E. evic} + \beta_6 \text{ Groupmemb} +$$
$$\beta_7 \text{Wealth} + \beta_8 \text{ Income} + \beta_9 \text{victimevic} +\beta_{10} \text{ Dinput} +\beta_{11} \text{ Dprimary}\ldots\ldots\ldots(3.7.8$$

Yrepresented the number of alternative strategies. Each dependent variable that measured the participation is censored as 0 or 1. Representing participation was 1and 0 non participating.

3.6   Justification and description of the explanatory variables

There were 11 variables that were fitted in the regression model as shown in Table 1. This section explains each variable in terms of its type and expected sign. The explanatory variables

were categorized into three. Namely the eviction level characteristic variables, household specific characteristic variables and household asset endowment variables.

i. Eviction level characteristics

Eviction:was coded as a categorical variable, representing the three levels of the eviction. (0) was coded for non evicted households,(1) for householdsthat were economically displaced described by the response that they lost access to: farming land, grazing land, both farming and grazing land, access to forest products andnon wood forest products. (2)was coded for households that were physically displaced and defined by the result of losing a household dwelling. (3) was coded for those households that were both economically and physically displaced. The Stata software allowed for the generation of the dummy variables for each level of eviction on households which were: economically displaced, physically displaced and those that were both physically and economically displaced. There was an omission of those that were not affected by eviction (Gould, 2011).

Economical displacement:This was a dummy variable, representing households who were economically displaced (1=economically displaced, 0= otherwise). Studies have shown that economical displacement involves the restricted access to a resource in form of displacement even when people are not physically removed (World Bank, 2001). Cernea (2006) establishes that the displacement results in loss of income sources or means of livelihood for households affected. Further the study elaborates that the displacement occurs when a particular development or conservation project introduces restricted access. The restricted access can be to cultivatable lands, fishing grounds and forests, even if the traditional users are not physically relocated but are administratively prohibited from use of natural resources. The study therefore hypothesized that economical displacement had a negative relation to the choice of livelihood strategies of a households.

Physical displacement: This was a generated dummy variable, which took into account that unoccupied land will remain for conservation projects or policies that will provide for an inadequate land provision similarly affecting the livelihood of households. Coding of the variable was that (1) represented those that were physically displaced (0) represented otherwise. Cernea (2006) states it is impossible to equally compensate such victims. Otherwise, without

land to hunt, gather and cultivate results in the displaced household groups becoming totally poorer than they were before. The study hypothesized that physical eviction had a negative relation to the choice of livelihood strategies of households.

Physical and economical displacement**:** This displacement was an intermediary of both physical and economical displacement levels. It was a dummy variable whereby on coding (1) represented those who were physically and economically displaced and (0) represented otherwise. Cernea (2006) and World Bank (2001) state that, household affected simultaneously by economically displacement and physically displacement became further impoverished and this adversely affected their livelihood. Hence the study hypothesized that there will be a negative relation between households that were both physically and economically displaced with the choice of livelihood strategies.

ii.   Household specific variables

Household size: this accounted for as a continuous variable; it referred to members of a household of an immediate family who use various common resources such as land and make joint decisions as a unit (Brown et al., 2006). Previous studies indicate those in large households have a positive relationship with diversifying into off farm activities (Homewood et al., 1998). Jumbe et al. (2009) further argues that this isbecause households with large members depend less on forest activities as their primary source. The study hypothesized that there would be a positive relationship between thesize of the household and the livelihood strategies.

Household head education level**:**this was measured as a categorical variable, representing the education level of households head. The variable was coded as shown: 1= for illiterate, 2= for attaining the Primary level, 3=Secondary 4=Technical/Tertiary respectively. Earlier studies have shown that education is one of the components that can facilitate for removal of entry barriers to remunerative livelihoods both at off farm and on farm levels. Thus entry to remunerative barriers will result in more numbers of livelihood strategies (Karugia et al., 2006). It was therefore hypothesized that the higher the household head education level the more the number of livelihood strategies.

Victim of eviction**:**The variable was measured as a dummy variable, representing the victims of evictions (1 for evicted and 0 for non-evicted households)**.** Studies have shown that eviction plays a role in shaping the diversification of households. Baird et al. (2013) states that

livelihood diversification is a response to coping and/or risk mitigation strategy pursued in response to various types of shocks and uncertainty. Further the research states that eviction reduces access to forest resources, grazing land and farming land resulting to limited strategies for diversifying (Carina, 2010). Thus the study hypothesized that there will be an indeterminate effect on the number of livelihood strategies of those evicted with comparison to non- evicted.

Group membership participation: Membership to a group was measured as a count variable, whereby respondents stated the number of groups they were members. Research done has found out that as household join a social group, facilitatingfor the functioning of a broader social network,the probability to increase the embracing of their risk management strategies increases (Ellis, 2000). Ellis (2000) furtherelaborates that the concept of livelihoods seeks to convey the non-economic and economic attributes of survival. It includes, inter alia, the social relationships and institutions that mediate people's access to different assets and income streams over time. The study thus hypothesized thathouseholdgroup membership participation had a positive relation with the number of strategies.

Distance to input source: This variable was measured as a continuous variable in kilometers. Research indicates that input markets such as fertilizer, animal traction, organic inputs, and water and soil conservation technologies are the focus when reviewing for the distance to an input source. Further the distance to input market access has been found to be an important factor in determining technology adoption choices among farmers (Luseno et al., 2003). Access to input markets allowed farmers to acquire inputs needed for adaptation choices such as planting of supplementary feed, windbreaks, purchase of new livestock species, vaccination etc. (Mandleni et al., 2012). The study thus hypothesized a negative relation between those far from a source of input to the number of livelihood strategies.

Time taken to primary school: This variable was continuous and was measured in terms of time taken in minutes. Previous literature state that household facing resettlement are often concerned about the access to adequate educational opportunities for their children. Forced eviction and resettlement will result in loss of access to supplemental education programs (Mgbako et al, 2010). Thus the study hypothesized a negative relationship between time taken to primary school and the number of livelihood strategies adopted by a household.

iii)   Household endowment variables

Household endowment variables included both wealth and income. Wealth is function of income. Annex 5 shows the correlation results which was0.41. According to Gujarati (2004) data obtained on income and wealth may be highly if not perfectly correlated: Wealthier people generally tend to have higher incomes. Gujurati(2004) further states that the rule of thumb is that if the pair-wise or zero-order correlation coefficient between two regressors is high, say, in excess of 0.8, then multicollinearity is a serious problem. Thus income and wealth were not correlated allowing the study to input the two variables. The variable wealth and income was log transformed to compress the scales in which the variable was measured. This is a corrective source of heteroscedasticity which is as a result in skewness of the distribution of one or more regressors included in the model. It is well known that the distribution of wealth and income is uneven, with the bulk of the wealth being owned by a few at the top (Gujarati, 2004).

Wealth**:** Wealth in the study was a measured as a continuous variable representing the value of both total livestock and household holdings in monetary terms in Kenya shillings. Wealth in a Pastoralist community can be measured by total livestock count unit (Baird et al., 2013)**.** Also wealth can account to as anasset household holding where examples are such as: bicycles, radios and water tanks (Block et al., 2001). Initial studies have indicated that wealth of a household has a positive relationship with the chosen alternative diversification strategies (Block et al., 2013). Block (2013) states that households' don't hold their wealth as a form of any single asset thus allowing for one to engage in various activities. Barrett (2001) study finds out that in rural Africa, wealth allows for households to engage in non-farm activities. The study hypothesized a positive relationship between wealth and participation in various livelihood strategies.

Income: was measured as a continuous variable, representing the total annual income earned by a household in the period of 12 months during the period of July 2013 to July 2014. In most studies livelihood diversification is a precursor to higher incomes as other studies have found (Bezu et al., 2012). Mccabe et al. (2010) establishes that communities living near protected areas maximize their income to insure themselves against loss and build the capacity to handle problems independently. Based on the following research, income is a risk-sensitive adaptation

thus a predictor of different strategies. Therefore the study hypothesized a positive relation between income and the number of livelihood strategy a household would choose.

Table 1: Description of explanatory variables and Hypothesized signs

Variables	Type of variable	Expected sign
Household size	Continuous	+
Household head education level	Categorical	+
Physical evicted	Dummy variables	-
Economical evicted	Dummy variables	+
Physical and Economically evicted	Dummy variables	+
Group membership participation	Continuous	+
Wealth	Continuous	+
Income	Continuous	+
Victim of eviction	Dummy	+/_
Distance to input	Continuous	-
Distance to primary	Continuous	-

Source: Author

3.6.1 Diagnostic test for NB Negative Binomial regression model

3.6.1.1 Testing for multicollinearity

Multicollinearity refers to correlation among explanatory variables in a multiple regression model. It is usually invoked when some correlations are large but an actual magnitude is not well-defined (Gujarati, 2004).In the analysis regression coefficients may add or delete an independent variable. The estimated standard errors of the fitted coefficients are inflated or the estimated coefficients may not be statistically significant even though a statistical relation exists between the dependent and independent variables. Gujarati (2004) further explains that the variance of an estimator is inflated by the presence of multicollinearity which is shown by the VIF. Another test is that of inter correlation among the explanatory variables which was done using the pair wise correlation. The test showed there was no evidence of multicollinearity since the highest correlation was 0.4716 (p=0.000).

The analysis for multicollinearity using the variance inflation factor (VIF) is a rule of thumb, if the VIF of a variable exceeds 10, that variable exhibits high collinearly (Gujarati, 2004).In the study the VIF of physical and economical displacement was 2.95which was the highest as

shown in (Annex1) whereas the test revealed absence of multicollinearity the overall VIF mean was 1.48. According to the rules the evidence for multicollinearity must satisfy the following conditions.

1. The largest VIF is greater than 10 (some choose a more conservative threshold value of 30).

2. The mean of all the VIFs is considerably larger than 1.

Thus in the study the largest VIF is 2.94 and the mean of all is greater than one but not considerably so. Another test done to check for multicollinearity is the pairwise correlation which providesevidence that there was no correlation as shown in Annex 2.

3.6.1.2 Testing for heteroscedasticity

The heteroscedasticity problem occurs where variables of the dependent variances are not constant across observations of the dependent data (Greene, 2002). It was tested using the Breusch-Pagan/Cook-Weisberg test. It tests for whether the error variances are all equal in a multiplicative function of one or more variables. In Annex 3results provide an evidence of a large chi-square that is statically significant(chi2 (1) =7.23. (Prob>chi-square=0.0072)hence provides evidence that we can reject the null hypothesis and conclude that there is a problem of heteroscedasticity (Berry et al., 1985). To correct for heteroscedasticity we regress the variable with the robust option to ensure that it allows for the variance to be small andfor the standard errors beingunbiased. This robust option releaves the effects of the t-test and significance testwhere the estimates may no longer be blue as shown in Annex 4.

Inference is generally faulty in the presence of heteroskedasticity thus adjusting of the standard errors, t and F test can be made valid in the presence of a heteroskedasticity-robust standard error transformation (White,1980). Where the robust standard error is computed diffrently for any particular variable that was statistically signficant using the usual t statistic although the variable will still be statistically significant using the heteroskedasticity-robust t statistic. This is because the two sets of standard errors are not very different. The associated p-values will differ as shown in Annex 4Householdsize,Physical displacement, physical and economical displacement,Inwealth, Inincome, Distance to primary school and Distance to inputbecome very significant slightly because of the robust t statistics.The robust standard errors can be either larger or smaller than the usual standard errors. In large sample sizes, we can make a case for

always reporting only the heteroscedasticity-robust standard errors in cross-sectional applications (Wooldridge, 2003).

3.6.1.3 Testing for the goodness-of-fit

The Pearson goodness-of-fit test can be used totest the fitness of themodel. The Pearson goodness-of-fit test is a test of the observed against \expected number of responses using cells defined by the covariate patterns. The model fits reasonably well as shown by the deviance statistic. The results of regression are shown in Annex 4. (Lemeshow, 1994)

3.7   Research design

Data was collected using a structured questionnaire. The questionnaire captured the socioeconomic and demographic characteristics of the households. In addition the livelihood strategy participation of each household was captured both for those evicted and non evicted. Information on participation to membership groups and income earned in 12 months was included in the study. The questionnaire was edited and changes were made to suit the location of study after the pretests

3.7.1   The sample size

The sample size was determined by the Cochran's formula for determining the sample size. A prerequisite of using the formula requires for one to establish the margin of error depicted as **d** which depicts the risk of error a researcher is willing to accept in the study.

The Cochran (19 77) simple formula is:

$$n_{0\backslash} = \frac{Z^2 pq}{d^2} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(3.4.1.1)$$

Where n_0 is the sample size, $Z^2$is the abscissa of the normal curve that cuts off an area of the tails (1-equals the desired confidence level which in the study is95%), d is the desired level of precision, p is the estimated proportion of an attribute that is present in the population P, and q is 1-p.The value of Z is found in statistical tables which is contained the area under the normal curve. The sample size for the study assumed that p= 0.5 which is the proportion of the households in relation to the true proportion P. There was no data on the number of households evicted thus justifying the assumption on p.

According to 2009 census records by Kenya National Bureau of Statistics the total households in Njoro division was19, 280 whereas the total household in Nakuru County was 129,841.

$$n_0 = \frac{Z^2 pq}{d^2} = (1.96)^2 (0.5)\ (0.5)/(0.05)^2 = 384 \text{ household} \ldots\ldots\ldots\ldots..(3.4.1.2)$$

An ideal sample size for a population of 19,280 would have been 209 respondents (Bartlett et al., 2001; p. 48). A sample size of 364 respondents was achieved due to missing data resulting in 20 being eliminated from the count of respondents.

3.7.2 Sample technique and data collection

The study followed a sampling procedure as follows: Njoro division was purposively selected; Secondly 7 villages were purposively selected this were: Chemunit, Imetoit, Kilumbero, Sigaon, Sigotik, Tagitech and Transmara. These villages were known to have displaced camps of victims of the eviction process. A list of evicted households was made with the assistance of local administrators (Sub chief and local village elders). The respondents were randomly selected from the list a total of 384 were selected. 20 questionnaires had incomplete data. The selected villages with the number of respondents were as follows: Chemunit 51, Imetoit 10, Kilumbero 17, Sigaon 169, Sigotik 36, Tagitech 63 and Transmara 18. The total sample comprised of 180 non evicted households while 184 consisted of evicted households. A semi structured questionnaire was used to collect data from households in the study area. The pretest allowed for compilation of a list which was the sampling frame. Selection of a householdfrom the list used the systematic random sampling technique, where the third household was picked randomly after count. Training was done by the enumerators who were locals from the area. Thus the language barrier was not a challenge in data collection since majority of the communities living in the area were the Kalenjins and Ogiek.

3.8 Study area

The Mau forest is divided into several blocs which are South-West Mau (Tinet), East Mau, Ol'donyoPurro, Transmara, Maasai Mau, Western Mau and Southern Mau. Nakuru County, Njoro division was purposively selected because it is within the Eastern Mau Forest block. The villages of study focus were in Chimunit, Imetoit, Kilumbero, Siagon, Sigotik, Tagitech and Transmara The Eastern Mau block is one of the second largest forest blocks in the Mau Complex, covering about 66,000ha of which 35,301ha were excised in 2001 for human

settlements (Kipkoech et al. 2011). The forest block is managed by the Kenya Forest Services (KFS). East Mau block has had eviction incidents that have been in the Mau forest in 2004. There have been heavily impacted by official forest excisions, in particular in 2001. Division where households were initially living in the forest are currently habiting adjacent to the forested area after eviction. Langat et al. (2010) confirms that communities like the Ogiek are dependent on forests wholly apart from subsistence farming and livestock keeping. The estimated size of the population of Mau forest of Eastern Mau is 47,802 (Kipkoech et al, 2011). The Eastern Mau forest, with about 3000ha under pine and cypress plantations, is the most exploited forest in terms of timber extraction. The major threats to the Mau forests include encroachment by settlers, unclear forest boundaries, and ownership conflicts, including issuing of fake titles, illegal logging and inadequate law enforcement. The situation has been complicated by political interference and uncoordinated ownerships of the forests (Kipkoech et al, 2011).
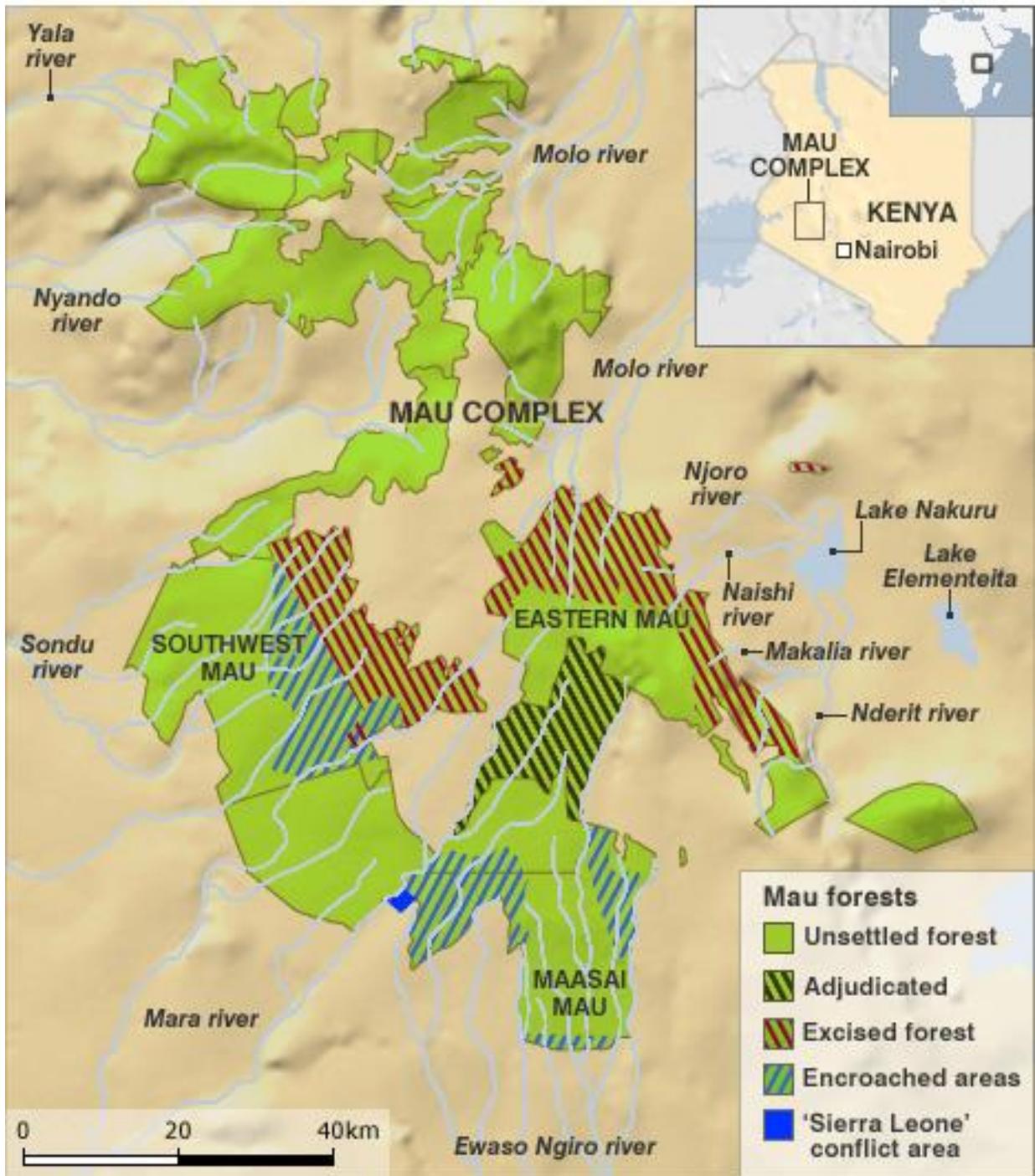
Figure 2: Map showing Kenya Mau forest

CHAPTER FOUR:

RESULTS AND DISCUSSION

This chapter provides a presentation of the results of both the descriptive and econometric results. The subsection provides the results and is a guideline in answering the 3 objectives which guide the study.

4.1. Characteristics of households with regard to eviction and levels of eviction

This sub section provides information on the characteristics of the non evicted and evicted households with the basis ofeach level of eviction as shown in Figure 3. Data on characteristics of households with regard to eviction and non eviction was analyzed through descriptive statistics. Majority of the households in the study area were evicted, at 50.6 percent.This can be likely explained by the fact that evicted households lackedresettlement alternatives thus a majority settled in camps at certain regional areas resulting to their total number being more than the non-evicted. These camps allowed for the access of food aid andallowed evicted households to construct temporary dwelling structures.According to a report by Cernea et al. (2006), 12 protected areas from 6 countries in the Congo basinhad a resettler–host ratio varying between 1:1 and 2:1. Similar studies by Geisler et al (2001) found out that globally at least 8.5 million people have been displaced from national parks by conservation. Eviction is posited to cause shocks on a household and influence the choice of alternative strategies.

When categorizing the 50.6% (184) total households that were evicted on basis of the levels of displacement. The results showed that a majority of the households were both physically and economically displaced at 86 percent: 11%of households were economically displaced while3% were physically displaced.The findings are shown below in Figure 4.1.1.Households that were both physically and economically displaced were likely to be in a high poverty level as compared to other displacements resulting to a majority of them encroaching the forest. In contrast, Carina (2009) findings show that a majority of households evicted were physically displaced in Mt. Elgon, Uganda.When devising conservation policies, levels of eviction are useful to ensure risks are taken in account and how they can be counter acted with feasible risk

prevention and risk mitigation measures (Cernea et al.,2010). Each level has an adverse impact on the livelihoods of the displaced victim (World Bank, 2010).
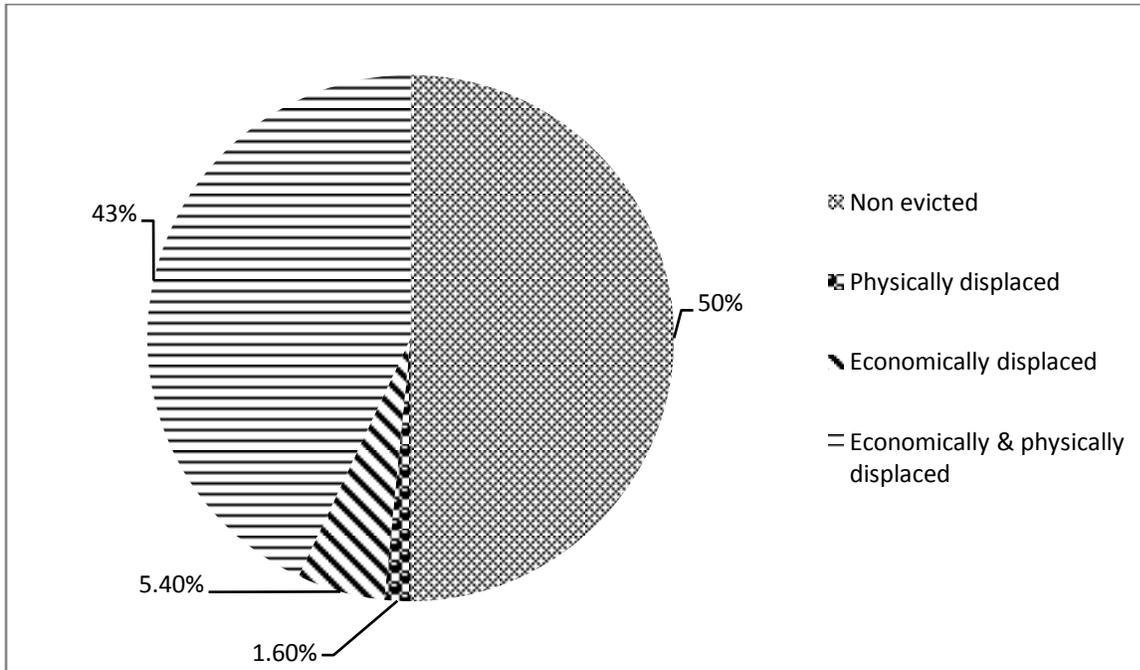
Figure 3: Summary of the households based on the effect of displacement.

Source:Survey data, 2014

4.1.1 Socio economic and Institutional Characteristics of households in Nakuru County, Njoro Division

This sub-section provides the findings of the Socio economic and Institutional characteristic results.The results were analyzed by descriptive statistics and are represented in Table 2. 70% of the majority of household heads had attained a primary education and only 20 percent had no education.The position of the primary education rate of households in Njoro is closely similar to the national level. This can be likely explained by the areas economic landscape and labour market which lacks the demand of labour force in the formal sectors that normally require higher educational level. The area is dominated by agriculture. According to KNBS (2009)report on national educational levels on primary school attendance rate is 77% for school age children. Education is hypothesized to influence the set of alternative strategies of a household.

Majority of households had an average of 5 members who were in total 19 percent. The least had a mean of 11 members at 1 percent.Weismann (2014) report on the socioeconomic atlas of Kenya states that at national level the average size of a household is 5.1. The average size of a household in Njoro division is almost similar to the National level. This is likely because households have awareness on the importance of family planning methods and how a household size affects their welfare decision. Household size is expected to have an influence on the choice of alternative livelihood strategies.

A large majority of household head respondents were male constituting of 87.4%.In contrast,the Kenya Integrated household survey (KHIS) (2005/2006) found out that about 70.1 percent were male headed householdsin the rural areas. These results were in contrast with the phenomenon of having a high female headed households count in rural areas. Most households were male headed in the study area which can be likely attributed to the fact that selective migration of labour is not dominant in Njoro division.Decision makers in the households are expected to have an influence on the choice of the number of strategies a household takes.

The average distance covered to a town center for household respondents averaged to 9.602kilometers (km). Distance to the nearest market for a household averaged to 6.909 km. From the discussion households access to a market was more relevant to their livelihoods as compared to proximity to a town center. This is because they were able to obtain access in selling and purchasing products in the market center easily with less cost.Majority of households constituting to 18.68% out of the total tookthirty minutes to access a water source. Households found access to water adequate due to the available constructed boreholes in the area. In addition the area received adequate supply of rainfall and the rivers were constantly replenished. Weismann (2014) in his research notes that accessibility strongly influences or limits future opportunities for development options. Development options have a role in shaping the livelihood alternatives of a household.

Table 2: Socio economic characteristics of households

Characteristics	n=364
Educational level (%)	
Illetrate	19.78
Primary	70.05
Secondary	8.52
Tertiary	1.65
Household size(mean)	5.07
Male headed respondents percentage	87.40%
Distance to a town(kilometers)	7.34
Distance to a market center (kilometers)	6.91
Distance to a watersource(minutes)	32.94

Source: Survey data, 2014

4.1.2   Comparison of the Characteristics of the Evicted and Non evicted households

The subsection looks at the comparison of the socioeconomic characteristics of households that were non evicted and evicted as shown in Table 3. Comparative studies alongside a control area provides for insights to social studies of conversation (Baird et al., 2013). The study uses descriptive statistic, Mann Whitney U test and t test to look at the dynamics of socioeconomic and institutional differences of the non evicted and evicted households. The t test (parametric)and Mann Whitney U test (Non parametric) check on whether the mean performance of one condition is significantly different from the other performance (Graham, 2009).

The Mann Whitney U test is a nonparametric equivalent of the t test.The difference between the two is that the U test is appropriately used when there is no normal distribution (McFarland, 1998).The following variables were tested using the t test. The mean of the household head educational years for non-evicted was 5.54 years whereas for the evicted was 4.55 years. These results are shown in Table. 3. The mean difference between the two households was not very large whereby on average 1.04 more non-evicted household had more educational years. The difference was associated with a one percent level of statistical significance.The difference in

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the education level between the evicted and non-evicted can be likely explained as a result of the income disparity which resulted in affordability to acquire education.The evicted household incomes were less compared to the non-evicted as shown in the Table 3. A comprehensive review of the relationship between parental income and school attainment concluded that poverty limited school enrollment achievement (Haveman et al., 1995).

The average distance to a tarmac road was 6.8448 km and 6.1449 km for both the evicted and non-evicted respectively. Themean difference was not so large whereby evicted households on average covered 0.7 kilometers more as compared to non evicted. The difference had no statistical significance. Displaced camps proximity to non evicted settlements was not far apart. This is because there is a likelihood evicted households benefited being closer to non-evicted since they provided agricultural labour to non evicted farms. Cernea et al. (2006) states that displaced people from a 12 case studies from six countries are working as laborers on small scale plantations of the non evicted.

Conducting of a Mann Whitney test was performed to evaluate whether themean rankof the evicted differ significantlyfrom the non evicted.The average household size was 5.24 members and there existed a difference between the evicted and non evicted households. The mean rank of the evicted was 93.49 whereas non evicted was 3.50. The difference can be attributed to the education status where non evicted households had better educational level hence smaller family sizes. Similar findings by the International Family planning perspective (2002), state that the educational status has a positive impact onreproductive behavior of households.Based on the p-value there is sufficient evidence to conclude that there is a difference between the evicted and non evicted household size at ten percent level of significance.

The mean income of the total households per year was 70,891 per year. Income of the evicted and non-evicted had a difference in their mean rank evidenced from the test static. The p-value was significant at ten percent level of significance. The mean rank of the evicted was 181 for non evicted and 93.52 for the evicted. The difference can be explained by the fact that displaced households income was affected by the displacement from forests resulting to a lower income.Majority of the displaced were dependent on forest for subsistence. According to Schimidt (2001) biodiversity conservation projects in Central Africa are susceptible in resulting in income impoverishment of displaced households.

The average household membership group participation per household was one. The difference test showed that the number of group membership of evicted and non evicted households mean rank was 93.21 and 53.50 respectively.There was no statistical difference between the evicted and non evicted household although the rank of evicted was more. Household before eviction belonged in social groups which after eviction were destroyed. Similar studies show that displacement results in social disarticulation and causes evicted households social stratification to disappear (Rudd et al. 2004).

Table 3: Comparing characteristics of the evicted and non evicted household

	Evicted households	Non evicted household	Mean Difference
T –test			
Househead education years	4.55	5.59	-1.04***
Distance to tarmac	6.845	6.181	0.664
Mann Whitney U test	Mean rank	Mean rank	Test stastic
Household size	93.49	3.50	0.091*
Number of Group Membership	93.21	53.50	0.432
Income	92.52	181	0.099*

Source: Survey data (t test level of significance 10%*, 5% **, 1% * **)

4.2 Identification and Description of the livelihood strategies of households in Mau forest, Njoro Division

The subsection is guided to fulfill objective one using descriptive statistics to present the results of the study.The objective was to identify and describe the diversification strategies of households. The subsection further looks at the dominance of each strategy and income contribution.

Waged agricultural labour: Majority of the households accounting to 70% of the totalparticipated in the supply of agricultural labour as shown in Table 4. This participation was high likely because non evicted households would access affordable labour for their farms from evicted. This result is consistent with aareport by FAO(2010) the total agricultural labour force in Kenya averages to 67.6 % at national level. A comparison between the evicted and non evicted showed that the evicted participated more in this strategy as compared to non-evicted as shown in Table 4.This is likely because evicted households were able to offer affordable labour for survival and was the easiest access alternatives to engage in.Therewas a statisticalsignificant

difference in participation between the evicted and non-evicted households at 5% level of significance. Cernea et al., (2006) research findings from a 12 case studyfrom six countries outlined thatmajority of displaced people work as laborers on small scale plantations of the non evicted households.

The activities that were included in delivery of agricultural labour included:weeding, planting, and harvesting. Crops that mainly created the opportunity for farm labour were potatoes and maize. The rate of payment would vary whereby the planting of maize would earn a household KES200 per day. Weeding and harvesting would each earn Kenya Shillings (KES)300 per day. Working hours would vary depending with the size of land which averaged to start at 8.00a.m and adjourn at 6.pm. For both planting and weeding of potatoes daily rate payment were similar to maize. Harvesting payment earnings was 200 KES per bag of potatoes. Averagely on a day respondents reported to earn 400 KES per day on working on a potato farm. A bag of potatoes is estimated to weigh 150 kilograms.

Planting seasons of maize arebetween March and April whereby weeding wouldtake place in the month of June to July while harvesting was done in the months of December and January. Forplanting of potatoes a majority accounted that they did it in the months of March, June, September, and December while harvesting was done 3 months after planting.

Waged agricultural labour was more dominantas per the response of the evicted households. Non evicted households were able to earn money from the farm activities. In addition they could access affordable and availablelabour from those evicted. Catherine et al. (2003) in their research findings states that non-evicted household devote part of their own labour input to managerial tasks or increasing their leisure activities this is because they hadbetter access to land as compared to non-evicted households.

Crop Farming: Crop farming participation was reported to account to 56.6 % of the total respondents.This account would likely be becauseof thearea having adequate rainfall and a is a high agricultural potential area thus facilitating for crop farming. Contrary to the results Kenya National Bureau of statistics (2009) found out that 33% people on national level are employed in small scale agriculture and pastoralist activities. On focusing on the comparison, majority of the non evicted households participated in crop farming constituting to 83% likely because of

land availability. With regard to crop farming participation of householdsinvolved Kitchen gardening and main field plantation. Kitchen garden crops planted and harvested included: Beans, Cabbages, Kales, Maize, Onion, Peas, Potatoes, Spinach and Saga. Crops grown in the main field included Beans, Peas, Maize and Potatoes. Land ownership was an issue since majority of the evicted were neither resettled nor compensated. Thus most households rentedland for crop farming while others were able to purchase land.

Most cultivated land by households was done by use ofeither hired or family labourwith an average acre of 0.99. Households that could mostly afford to hire labour had not been evicted and were better off in terms of wealthand land ownership hence could outsource labour out of the family or use their own human capital. Machingura (2007) in his research findings states that farming on small scale depends on family labour. Catherine (2003) establishes that households with large tract of land considered to be wealthier would substitute their performance on farm activities to leisure activities or supervision.There existed a significant statistical difference in participation of crop farming between those evicted and non-evicted at 1% level of significance. This is because evicted households lost land to be able to practice crop farming and didn't have resettlement options. Carina (2010) states that evicted households when economically displaced lose land that they can pursue their livelihood.

Livestock Keeping: Total households thatparticipated in livestock keepingamounted to 45.3% from the total.These resultscould be likely due to the fact that the area has minimal risks such as drought and livestock diseases. Contrary to Kenya Household Integrated Survey KHIS (2005/2006) findings, 84.3% of the households at the rural in the in Kenya own livestock. Those of who participated in livestock keeping included the evicted and non-evicted household and there existed a high level of statistical significant difference of 1%. This difference in their participation can be possibly due to the fact that non evicted households are better off in linking their production to livestock due to accessibility to land.Majority of the non evicted households constituted to 65% that accounted in participating in livestock keeping. This result is in line with Curran (2000) findings, that conservation displacements undermines households to have farms which results in problems in food security. The livestock that were reared in the study area were: Bulls, Cows, Heifers, Calves, Goats, Sheep, Donkeys, Pigs, Chicken, Ducks and

Turkey. The dominantly reared livestock was chicken,34 percent households participated in the rearing of this type of livestock. This dominance of rearing of chicken can be explained likely because poultry requires less land and labour use thus was favourable.ContraryKHIBS (2005-2006), found out that the national level 67% reared poultry in Kenya. Although the highest contributing livestock type in terms of income in marketing and production was from the rearing of cows 37% participated in cattle keeping.It allowed for a household to earn from an average sale of between KES1,000 to 30,000 depending on the size of the livestock. The market for livestock was favourable in cattle keeping thus participation encouraged the acquisition of profits from the same. Findings from KHIBS (2005-2006) also found that 64% in Kenya reared cattle.Sale of livestock was either done in the market or sold to a nearby willing seller..

Income Forest products: household respondents that participated in income forest activities were 22%. This was through Community Forest associations or purchasing of individual permits from the Kenya Forest Service to acquire firewood. Contrary to a report by Nyangena et al., (2011)of households participated in Community forest association and obtained forest products in Kakamega forest reported to be 52%. The Forest products derivedin the area for a majority of households included charcoal and firewood. Households who legally acquired forest products had received permits from KFS. The bag of charcoal at farm gate in the market area was 200 KES per bag, price per head lot of firewood was 100 KES.

Waged non Agricultural: Total households constituting to 8.5% participated in wage non-agricultural labour. Majority of the households that participated in this strategy had obtained training to engage in the informal service sector provision. KNBS(2009) research found out that 44% on national level are employed in the informal sector. There existed a statistical significant difference between those evicted and non-evicted households at 1% level of significance. Non evicted households engaged more in the informal sector which can be likely explained that they had acquired training on skills of the informal sector. Karugia et al. (2006) research supports that education removes entry to barriers in renumerative strategies. Thus acquisition of skills allowed for evicted to engage in the strategy. Waged non-agricultural activities included: masonry, plumbering, welding, carpentry and mechanics. The range of KES earned by a household per month ranged from KES 100 to 250 per day.Where "boda boda" mechanics were

well off due to the demand of their services and the escalating transport business they earned KES1000 to 2000 a day.

Income from Non wood forest products: Wood products that households would outsource are: medicinal plants, grass for grazing and honey. The total households who participated in Non wood forest products NWFP amounted to 21.7%. Household that participated in this strategy were in community Forest associations which allowed for acquisition of the NWFP and others obtained this products illegally. Adhikari et al. (2004) states over 1.2 Billion of rural populations generally depend on NWFP.

Petty Business: the total household respondents who engaged in petty business were 3% and included ventures in: retail shops, bars, pool dens, hotels , cloth sales, salon and barber shops ,charcoal retailers, "boda'' operators. The participation in business was very low which can likely be explained by the lack of having a startup capital.Most business centralized their operations at the market centers and near homestead areas. Petty business that was most sustaining was the hotel business and charcoal sale where they would earn up to KES 600 to 60,800 per month. The non-evicted participated more in the livelihood strategy and there existed a statistical significance difference at 1% level of significance.

Contrary KNBS (2009) reported that 9% are self-employed in the modern sector.

Salaried skilled non-agricultural labour: The total respondents that participated and earned from salaried non skilled agricultural labour were 1.9 % from the total. This included carpenters, electricians, teachers, chiefs, drivers, mechanics who had special training to deliver their services. The low rate of participation can be explained by the fact that household did not have education to engage in this strategy. FAO (2010) reports the share of non agriculture labour force in Kenya is 30.4%.

Remittances: This included remittances from migrant workers who participated in the strategy who accounted for 3.6 % of the respondents. Households in this area had a minimum migration rate of labour thus there was low record of cash transfer as a strategy by households. The earning from remittances per monthwas between Kenya shillings 150 to 5,000. Contrary to a report by KHIBS (2005-2006), thereport found out that 74% of households received cash transfers.

Table 4: Summary of livelihood strategies participated in Njoro, Nakuru County.

	Frequency of the number of household:		% of total participants
Livelihood strategy	evicted	non evicted	
Livestock keeping	58	107	45.3
Crop farming	64	142	56.6
Wage agricultural labour	141	117	70
Salaried non skilled agricultural	7	0	1.9
Petty Business	6	18	3
Income from forest products	43	36	22
Income non wood products	43	36	21.7
Transfers	9	5	3.6

Source:Author

4.3   Test of hypotheses

The subsequent subsections 4.3.1 and 4.3.2 are answers to objective two and three respectively and discussion on hypothesis testing and individual coefficient results from running the regression.The Table 7 below is as a result of running a multiple negative binomial regression model with all the 11 variables fitted into the model. Table 5 and 6 are a test of the hypotheses as outlined in Section 1.3.3. The results in each testing of the hypothesis as shown in Table 5 and 6 coefficients cannot be discussed since they are variables are that based on literature and would result to misspecification bias of the model hence coefficient results cannot be discussed (Gujarati, 2004).

4.3.1   The effect eviction and its levels on livelihood strategies in the Mau forest

To perform a joint test of the first hypothesis the Negative binomial regression was used to test the joint effect of eviction and its displacement levels on the number of strategies. The results shown in Table 5 provide evidence that eviction and its levels of displacement have joint effect on the number of strategies. This is shown by the p-value for the chi-square in Table 5, which is very significant, which is normally used as a test that allof the estimated coefficients are equal to zero (Gujarati, 2004).Thus the conclusion is that one being a victim of eviction and affected by the levels of displacement affect the number of strategies.

On running the regression with all 11 variables fitted into the model in Table 7, the variable being a victim of eviction was used to assess the effect of eviction by using non evicted

households as the control category.Result from the differential intercept coefficient suggests that evicted households increase their livelihood strategies by 18% as compared to non-evicted households. The variable being a victim of eviction is positive and statistically significant at 10% statistical level of significance. Gujarati (2004) states the differential intercept coefficient can be used to explain on the difference of the evicted households from non-evicted. These resultssuggest that eviction diminishes their welfare and thus households are forced to seek alternatives strategies to ensure that they mitigate the shocks of eviction and improve their welfare.Baird et al. (2013) had similar findings and states that the increase in diversification alternatives is a response to the shock of eviction so as to mitigate the risk of impoverishment and vulnerability.

Based on the levels of displacement of eviction the following results were found. Households that were physically displaced had their number of strategies reduced by 48%. This variable was negative and statistically significant at one percent level of significance. The results infer that households that were physically displaced had their livelihoods' negatively affected likely as a result in the lack of a resettlement remedy. The physical displacement victims had lost access to land for shelter purposes and these made them more vulnerable and were likely to reduce their number of livelihood strategies. Delvingt (2001) and Cernea et al. (2001) had similar findings where they argue that loss of land as a result to conservation displacement or restriction to access of land results to the impoverishment that leads to de capitalization.

Physically and economically displaced household victims had their livelihood strategies negatively influenced at astatistical significanceof 1% level of significance.Household who were both economically and physically displaced had their livelihood strategies reduced by 45 % as shown from the result.This displacement resulted to the reduction in the number of strategies of a household which could be likely as a result of losing both land for shelter and for pursuing farm economic activities. Cernea et al. (2006) explains that an economic and sociological sense is that displacement occurs not only when land takings compel physical relocations but when a particular conservation policy introduces restricted access to cultivatable lands such as fishing grounds and forests thus resulting to reduction in the number of strategies.World Bank in a new provision defines the introduction of ''restricted access'' as a form of involuntary displacement resulting in loss of income sources or means of livelihood

whether or not the affected persons must move to another location (World Bank, 2001). Contrary to the prior expectation those who were economically displaced had their livelihood strategies negatively reduced but there was no statistical significance.

Table 5: Joint test of the hypothesis of the effect of eviction and its levels of displacement on the number of livelihood strategies

Variables	Coef.	Std. Err.	P>z
Economical displacement	-0.4925	0.1753975	0.005***
Physical displacement	-0.6320	0.328892	0.055*
Economical&physical displacement	-0.5859	0.110263	0.000***
Victim of eviction	0.1327	0.113479	0.109
_cons	-0.7270	0.501995	0.148
Observation	364		
prob>chi^2			0.000***
Log likelihood	-555.05151		
LR chi^2 (4)	49.4		

(p value level of significance *=10%,=5% and***= 1%)**

4.3.2.1   The effect of household specific characteristic factors influencing the choice of the number of livelihood strategies

This section discusses the results of running the regression model. It answers objective three. The results are summarized on Table 7 below. A test of the hypotheisis of the effect in table 6 showed that there is evidence that there is a joint effect of both household specific factors and household assesment factors on the number of livelihood strategies. This is shown in Table 6 by the significance of the p-value for the chi-square which is normally used as a test that allof the estimated coefficients are equal to zero. This results that the overall significance proves they have joint effect of testing for significance (Gujarati, 2004). The household specific characteristics variables included household size, household educational level,membership to a group, distance to an input source and distance to a primary school. Household asset enownment variables were wealth and income discussed in the below section.

Household size postively influences the number of livelihood strategies that a household participates as shown from the regression results. Household size variable had a positive and statistical significance. This infers that households with large family members were better off in engaging in more number of livelihood strategieslikely due to the availability diverse labour and skills from different family members. A household that had a larger size had a 2.9 % likelihood

chance of increasing their set of livelihood strategies this is statistically proven by the variable household size being signficant at one percent level of signficance.

This is consistent with literature: Homewood et al (2002); Machingura (2007)and Dlova et al. (2004) state that households' with a higher number of family members meant high labour availability reflected by the high number of productive workers. However, from findings is that family members should be of a legally adult age to be able to perform the farm work. Démurger (2010) establishes that local off-farm activities are mostly driven by households' working resources, while migration decisions strongly depend on the household size and composition. Jumbe (2009) study suggests that households with larger families depend less on forests as their primary source of income thus there will be more alternative strategies they can engage in.

Time taken to walk to a primary school had a negative influence on the livelihood strategy chosen. Time taken to walk to a primary school was statistically significant at one percent level of significance. Households that were near a primary school had a likelihood of adapting to more stratgies as compared with those that were far. This meant that household's proximity to primary schools played an important role in the adoption to more strategies in terms of access in time. The conclusion can support the fact that households nearer to primary institutions have increased number of persons to assists in increasing the set of livelihood strategies. Though his findings were contrary to child labour practice which other literature strongly advocate against. This is in line with literature: Mburu (2013) underlines the importance of children in providing assistance in participation in livelihood strategies and notes how free primary education resulted in low turnout in forest participating activities. He further states that children assisted during holidays and this can be related to that the less the distance from school would allow for participation of the activities thus increasing the set of strategy participation in the household. Barrett et al. (2000) argues that households with more children have more hands available for income earning off the farm, including: gathering and sale of firewood, management of valuable livestock, daily wage labor or petty commerce.

Distance to access to an input source had an negative effect to the number of livelihood strategies whereby those who had a further distance to cover had thier number of strategies signficantly reduced. Distance to input had a negative influence and was statically significant at

one percent level of significance. This means household that were close to input sources had more strategies and as the distance increased the number of livelihood strategies reduced. The conclusion is that households that are near input source are able to vary the application of technology and thus increase the number of livelihood strategy. This supports various literature for instance: Zhang et al. (2001) found that long distances to input markets decreased the likelihood of adaptation. Luseno et al. (2003) and Mandleni et al. 2012 in their findings states that market access is an important factor in determining technology adoption choices among farmers. Contrary to prior expectation household head education and membership of a group did not influence the number of livelihood strategies a household would adopt.

Table 6: Joint test hypothesis of the effect of household specific characteristic and household asset endowment factors influencing the choice of the number of livelihood strategies

Variables	Coef.	Std. Err.	P>z
Household specific characteristics:			
Household size Hhsize	0.0257	0.015866	0.105
Household head educational level	-0.0138	0.0593724	0.831
Membership of groups	0.0298	0.0596123	0.944
Distance to primary school	-0.0001	0.0005969	0.141
Distance to input	-0.0031	0.0031693	0.388
Household assest endownment :			
Log of wealth	0.069992	0.0219468	0.004***
Lnincome	0.106359	0.0450701	0.02**
prob>chi^2	0		
Log likelihood	-541.4521		
prob>chi^2			0.000***
Pearsonchi^2	131.7028		
LR chi^2 (7)	61.7		

(p value level of significance *=10%,=5% and***= 1%)**

4.3.2.2 The effect of household asset endowment factors influencing the choice of the number of livelihood strategies

Wealth and income had a postive influence on the livelihood strategy a household choose. A one percent increase in wealth for a household would likely increase the number of strategies by 7%. The findings relate with various literauture that households wealth affects the capability of them adopting to various alternative strategies.. The evidence is given by the variable wealth being statistical signficant at one percent level of signficance. Wealth had a positive influence

and was statistically significant this concludes that households that were wealthier were better off in adapting to an increased number of livelihood strategies so as to reduce the schock as a result to the eviction. This was in line with the following literature: Demurger (2010); Schwarze et al. (2005) concludes that households with wealth which the study defines as households' asset position and working resources strongly increases the likelihood to engage in local off-farm activities, Davis et al., (2010) studies shows that rural households engage in a diverse set of income-generating activities so as to accumulate wealth. De janvryet al. (1991) and Kinsleyet al. (1998) indicate that diversification is not only positively correlated with wealth but enables households to cope with shocks, or reduce their livelihood vulnerability.

Income variable was positive and statistically significant this concludes that households with high income were better off in engaging in more livelihood strategies. Households that had a higher income had a high statistical signficant chance of increasing their livelihood strategies, with the variable being signficant at one percent level of signficance. A one percent increase in income is likely to result in the increase the number of strategies by 10%.This can be likel;y explained that household with high income levels were able to particpoate in more stratgeies to reduce thier vulnerability after eviction. Similar findings by Baird (2013) states that households near the park similar to the evicted adapt to seek to reduce their variance in income in response to disturbances such as eviction. Schwarze et al. (2005) contradicts with the literature findings and states that poor households are already involved in a number of different activities. Income diversity shows that poor households tend to have more income sources and thus a more evenly distribution of the income between these sources exists.

Table 7: Result of the running the Negative Binomial Regression on factors that influence household livelihood strategies in Mau forest in Njoro

Variables	Coef.	Std. Err.	P>z
Household size	0.029	0.010	0.005***
Hhedclevl	-0.013	0.035	0.715
Economical displacment	-0.171	0.119	0.151
Physical displacement	-0.481	0.136	0.000***
Economical &physical displacment	-0.450	0.073	0.000***
Lnwealth	0.070	0.014	0.000***
Lnincome	0.106	0.024	0.000***
Memebership to groups	-0.004	0.035	0.903
Distance to primary school	-0.001	0.000	0.017**
Victim of eviction	0.182	0.063	0.004***
Distance to input	-0.003	0.001	0.016**
_cons	-0.727	0.277	0.009***
/lnalpha	-28.795	.	
Alpha	0.000	.	
Prob>chi			0.000***
Wald chi	254.82		
lnalpha	-28.795		
alpha	0.000		
Log pseudolikelihood	-533.456		

(p value level of significance *=10%,=5% and***= 1%)**

CHAPTER FIVE:

SUMMARY CONCLUSION AND RECOMMENDATION

5.1   SUMMARY

The study had three main objectives. The first one was to identify and describe the diversification strategies of households. The second one was to assess the effect of eviction on the alternative choices of diversification strategies and the last one was to evaluate elements of household attributes and levels of eviction on its effect on the types of diversification strategies. The study obtained primary data from 364 households randomly selected who constituted those who were evicted and non-evicted. Data was mainly collected using a semi structured questionnaire. Descriptive statistics was used to give detail and characterization of the livelihood in the Mau forest. The Negative binomial regression was used to assess the effects of the levels of eviction and also to evaluate the factors that affect diversification of the number of strategies a household selected.

From the results there were nine distinct identified livelihood strategies that were selected by a household. This included livestock keeping, Crop farming, Sale of agricultural wage labour, Sale of non-agricultural wage labour, Petty business, Sale of salaried non skilled agricultural labour, Sale of forest products, Sale of non-wood forest products and Remittances. Majority of the households accounting for 34% participated in waged agricultural labour as dominant strategy. 70% of the total households were participating in waged agricultural labour to meet their subsistence. Evicted households mostly participated in waged agricultural labour this is likely because they provided available labour to non-evicted households. Remittances were the least dominant strategy and accounted for 3.6% of the total households. The reason for its least dominance as a livelihood strategy could be likely attributed to less migration employment of immediate household members.

The agricultural sector created both self-employment and employment opportunities directly and indirectly contributed 80% of the total income of households. Agricultural self-

employmentincome was derived from livestock keeping, crop farming and forest dependency activities and accounted for 59%.Forest related activities contributed 30% of the income. Employment opportunities from agriculture contributed to 21% of the total income. The least contributor to the total income was salary earned from non agricultural skills which accounted to 0.34%.The Negative binomial regression model revealed that households that had a larger size were better off in increasing their set of livelihood strategies. Eviction negatively influences the set of livelihood strategies when focusing at the levels of eviction both physical displacement and physical and economical displacement had their livelihood strategies reduced. Although from the results presented households that were victims of eviction were diversifying enormously as compared to non-evicted households. This can be explained by the fact that the effect of eviction on the victims forced them to spread the risks of poverty and unemployment by venturing into new livelihood strategies. Time taken to a primary school in minutes had a negative influence on the number of alternative livelihood strategies a household would select. Same for the distance to an input source in kilometers had a negative influence on the number of livelihood strategies.

5.2   Conclusions

Eviction had a number of challenges resulting to land and economic constraints but resulted to other opportunities for diversifying to other sets of livelihood strategies. Households were coping with the shocks brought out by their ability to engage in a set of activities. Evicted households were better off in terms diversifying to other livelihood strategies. There were constraints that made them worse off such as endowment of land ownership, low income earnings and low wealth status. The agricultural sector which included farm activities was the most dominant strategy and contributed significantly to the total income. This can be entirely attributed to the geographical endowment of the area derived from: the forest resulting to available rainfall, soil area fertility, rainfall availability and the increased supply affordable available labour sourced mostly from non evicted household. Shift to non-farm employment has barriers which include: poverty, poor infrastructure like roads and the lack of improving of human capital.

The eviction process is a dynamic process with various levels of displacement which negatively influences the livelihood strategies chosen by a household. From the study economical displacement had no significant effect on the number of strategies since households affected were non-residents within the forest boundary and had other alternatives such as land away from the forest. Physically displacement which mainly resulted due to the loss of their dwelling premise had a negative reduction influence in the number of alternative strategies. Households that were both physically and economically displaced had their livelihood strategies reduced. Comparing the number of livelihood strategies of evicted households before and after eviction is evidence that households' lack of basic need such as shelter and land access reduces their available opportunity to venture in other livelihood strategies. Thus the makeshift of temporary structures in inadequate formal settlement camps affects their welfare and choice of alternative livelihoods. Physical displacement and economical displacement constrained households from an enabling environment to generate income they obtained from settling within the forest in depriving their basic need for shelter. Thus compensation and recovery interventions can be targeted to victims based on how the level of eviction affected unlike the tradition of reallocation is not sufficient. Evicted households who were victims of the policy are diversifying intensively but lack the incentives of improving their income sources and increasing their wealth.

Households that had a larger family size were able to participate in an increased number of sets of strategies likely due to the available productive labour force. Household that had higher income were likely to diversify to other strategies to reduce loses or shocks as a result of eviction and were less vulnerable allowing them to invest better in both off farm and farm activities. Wealth of households influenced diversification whereby households that had a diverse set of assets enabled them to engage in various different activities. Households that had close proximity to a primary school were better off in engaging in more strategies. This could be explained by the opportunity cost of time or money where one would sacrifice the cost of transport or time taken by a child to school to engage in other activities thus increasing the number of activities. Distance to an input source by a household had a negative influence where households close to an input source were better off in adapting to other strategies this could be because of the accessibility to technology facilitated for such an incentive to diversify.

5.3   Recommendations

The study recommends various strategies that need to be adopted:

1. There is need for interventions targeting households with large sizes to diversify from natural resource dependence to other mix of non-farm income activities facilitating for sustainability of use of resources and sustaining their livelihoods.

2. A pro-poor strategy can be targeted to assets (wealth) policies and projects that ensure substitution between assets and activities. Substitution between assets is facilitated with a range of assets ownership in a household with support from working markets that enable one type of asset to be converted into another. This will allow for livelihoods being more resilient, and thus will allow for better adoption to eviction.

3. Micro policy can be targeted on households' incomes that facilitate the provision of widening income options through small scale group schemes, credit access interventions, spread of financial institutions that are self-sustaining in savings and loan provision.

4. Infrastructural policy constraints on education institutions and access to input sources interventions need to be implemented. By ensuring infrastructure access in the location is nearer to household settlements.

5. Displacement policy interventions should ensure implementation of equitable planning for sustainable resettlement, monetary compensation and recovery based on the form of displacement affected.

6. Provisions of integral conservation policies should ensure that the targeted victims of eviction should not be economic destitute.

5.4   Areas for further research

1. There is need for research to evaluate the factors that contribute to the determinants of different levels of evicted households in engaging in non- farm sectors. This will comprehensively help in understanding and developing of policies and interventions that will of be content specific of how diversification can be focused to non-farm sectors based on levels of evictions.

2. There is also the need in establishing how different contribution factors in the categories in the level of eviction affect the household livelihood diversification. For example

being economically displaced has categories such as loss of access to farming land, loss of access to grazing land, loss of both access to both farming and grazing land, loss of access to wood forest products and non wood forest products. This will assist in better policy of enforcing eviction and incorporating the livelihood strategies. This was one of the limitations of the study where the scale of how each affects was not looked into conclusively. This will also allow for an improved environmental sustainable policy by incorporating a policy to assist the targeted households with reference as to how they were affected.

3. The study does not look on gender roles and does not look on how it affects eviction. This includes how gender influences the number of strategies. There is an opportunity to look on sex aggregated data role with regard to eviction.

4. There is also need to evaluate how the perception of eviction of households affects their livelihood strategies. Whether this perception has an influence on determining how households diversify from engaging to shift away from independence of forest activities. This will enable policy makers understand the importance of incorporating the community in the process of eviction since they are the ones who bear the policy effect. The study did not look into the perceptions of households.

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Annex 1: Test for Multicollinearity

Variable	VIF	1/VIF
Hhsize	1.08	0.929984
Hhgender	1.1	0.912916
Hhedclevl	1.1	0.907577
eviction4_2		
Economical displacement	1.4	0.713248
Physical displacement	1.14	0.874983
Physical &economical displacement	2.95	0.339374
Lnwealth	1.62	0.61769
Lnincome	1.3	0.767994
no_ofgroups	1.12	0.893121
walkprimar~b	1.35	0.7392
victeviction_~b	2.52	0.396185
Distinput	1.04	0.96466
Mean VIF	1.48	

Annex 2: Pairwise correlation

pwcorr correlation Household size Household education level Economic displacement Physical displacement Economic and physical displacement lnwealthlnincome

	Household size	Household educational level	Economic displacement	physical displacement	Economic and physical displacement	lnwealth	lnincome
Household size	1						
Household educational level	0.0747	1					
	0.1548						
Economic displacement	0.0068	0.0946	1				
	0.8968	0.0714					
physical displacement	0.0343	0.0176	-0.0312	1			
	0.5139	0.7376	0.5527				
Economic and physical displacement	0.0053	-0.1587	-0.2346	-0.126	1		
	0.9194	0.0024	0.00	0.0162			
Lnwealth	0.0929	0.1778	-0.0678	-0.0525	-0.4711	1	
	0.0789	0.0007	0.2	0.3211	0.00		
Lnincome	0.066	0.1713	-0.1395	-0.0741	-0.2432	0.4193	1
	0.2089	0.001	0.0077	0.1582	0.000	0.00	
Membership of groups	0.1812	0.1267	0.0125	-0.0767	-0.1931	0.1874	0.1029
	0.0005	0.0156	0.8126	0.1441	0.0002	0.0004	0.0499
Walk to primary	-0.037	0.0242	0.4716	0.004	-0.2245	0.0003	-0.1124
	0.4819	0.6458	0.000	0.9393	0.000	0.995	0.0321
Victim of eviction	-0.094	0.1534	0.1714	-0.0849	-0.7424	0.3783	0.2691
	0.0732	0.0033	0.001	0.1059	0.000	0.000	0.000
Distance to input	0.000	-0.062	0.0585	-0.0086	0.0287	0.0794	-0.0047
	0.9992	0.2382	0.2655	0.8708	0.585	0.1332	0.9294

	Membership Of groups	Walk to primary school	Victim of eviction	Distance to input			
Membership of groups	1						
walkprimar~b	0.072	1					
	0.1706						
Victim of eviction	0.125	0.1795	1				
	0.017	0.0006					
Distance to input	0.0481	0.1049	-0.0784	1			
	0.3602	0.0455	0.1354				

Annex 3 : Test for Heteroscedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
>   Ho: Constant variance
>   Variables: fitted values of nostrategyaftereviction
>   chi2(1)   =   7.23
>   Prob > chi2 = 0.0072

Annex 4: Poisson regression results

Variables	Coef.	Std. Err.	P>z
Household size Hhsize	0.029306	0.01622	0.071
Household head educational level	-0.01272	0.059687	0.831
Eviction levels:			
Economical displacement	-0.17105	0.205703	0.406
Physical displacement	-0.48055	0.334306	0.151
Economical &physical displacement	-0.44998	0.122185	0.000***
Log of wealth	0.069992	0.024198	0.004***
Lnincome	0.106359	0.045804	0.02**
Membership of groups	-0.00428	0.060619	0.944
Distance to primary school	-0.00101	0.000685	0.141
Victim of eviction	-0.18178	0.113479	0.109
Distance to input	-0.00295	0.003413	0.388
_cons	-0.72701	0.501995	0.148
Observation	364		
prob>chi^2	0		
Log likelihood	-533.576		
Chi^{2}deviance	139.3796		
Pearsonchi^2	131.7028		
prob>chi^2(347)	1		

(p value level of significance *=10%,**=5% and***= 1%

Annex 5: Correlation between wealth and income

Correlate lnincome lnwealth

Lnincome lnwealth

*lnincome*1.0000

lnwealth 0.4193 1.0000

Annex 6: Questionaire

The effect of eviction and diversification on the livelihood in the Mau forest

Introduction

The purpose of the study is to collect information about the effect of eviction livelihood strategies on livelihood of households in the Mau forest complex those in the forest and evicted. The responses given from the research will have strict confidentiality and will not be shared to the general public.

Section 1:

1.   General information

Name of interviewer ………………………………………………………………….

Date ………………… Interview time : From ………………To……………………….

Name of respondent ………………………………………Phone no:……………………..

County……………………………..District …………………………Division…………………..

Location…………………………Sub location …………………Village……………………….

2.   Household head characteristic((Instruction indicate household living in the homestead)

Name of the individual	2.1Gender 1=male 0=female	2.2Relation to the household heasd 1.Household head 2.Spouse 3.Relative 4.0thers	2.3Level of education 1.Illetrate 2.Primary 3.Secondary /technical degree 4.Tertiary	2.4Numbers of years in education	2.5Age of the individual
1.					
2.					
3.					
4.					

Section 2: Livelihood strategies

2.1 Livelihood strategies

Livelihood strategy	1 if participates 2 if doesn't participate
1=Livestock keeping	
2=Crop farming	
2=Waged agricultural labour	

3=Waged non-agricultural labour	
4=Salaried skilled non-agricultural labour	
5=Salaried skilled agricultural labour	
6=Petty business	
7=Transfers	
8=income from forest products	
9=income from non wood products	
10=other specify	

2.2 Which are your three main livelihood strategies in the order of importance?

Livelihood strategy	List the strategies in order of importance eg (1,6,7)
1= Livestock keeping 2=Crop farming 2= waged agricultural labour 3= waged non-agricultural labour 4= salaried non-agricultural labour 5= salaried agricultural labour 6= petty business 7= remittances 8= others specify…………	

4.3 What are the reasons for you response above?

………

Total household income for the last 12 months

	Income type	Did any household member earn from? No= 0, Yes = 1. *If no go to the next row*	Number of units worked (days, weeks, months, times,)	Average income/ unit		Total income
				Cash	In kind	

1	Agricultural labor				
2	Casual labor				
3	Salary				
4	Pension				
5	Rent				
6	Food aid				
7	Remittances/Gifts				
8	Marriage/dowry				
9	Sale of wood or charcoal				
10	Sale of fruit				
11	Petty trade (shops, grocery)				
12	Transport				
13	Sale of crops				
14	Sale of crop residues				
15	Sale of animal fodder				
16	Livestock sale				
17	Milk sale				
18	Eggs sale				
19	Sale of other livestock products				
20	Rented out land				
21	Proceeds from machine hire				
22	Other specify				
23	Total				

Section 3 :   Eviction

1. Did you receive any notice of the eviction process   1.Yes   2.No

b) If yes what were your main sources of the

              1. Radio ( )   2. Information meeting (   ) 3. Neighbors (   ) 4. By surprise ( ) 5.Dont remember (   )

2. Have you received any compensation?

              1. Yes   2.No

b) If   Yes what was the form of compensation?

              1. Monetary form   2.Resettlement 3. Others

3. How has eviction affected your household ?(tick where appropriate).

         a)   Economically displacement.

            I.   Loss of access to farming land.

           II.   Loss of access to grazing land .

III. Loss of both access to both farming and grazing land .

IV. Loss of access to forest products Non wood forest products

V. Loss access to resources

b) Physically displacement.

c) Physical and economical displaced

I. Loss of access to farming land.

II. Loss of access to grazing land .

III. Loss of both access to both farming and grazing land .

IV. Loss of access to forest products Non wood forest products

V. Loss access to resources

VI. Physically displaced

4. What is your perception on the eviction process ?

    1.   Positive   ( )   2. Don't know ( )   3. Negative (   )

5. Do you have any perceived knowledge on the reason for conservation?

  1. Yes   2. No   3. Don't know

6. What are the benefits of the forest that your household derives ?

……
……………………………………………………………………………………………….

7. What are the perceived cost that your household derives from the forest ?

……
……

8. Is the respondent living within the forest boundaries ?

   1. Yes   2.No

b). If No was the respondent evacuated from the forest 1. Yes   2.No

c) What was the prior investment on the area of land the household settled (tick where appropriate)

1.   Stone wall   2.Live barrier or fence   3.Tress planted

9. What is the respondent's current household dwelling ?

1.What is the type of dwelling	1.Mud house 2. Thatched (straw)
	3. Permanent structure 4. Iron sheet
2.Is the dwelling you currently live?	1.Owned by your household head
	2. Rented

Section 4: Determinants of diversification

4.1 Land holding of the household

Tenure	Cultivated in acres	Fallow (eg for grazing)
1.Own land		

2.Leased in		
3.Leased out land		
4.Borrowed out		
5.Borrowed land		
6.Total		

2. Do you have a title deed for the land you own? 1=yes   2=no

4.2 Livestock holdings

Type	Does he own if yes 1or no 0?	Stock when evicted	Value of stock	Stock now	Value of stock
1.Bulls					
2.Cows					
3.Heifers					
4.Calves					
5.Goats					
6.Sheep					
7.Donkeys					
8.Pigs					
9.Chicken					
10.Ducks					
11.Guinea fowls					
12.Rabbits					
13.Geese					
14.Turkey					
15.Total					

4.4 Social organizations

1.Are you a member of any group	1= yes 0= no	
2.If yes specify the kind of a group	1= farmer group 2= women's group 3= faith based organization 4= community based organization 5=youth club 6= farmer cooperative 7= welfare organization 8=Savings and credit group	

	9= others specify………..	
3.Year you first joined / No of years		
4.Main function of the organization	1=produce marketing 2= input access 3= savings and credit 4=welfare 5= tree planting 6= faith based organization 7= others specify	

4.3 Household Asset holdings

Asset name	Do they own 1 if yes or no	Number currently owned	Year bought/built	Current value
1.Bicycle				
2.Car				
3.Wheel barrow				
4.Store for farm produce				
5.Livestock kraal				
6.Radio				
7.Mobile phone				
8.Television				
9.Computer				
10.Water pump				
11.Chemical sprayer/pump				
12.Sofa seats				
Motor bike				
13.Tractor				
14.Ox plough				
15.Donkey cart				
16.Lorry				
17.Water tank				

Others specify…………				
Total				

4.6. Marketing of crops

a) Kitchen garden

Crop type (***)	production (kgs)	Qty sold (kgs)	price/ kg	total sales	consumed (kgs)	saved for seeds (kgs)	Given out (kgs) (Tithes, donations, wages in kind)	Estimate of land area cultivated in acres
Total								

b)   Main field

Crop type (***)	production (kgs)	Qty sold (kgs)	price/ kg	total sales	consumed (kgs)	saved for seeds (kgs)	Given out (kgs) (Tithes, donations, wages in kind)

Total							

4.7 Marketing and production of Livestock

Type	Number owned currently	How many did you sell	Average selling price/ unit	Total income
1.Bulls				
2.Cows a) Improved dairy cattle cross breed or pure breed or exotic breed				
b)Local breed dairy cattle				
c)Non Dairy (beef cattle)				
3.Heifers				
4.Calves				
5.Goats				
6.Sheep				
7.Donkeys				
8.Pigs				
9.Chicken				
10.Ducks				
11.Guinea fowls				
12.Rabbits				
13.Ducks				

14.Turkey				
Total				

3.9 Indicate the value collected in the last one 12 months

4.5 Social amenities

	Issue	km	walking minutes	cost
1	Distance to the nearest town			
2	Distance to the nearest input source (fertilizer, concentrates, seeds)			
3	Distance to agricultural field office			
4	Distance to the nearest Bank			
5	Distance to nearest market			
6	Distance to the tarmac road			
7	Distance to the water source			
8	Distance to the nearest hospital			
9	Distance to the nearest electricity hook up			
10	Distance to the nearest primary school			
11	Distance to the nearest secondary school			
12 Number of contacts with extension services in the last 12 months				