

UNIVERSITY OF NAIROBI
INSTITUTE OF DIPLOMACY AND INTERNATIONAL STUDIES

**ROLE OF ENVIRONMENTAL GOVERNANCE IN THE MANAGEMENT OF LAND
DEGRADATION IN THE EAST MAU FOREST COMPLEX, KENYA.**

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DECLARATION

This research proposal is my original work and has not been presented for the award of a degree in masters in this University or any other Institution of higher learning.

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This research proposal has been submitted for examination with my approval as the University of Nairobi supervisor.

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DEDICATION

This work is dedicated to my loving wife Judy Njoroge, my caring parents and siblings for the patience and encouragement through the period of conducting this research project.

The hours spent are immense and your emotional support does not go unnoticed. Your reward is truly great.

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ABSTRACT

Transformation of forest to agriculture, creation of industries, imminent human activities and construction of infrastructures has been identified as the core drivers of land degradation been carried out by most forest conservation workshops. The objectives are; to assess the principal drivers / causes of land degradation in the Mau Forest Complex, to analyze the environmental effects of land degradation by the Mau Forest complex, to find out the role of environmental governance on curbing land degradation by the Mau Forest community and to examine the challenges affecting environmental governance approach in exacerbating land degradation in Mau Forest. The theories involved are the natural resource bases theory and the peoples centered theory to conduct the study. The study adopts a descriptive survey research design which is mixed method research that covers both the qualitative and quantitative approach. A sample size of 350 respondents out of 1,200 will be picked using simple stratified random sampling techniques. The study will use questionnaires, interview guides and focus group discussions to collect primary data, the quantitative data from questionnaires will be analyzed using descriptive statistics such as frequencies and percentages. The qualitative data from interviews and focus group discussions will be analyzed using content analysis.

LIST OF ABBREVIATIONS

EAC	East Africa Community
ED	Environmental Degradation.
EIA	Environmental Impact Assessments
EMCA	Environmental Management and Coordination Act
EU	European Union
GLASOD	Global Assessment of Soil Degradation
GDP	Gross Domestic Product
GoK	Government of Kenya
LM	Land Management
KFS	Kenya Forest Service
KIFCON	Kenya Indigenous Forest Conservation Kenya Programme
KNBS	Kenya National Bureau of Statistics
KSH	Kenya Shillings
MFC	Mau Forest complex
MNCs	Multinational Corporations
NCCRS	National Climate Changed Response Strategy.
NEMA	National Environmental Management Authority
NGOs	Non-Governmental Organizations
NRM	Natural Resources Management
NTFP	Non-Timber Forest Product
SDG	Sustainable Development Goals
SMFE	Small and Medium Forest Enterprise

UN United Nations

UN_HABITAT United Nations Human Settlements Program

UNCCD United Nations Convention to Combat Desertification

UNEP United Nation Environmental Program

WB World Bank

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CHAPTER ONE: INTRODUCTION TO THE STUDY

1.1 Introduction

Environmental governance focuses on natural resource management which looks at the people's population living within given resource. Generally, it takes into account ecological, economic, and social factors characterizing it as a form of sustainable development. Environmental governance and management includes active participation and cooperation of different stakeholders both at the public and private sectors.¹ The kind of engagement by the stakeholders will be dependent on the specific project, operational structures in place and the region and acknowledging the role of ineffectual governance, corruption and commercial timber extraction in creating the twin problems of land degradation and upland poverty.²

In addition, human beings living near or within forestlands, understanding of the resources, the terrain, opportunities and their constraints,³ and are apparently in a better place to respond in a faster way to such emergencies as encroachment, timber poaching and fire outbreaks. Besides, when looking at the communities found in the forest lands – both the migrants and the indigenous people – have been the subject of government neglect and gross injustice for a long time, either through colonial aggression,⁴ unbalanced allocation of resources, or displacement by the more favored logging or mining concessionaires completely,⁵ the principle of social justice

¹ Warner, K, (2005) *Patterns of tree growing by farmers in Eastern Africa*. In: Arnold, J.E.M. and P.A. Dewees (Eds). *Tree management in farmer strategies: Responses to agricultural intensification*. London: Oxford.

² Thenya, T., E. Nahama, and B. Wandago, (2007) *Participatory Forest Management Experience in Kenya (2006-2006)*. *Proceedings of the 1st National Participatory Forest Management Conference, 6-8 June 2007*. Nairobi, Kenya.

³ Alcorn, J, (2003) *Indigenous Peoples and Conservation*. (Conservation Biology), 7(2), 424-426.

⁴ Ibid

⁵ Benson, D, (2001) *Wildlife and recreation management on private lands in the United States*. (Wildlife Society Bulletin, 29(1), 359-371.

demands no less than stake holder participation in both the benefits and responsibilities of forest management.⁶ Transformation of forest to agriculture, creation of industries, imminent human activities and construction of infrastructures has been identified as the core drivers of degradation of land been carried out by most forest conservation workshops.

Land degradation has a major effect on ecosystem by slowly turning the tropical zones into deserts, depletion of water resources and this is mainly due to logging and clearing up land for settlement, leading to climatic changes that affect agricultural produce by lowering the yields and the gross domestic product of the country. This finally leads to a country that cannot support itself with the agricultural produce but has to import food produce from other countries because of the increased desertification. In addition, environmental governance is a significant way on reducing land degradation by community. Communities living in the forests if not well governed end up being a major cause of degradation of land due to their unfriendly activities towards the environment.

1.2 Background

Kenya is among East Africa countries that have gone through significant forest cover loss, mostly for the last two decades. Mostly this is as result of agricultural expansion over rapidly growing population. Many rivers have gone dry since the water catchment areas are slowly getting depleted as a result of the continuous logging up until last year when logging was suspended. Poor governance at sectors of forest has contributed to the excision of hundreds of thousands of forest land by the government. This has been pointed out as the major drivers of land degradation that has affected gazetted forest land in the vital water catchment areas like Mau. Mau Forest Complex has a coverage of 400,000 hectares with the largest closed forest

⁶ Agrawal, A. & Gibson, C, *Enchantment and disenchantment: The role of stakeholders in natural resource conservation*. (World Development, 2009), 27(4), 629-649.

ecology amongst the East African countries. Mau waters also play a very critical role for the trans-borderline of Nile river and Lake Victoria which are the largest fresh water bodies in Africa. Being the largest fresh water bodies they are also a source of livelihood for the marine life and the implication of this is that should the waters be affected in any way then the marine life would also be affected. Mau has other functions such as filtering and regulating underground water, storing water, controlling local and regional climate, protection of the soil from degradation and provision of habitats for different biotic diversity.⁷

Most of forest areas have been cut down which is against the law with view of creating new settlements even as populations increase with no enough land for habitation.

The study examined the role of environmental governance and management of land in Mau Forest Complex. In regards to this, it aimed to add more knowledge to the different partners in the land management and usage sector⁸. In addition, the study aimed to make a deeper theoretical and empirical assessment of the likely land degradation threats posed by the climate change, bio diversity, and loss in agricultural productivity, human settlement.

In the recent past, Mau forest has been the center of attention due to the continuous encroachment of the forest land by the communities around the forest. These communities have time and again been asked to leave the Mau complex because of the continuous damage that is evident but none wants to leave citing lack of land for settlement, The Mau complex is identified as Kenya's most important water towers and is located in the Rift Valley region with four wards - Kericho, Nakuru, Bomet and Narok. These counties are well known for their green habitation and the farming that takes place there and are somewhat the backbone of agriculture in Kenya.

⁷ Dr. Shazia Chaudhry. *The Impact of Climate Change on Human Security: The case of the Mau Forest Complex*, 1963 – 2012.

⁸ P. Forster et al., „Changes in Atmospheric Constituents and in Radiative Forcing“, In: *Climate Change 2007: The Physical Science Basis, Contribution of Working Group 1 of the Fourth Assessment Report of the IPCC*, S. Solomon et al., (Cambridge: Cambridge University Press, 2007).

The foremost economic activities in Mau Forest Complex area are tea plantation, tourism and energy sectors which generate more than 20 billion Kenya shillings in a year. From the Mau Forest complex are some of the falls within Kenya that also serve as tourist attractions. Most of the urban areas in the Rift Valley region depend on it for water supply. As such, there are several major towns' as well small towns that have continued to suffer the effects of tampering with the Mau complex and this is evidenced by the many people living in the urban areas who are continuously looking for water. Water is a scarce commodity in some areas but the Mau complex is the source of the many rivers that are there in Kenya, This means that any damage that is cause to the MHC finally leads to degradation of land as it is the ultimate source of the rivers.

1.3 Statement of the research problem

Activities such as urbanization, agriculture, deforestation and overuse of fossil fuels are the key causes of land degradation thus affecting the environment⁹. Poor rainfalls have led to prolonged drought periods and this leads to poor crop yields. Overgrazing in the forest regions, charcoal burning, mining within the forest, violence, civil strives illegal logging, famine, deliberate or accidental fires, loss of livelihoods and urbanization all attribute to land degradation in Kenya.¹⁰ This not only presents significant economic and environmental threats, but it also links to a disturbing challenge to the established system of regulation in internal security, weak governance, chronic poverty, financial constraints and conflicts.

These drivers are reflected on the governance which involve little or no application of forest management which results to conflict of resources. Since the late 1980s, about a quarter of the

⁹ P. Forster et al., „Changes in Atmospheric Constituents and in Radiative Forcing“, In: *Climate Change 2007: The Physical Science Basis, Contribution of Working Group 1 of the Fourth Assessment Report of the IPCC*, S. Solomon et al., (Cambridge: Cambridge University Press, 2007).

¹⁰ T. Renard, „Heated Terror: Exploration of the Possible Impacts of Climate Change on the Causes and the Targets of Terrorism“, (Les Cahiers du RMES, Volume V, Numero1, ETE 2008), p.7.

400,000 hectares of land of the forest has been lost due to heavy encroachment and destruction by illegal excisions, land distribution, logging practices and use of forest fires to clear land for settlements and cultivation. Due to this, land degradation has immensely occurred leading to frequent droughts, climate change, little rainfall and temperature rise. There has also been increased soil erosion, flash floods with difficulties to the small farmers and pastoralists in the area. This has caused threats to the health of agricultural productivity, food supply and high levels of unemployment in the area. The area has also experienced decline in the local tourism due to rapid changes in the land and climate changes leading to losses in revenue and economic degradation. These issues are complex and require major attention. Therefore, sought to assess the gap that exists between the role of environmental governance and the degradation of land in the Mau Complex Forest.

This study will aim in assessing the role of environmental governance in the management of land degradation in the East Mau forest complex, Kenya.

1.4 Research questions

The study answers;

1. What are the principal drivers of land degradation in Mau Forest complex?
2. Which are the environmental effects of land degradation in the Mau Forest complex?
3. Which are the challenges affecting legal and institutional framework put in place to govern the Mau Forest complex?

1.4.0 Research objectives

1.4.1 General objectives

To examine the role of environmental governance in the management of land degradation in Mau forest complex.

1.4.2. Specific objectives

1. To evaluate the principal drivers of land degradation in the Mau Forest Complex.
2. To analyze the environmental effects of land degradation by the Mau Forest complex.
3. To examine the legal and institutional framework put in place to govern the Mau Forest complex.

1.5 Literature review

1.5.1 Introduction

Degradation of land is a progression that is slow and cumulative and takes a long time for its effects to be felt on the environment or by people living around the affected area. Land degradation can therefore be taken to mean the loss of ecosystem purpose and its products due to natural or caused events which the land cannot recover from. Since this was an issue that was being faced worldwide, it was declared a global environment and development issue during the UN Convention to Combat Desertification. There are about 3.2 billion people in the world that are affected by the degradation of land especially the very poor in the society, farmers with small parcels of land and people who are living in the rural areas.¹¹ The population of the world is estimated to rise by about 35 percent which would be translated into about 9.7 billion people in 2015 with increasing demands for agricultural product like food, fuel and fiber. Nevertheless the

¹¹ World Conservation Monitoring Centre ; International Union for Conservation for the Nature and Natural Resources (1997)

strain on world land resources is on the rise because of other factors as well like where the system of producing agricultural products are made less effective by factors like weather effects and variability of the climate, also the loss of biodiversity. A change in climate worsens the income and profits from agriculture thereby threatening the food production systems stability and the flexibility of agro-ecology.

1.5.2 Environmental governance

Considering the world's resources, land is one of the most limited and non renewable of all.. Despite the fact that land is owned by individuals and private sectors, its management and sustainability requires proper collaboration of different fields like policy makers, land users and scientists putting in mind that their condition is resolute by the continuous interactions of social, economic, political and biophysical structures and processes, operating across a variety of temporal and spatial scales.¹²

Biophysical factors like soil, hydrological patterns and the climate are covered with economic and socio-political processes and structure such population demographic changes, technological and markets changes as well as human migration¹³. Some of these variables would move at a slower speed and be in operation over a long time frame, while others are more quick¹⁴. The existed experience of soil and land degradation becomes ostensible at the local balance¹⁵, where the populace experience it as a creeping phenomenon¹⁶, with the vast majority of people being acutely dependent on the natural resource base for their livelihood (often the marginalized and

¹² Ernest T. Stringer (2007). *Action Research (Third Edition)*. London: Sage Publications, 279pp (pb), ISBN: 978-1-4129-5223-1,

¹³ World Conservation Monitoring Centre ; International Union for Conservation for the Nature and Natural Resources (1997)

¹⁴ Carpenter and Turner, (2000) *Hares and Tortoises: Interactions of Fast and Slow Variables in Ecosystems*

¹⁵ A. WARREN (2002) *land degradation & development Land Degrad. Develop.* 13: 449–459 (2002)

¹⁶ Ademola K. Braimoh, Paul L. G. Vlek (2008) *Impact of Land Use on Soil Resources*

the sidelined) being the most susceptible to its effects¹⁷. While the soil and land resource being degraded is of national authority concerns, the indirect impacts of degradation rise above national, district and village boundaries and affect food security, food prices and provision of ecosystem service in locations that are downstream, far away from the location of degradation. This is different from environmental challenges that contain properties that are common resources which naturally and directly affect everybody (e.g. ozone depletion). However, these intricate multi-scale connections present a clear need to frame soil and land and degradation as global issues which requires international recognition – in particular driving investment in technology, capacity building and technology transfer and funding to tackle the soil and land challenge¹⁸– and since the continued soil and land degradation is a threat to our common food security. The international approach is very important since soil degradation and land degradation is seen to and thought to be increasing in the global arena in both harshness and extent¹⁹ and it is of outmost importance for nations to cooperate so as to minimize border conflicts over soil, land and other associated resources such as water. The global environment sustainability and sustainable development is at risk when there is no sustainable management and use of soil and land resources.

1.5.3 Issues of land degradation

Being a global issue, degradation of land has been defined in many ways starting with FAO in 1979 who defined it as the reduction of present and potential capability of soils to indulge in the production of goods and services. In addition, the Millennium Assessment further defined as the

¹⁷ Ernest T. Stringer (2007). *Action Research (Third Edition)*. London: Sage Publications, 279pp (pb), ISBN: 978-1-4129-5223-1,

¹⁸ Eric F. Lambin and Patrick Meyfroidt (2002) *Global land use change, economic globalization, and the looming land scarcity*

¹⁹ Bai, Z.G., Dent, D.L., Olsson, L. & Schaepman, M.E. (2008). *Proxy global assessment of land degradation. Soil Use and Management*, 24, 223–234

decline in the ability of land to produce environmental goods, functions and services that are in support of the societal development. Looking at the concept of dry lands, UNCCD brought in the definition of degradation of land as the loss or reduction of economic and natural productivity and complication of rain-fed, irrigated cropland, pastures, woodlands in dry sub humid, semi-arid and arid areas, forests and range areas due to how the land is being used or process arising from poor settlements patterns and human activities. The degradation of land has increased during the 20th century because of the increase and combined push for livestock and agricultural production, dangerous weather events like coastal surges and draughts, deforestation and urbanization.

There are many complex interrelated degradation processes that lead to the deprivation of land the key drivers being deforestation, poor agricultural practices and overgrazing of livestock. The symptoms of land degradations maybe seen in form of water pollution, soil erosion, low yields from the agricultural produce salinization. FAO LADA/WOCAT²⁰ says that there are different degradation types, these include:

Biological deprivation is defined as the loss of vegetative cover, species and habitats and decline of biomass from the environment. Secondly, there is the erosion of the soil by water which is the process of loss of topsoil because of water runoff or overland flows. These can be identified through formation of gullies, landslides in highlands and riverbank erosion. Another form of degradation is wind erosion that which is related to uncovered lands which are susceptible to strong winds and light soils. Wind erosion harms the natural vegetation and land through the removal of soil from one location and depositing it in another location. Its results is; loss of productivity and nutrients, decline of the structure of soil and the dryness of soil. Dust and dirt that is in the air will inevitably be deposited on everything. This dust blows all over including in

²⁰ FAO, 2009. Field Manual for Local Level Land Degradation Assessment in Drylands. LADA-L Part 1: Methodological Approach, Planning and Analysis. FAO, Rome.

homes and it also blows and covers the roads and the highways and to an extent any plants that are on its pathway are also covered. In the soil formation process, geological processes that occur out of the transportation and deposition of sediment are very important over a period of time. Moreover, chemical degradation is normally associated with chemical properties of soil which present itself in terms of high soil PH, reduced soil organic content, soil pollution by pesticides, nutrients mining and leaching. The soil here is seen as an example of a living organism, and as a one has a multifaceted system of self-regulation. Soil that is healthy has biological and chemical attributes which are inclusive of the acid and buffer base capacity, toxic metal inactivation, pathogen destruction, organic matter decomposition, nutrient supply and toxic organic inactivation and deactivation. These attributes are the ones that enable a soil to be classified as “healthy” soil. When not properly managed, their abilities which are limited can be mismanaged. The magnitude to which these properties are affected define the magnitude of degradation by chemicals. Just as with soil loss, chemical degradation can be measured to determine how much is tolerable. However there is a difference in that unlike the soil loss, chemical degradation can be reversed. For example when there is a lot of acidity, the levels of acidity can be counterbalanced. Accumulation of metals in excess such as copper, cadmium or lead to high levels of toxicity is unalterable.²¹ In some cases, there are ordinary processes that can also result to chemical degradation for example when a fire burns the organic matter in the built up reserves. The changes in stream hydrology can lead to soil condition that is anaerobic as well as restricted drainage. Volcanic ash that is high in solvable salts can be dumped on fertile soil. The focus of this chapter, however, will be on the impacts of anthropogenic, especially those of modern industrial people. Physically, degradation presents itself in form of loss of aesthetic or

²¹ Eric F. Lambin and Patrick Meyfroidt (2002) *Global land use change, economic globalization, and the looming land scarcity*

natural physical condition of land for example quarrying, soil compaction, clogging of pores with fine soil material, and creation of an impervious soil surface layer obstructing infiltration and scarification. Areas that are flat low laying often lead to inadequate drainage , choking of natural drainage , poor maintenance of drainage and are also prone to flooding. This creates a number of problems which include restricted permeability of soils, reduction in infiltration, crusted soil surface as well as decreased air circulation in the soil. Another form of artificial soil loss are the human activities for development which include building, construction, railway track construction, industrial development , increased urbanization etc. are other forms of physical degradation of soil in general and in particular artificial soil loss.

1.5.4 Literature gaps

In the past most of the researchers have studied environmental governance in relation to other field but few have looked at it in relation to land degradation especially in Africa. The studies that exist some have stayed for a period of time and therefore as the study was being carried out there were some gaps that were felt from the scholars.

1.6 Natural resource management theory

This study will adopt the natural resource management theory. One of the greatest challenges in many nations is environmental management in regards to people living close to the resource being given very little recognition. That has however changed over the past years because the idea that these people may play a very significant role in the planning, usage and management of the ²²resources in their surroundings. To date the stakeholder natural resource management – an effort to involve all environment stakeholders into guarding their immediate environmental surrounding with an aim to meet the social and ecological goals both locally and globally – has

²² Agrawal, A. & Gibson, C, *Enchantment and disenchantment: The role of stakeholder in natural resource conservation*. (World Development, 2009), 27(4), 629-649.

been used.²³ This practice has been supported by many organizations in theory regarding humans and environment.

A paradigm shift of ecology was brought about by the flux of nature which looks at how species like humans relate to their surroundings. It considers several elements like the fact that a systems approach is most fitting for ecosystem administration, human beings are an important part of the landscape, and their participation in the management of the natural resource is a worthwhile and necessary endeavor.²⁴ This concrete change allows for additional incorporation of the various different groups in the natural resources management rather than trying to dismiss them completely as has been done in the days gone by.²⁵

Debated upon is the essence that poverty is high caused by a combination of high population growth, resource depletion, unequal access to resources and environmental degradation. In many developing countries, these factors have been also been associated to income inequalities which easily translate to grievance increasing the risks of societal conflict and rebellion.²⁶ The same have also been reported in some developing countries with extractive industries such as Congo

²² ‘Wangari Maathai-an excerpt from the Nobel Peace Prize winner’s Acceptance Speech,’ (Earth Island Journal). Available at

http://www.earthisland.org/journal/index.php/eij/article/wangari_maathai_an_excerpt_from_the_nobel_peace_prize_winners_acceptance_sp/ [Accessed on 12/04/2019].

²³ Alstine, J.V., et al, *Resource Governance Dynamics: The Challenge Of ‘New Oil’ In Uganda*, (Resources Policy, Vol. 40, 2014), pp.48–58, p. 48.

²⁴ Ibid, p. 48

²⁵ Samndong, R.A. & Nhantumbo, I., *Natural resources governance in the Democratic Republic of Congo: Breaking sector walls for sustainable land use investments*, (International Institute for Environment and Development Country Report, February 2015), p. 11. Available at <http://pubs.iied.org/pdfs/13578IIED.pdf> [Accessed on 12/04/2019].

²⁶ Berkes, F. & Seixas, C, *Lessons from community self-organization and cross-scale linkages in four equator initiative projects. Joint Project with the International Development Research Center and the UNDP. Winnipeg, Canada: Centre for Community-Based Resource Management*, (Natural Resources Institute, University of Manitoba, 2004).

and Sudan²⁷ . In those countries conflicts erupt thereby producing significant environmental degradation.²⁸

Environmental management is one of the more prolific stakeholder natural resource management strategies all over the world. This is because forests have been recognized as very important yet threatened natural resources.²⁹ There are very many ecosystem products and services provided by Forests for human consumption, and a home for countless species. The complication is occasioned by the fact that there is no clear tenure of land as the indigenous people have no ownership evidence.³⁰ Stakeholder natural resource management in developing countries has been initiated by international institutions (e.g. United Nations), international non-governmental organizations, and national governments.³¹ Local communities have also implemented stakeholder natural resource management without the supervision of external interventions and primarily in response to management through exclusion of public lands or recognition by community members of degradation of resources.³²

1.7 A Peoples- Centered Development Theory

This is the process where society members increase institutional and personal capability to manage and mobilize resources to produce sustainable and well distributed improvements in

²⁷ Kellert, M., Audouin, M., & Weaver, A, *Advancing sustainability science in South Africa*. (South African Journal of Science, 2010), 102, 379-384

Agrawal, A. & Gibson, C, *Enchantment and disenchantment: The role of stakeholder in natural resource conservation*. (World Development, 2009), 27(4), 629-649.

²⁸ ohannes, E.M., et al, 'Oil discovery in Turkana County, Kenya: a source of conflict or development?' African (Geographical Review, Vol. 34, No.2, 2015), pp.142-164, p. 142.

²⁹ FAO. (2003). Country profile, Kenya.

³⁰ Kellert, M., Audouin, M., & Weaver, A. (2010). Advancing sustainability science in South Africa. South African Journal of Science, 102, 379-384

³¹ Ibid

their quality of life. This theory majorly looks at the participation (as a complicated and continuous process where influential people are able to put into practice their influence to bring about developmental change), social learning, empowerment and sustainability of these individuals.³³ The People-centered developmental approach is aimed creating a sense of community independence to an point of empowering them to manage their own resources and participate in policy making to guard their resources. Looking further into the sustainability aspect of the environment, it advocates community actions that are small scaled in nature so as to enhance self-reliance economically and bring about income that is reliable. It also provides room for the society to come up with their own decisions and developmental goals which would determine the quality of their lives. Individuals have a much more motivation to pursue environmental practices that sustainable in nature where these resources are found. There is the dissuasion of individuals enriching themselves at the expense of other people who are depending on the same resource.

As per the pilot study carried out in the Mau forest in 2010, there are sufficient natural resources which are very important for agricultural development such as human capital, access to water and the arable land.³⁴ It was noted that the people found in Mau needed inspiration, empowerment (in terms of addressing socio-cultural barriers), and reassurance about agriculture and they needed the relevant tools to execute activities that would bring about agricultural development. The approach ensures that there is education and involvement of the local communities in various areas of development. These communities become responsible,

³² Ibid

³³ Flood, L. and U. Grasjo, *A Monte Carlo Simulation Study of Tobit Models*. (Applied Economics Letters, 2001), 8 (581-584).

cooperative, creative, empowered and self-confident.³⁵ They also empowered to make decisions on matters affecting them and they take a key role in social and economic development. According to the pilot study conducted in the Mau forest in 2010, there are enough natural resources which are fundamental to agricultural development such as arable land, access to water and human capital.³⁶ These communities become empowered, self-confident, creative, responsible and cooperative.³⁷

The theoretical base which supports the study puts great emphasis on people taking the role of wanting to participate in activities that will lead to their development. It inspires people, to make their own decisions and promotes access to development related resources that are needed to enhance their development activities. The partaking of these communities in agriculture related activities at Mau forest will lead to independence, self-sustenance, personal enrichment, economic and community development and having a reduction of land degradation. Every community is unique in its own way hence the people in the community should be respected and trusted, their values, skills and potentials appreciated. They therefore should not be branded in any way, many a times the community could be branded as apathetic on disinterested and that the programmes brought forth do not fit them. The hands on approach is what the People centered developmental approach encourages in the people's developmental process. The people will be providing for their needs as well as for the needs of their families while participating in the agricultural and economic development of the nation.

³⁶ *The Mau Forest Complex* 2010

³⁷ Thenya, T., E. Nahama, and B. Wandago, *Participatory Forest Management Experience in Kenya (2006-2006)*. (Proceedings of the 1st National Participatory Forest Management Conference, 6-8 June 2007. Nairobi, Kenya).

1.8 Hypothesis of the study

- I. Good environmental governance reduces land degradation
- II. Land degradation reduces revenue channeled to the government coffers.

1.9 Justification of the Study

The removal of barriers to stakeholders' access to resources that are productive can lead to increased participation in economic and social growth and all seven blocks in Mau complex. The study will give attention of the Kenya Forest service, Mau Forest Management Plan, the stakeholders in the management of Mau block and help in the formulation of strategies to aid the indigenous communities. The study will provide an extensive collection of material that is the Environmental governance and management. The government and stakeholders will be greatly encouraged to focus their attention in development programs for rural areas and promote the Maasai community dependence on forests.

This study will be shared with the Ministry of Agriculture to sensitize farmers on Good Agricultural Practices and good land use since agricultural the key causes of degradation of land are activities.

The study will create awareness and understanding of environment policies and management by all stakeholders. District planners, the policy makers in different regions and the development officers in communities will also earn great value from this study. It will allow especially the policy makers, developers of the community to have profound knowledge and understanding of the reasons that impact the economy negatively. Also give the reasons as to why the community is not involved in the projects at an individual level. In addition, different ways of dealing with the forest management may be finally realized by the policy makers, community developers and

other stakeholders. Finally, the study will be a useful reference material on the same for readers and other researchers on similar topics.

This study helps unravel some of the main drivers which have continually contributed to degradation of land and environmental in the MFC. It helps throw some light on the major reasons of similar degradation and how it affects the management, thus affording all the concerned agencies and authorities the singular hope of instituting effective counter-measures at the most nascent level, the resource management and conflict prevention and its management. That way, many lives may be saved as destructive rhetoric by politics, who often whip up ethnic and political tension, can be headed off. That would also help in ensuring harmony and stability and throw in towards the achievement of Vision 2030 of Kenya goals, among others.

For the academic community, this study provides contemporary insights on particular aspects of environment governance in a forested ecosystem. It presents clear findings and recommendations that would be useful to researchers, students, policymakers and administrators at the KFS, among other key players and stakeholders.

1.10. Limitations of the research

This Study had limitations arising from several subject matters. In terms of primary data collection, it was limited in its geographical scope to Kenya, even though its implications will be valid for the other Eastern Africa region, at least. Otherwise the paper was subject to several other constraints including: logistical challenges that may prevent the researcher from physically sampling a maximum number of respondents; inadequate finances; time factor since the researcher has a full time employment and the course requirements itself for projects of this nature. In addition, the researcher noted that land issues and resources, including their ownership, distribution and governance, are very sensitive in Kenya. The researcher noted that

respondents may be subject to fear of victimization for ‘speaking out’, while government officers may be reluctant to be seen to criticize the government or its policies on the subject matter.

1.11. Scope of the study area

The geographical extent of the study was only within Kenya, with much of the information to be collected within Nairobi and in the Mau Forest Complex. As Kenya’s seat of government offices, commercial and industrial center, are based in Nairobi with entire relevant regulatory and oversight institutions like KFS as well as the Ministry of Environment and Natural Resources. Nairobi is known as a center for academic research, so it facilitated access to some of the leading scholars in the topic of this project. For these reasons, and also for practical considerations of effective reach, the study used Nairobi and the South West Mau and East Mau region as its twin centers of focus.

1.12. Research Methodology

1.12.1 Introduction

This chapter presents the methodology that was used for the study. It looks into the study design, the Target population, Sampling design, Data collection methods, and Data analysis methods.

1.12.2 Research Design

The study adopts a descriptive survey research design. According to Cooper and Schindler³⁸ survey aims at ensuring that an accurate account on a specific aspect of a situation, person or community is the end goal. The case study is appropriate because it involved an intensive investigation of a particular social unit under consideration and deepened the researcher’s perception by enabling the researcher acquire a real and progressive record of personal

³⁸ Cooper, D. R., & Schindler, P. S, *Business research methods* (8th Ed). (New Delhi, India: Tata McGraw-Hill Publishing Company, 2008).

experiences while equally increasing the researchers' ability and skill to analyze. It is also used to determine the motives and reasons for the existing state in the area under study. The study will analyze the role of environmental governance in addressing the management of degradation of land in the Mau Complex.

This study also has a mixed research method that covers both the qualitative and quantitative approach. The study will triangulate between qualitative and quantitative methods. Qualitative research focuses on people's experiences and data is obtained through interviews and observations and open-ended questions.³⁹ Qualitative research is primarily exploratory research aimed at understanding and interpreting social interactions. Some of the methods associated with qualitative data collection are interviews, focus group discussions, case studies to identify either the success stories or failures and survey design techniques. Qualitative methods strongly bring out the in-depth meaning about a study or situation as compared to any other method of data collection. However, in some cases, researchers chose it in their studies with the assumption that it is easier to apply than quantitative method. Quantitative research is related to any form of study that looks into quantities, measurements and amounts of items, population size, sample size among others that can be manipulated statistically.

1.12.3 Target population

Population is taken to be the total group of persons, individuals, objects or events that have common features.⁴⁰ The target population for this particular study, the research covered two main locations, namely Nairobi and the East Mau Forest complex region. In Nairobi, the study sample environmental scholars, academicians even officials and policy makers in relevant

³⁹ Frankfort-Nachmias, C. and Nachmias, D, *Research Methods in the Social Sciences*, 7th ed. (New York: Worth, 2008).

⁴⁰ Mugenda, O. M., and Mugenda, A. G, *Research methods: Quantitative and qualitative approaches*. Nairobi: Acts Press, 2003).

⁴¹ Cooper, D. and Schindler, P. S, *Business research methods*. London: McGraw-Hill, 2006).

government sections and agencies while, at Mau Forest Complex areas, it sampled local leaders and residents. The Mau Complex covers over 290,000 hectares and is located approximately 250 km from Nairobi. It borders Nakuru on the North, west of Kericho and south it borders Narok. The larger Mau is formed by seven blocks which includes Transmara, East Mau, South West Mau, Southern Mau, Maasai Mau, Mau Narok and Western Mau. Among the seven blocks, the only one that's yet to be gazette is the Maasai Mau. The study concentrated in two main wards; Mariashoni ward and Nakuru East ward.

1.12.4 Sampling Procedure

Sampling is the process in which a number of people are chosen from whom data is collected thereafter conclusions drawn about some larger group, whom these people, represent.⁴¹ The survey looked at two types of data – primary data which was collected from first hand sources (respondents) and secondary data – that were gathered from previous case studies, surveys, literature reviews. In this study, purposive and snowball sampling techniques were used to select and interview the respondents in the categories identified in the two main research sites. Purposive sampling can look at averages, but it will also help researchers to identify the extreme perspectives that are present in each population group as well. Snowballing is cost effective as the referrals are obtained from a primary data source. It's is convenient and not so expensive as compared to other methods. It used primary and secondary data since valid research can equally be done out on data already collected by someone else.

1.12.4.1 Sample Size

A sample is defined as a segment of a part that represents the larger whole. A sample of any populace possesses the same features as the population in question and is considered a smaller version and a representation of the population in its entirety under researcher's investigations. A

sample size of 300 respondents out of 1,200 will be picked using simple stratified random sampling techniques based on density of the communities within a particular region. In this research, the sample size was obtained through the formulae for a target population of less than 10,000 scientifically computed as follows⁴²:

$$n = \frac{N}{1+N(e)^2}$$

Where

n= Sample size

e= Level of precision

N = Estimate of the size of the population;

At 95% level of confidence and P=5

n= 1,200/1+1,200 (0.05)²

n= 300

NO.	Target Group	Target population	Sampling procedure	Sample size
1	Researchers and officials in Nairobi	300	300/1200x300	75
2	Local leaders in East Mau area	50	50/1200x300	13
3	Local residents around East Mau area	800	800/1200x300	200
4	County officials in Nakuru County	25	25/1200x300	6
5	Policy makers	25	25/1200x300	6
	Total	1200		300

Table 3.4.1 Sampling Procedure and Sample size

1.12.5 Data Collection Instruments

Both secondary and primary data was collected for the study. Focus group discussions, interview guides and questionnaires were used to collect the primary data. The data that was collected was

⁴² Mugenda, O.M & Mugenda. A.G, *Research methods. quantitative and qualitative approaches*. (Nairobi, Kenya: ACTS Press, 1999), 46-48.

from focus group discussions and interviews was qualitative whereas quantitative data was from questionnaires in nature. The most suitable method to acquire vital information about the people in a given area is by use of questionnaires.⁴³ This is because they are seen to be independent in that the respondents do not feel compelled by anybody to give skewed responses. They are administered and the respondents given time to fill them after which the researcher collects them back for the purpose of analysis. In this case, the questionnaires were able to reach a large number of subjects who had the ability to read and write independently. The questionnaires used both checklist and rating scales. The questionnaire was developed and organized as per the objectives of the research as well as questions appropriate to the research. The questionnaire was both open ended and close ended. Open ended where the responses required were quite detailed and required a lot of explanation and close ended where the responses sought required a direct answer without much explanation. This made it easier for the researcher to get as much information as was necessary for the purpose of this research. The reason as to why the questionnaire is chosen is because it's seen to be the most convenient and economical way of collecting data where respondents' own words are used for analysis thus eliminating the interviewer's bias. Mainly, however, the Study had qualitative data collection method that relied on the purposive and snowball sampling and structured data collection instruments that shape predetermined response categories as already identified.

For this study, secondary data was also collected to supplement the primary data. The desktop research technique was used to collect the secondary data. The desktop research involved evaluation of publication on Mau Forest complex in Kenya. Reports from the Government, these are reports from scholarly articles and by private entities, were also included in the publications.

⁴³ Orodho, A. J, *Research methods*. Nairobi: Kenyatta University, (Institute of Open Learning, 2004).

1.12.6 Pilot Testing Instruments

A pilot study was conducted for this study through pre testing of questionnaires administered to data subjects drawn from the target population. The pretesting activity concentrated on how respondents were answering the questions because in comparison with any other population, challenges in answering questions are expected to arise. The aim of the pretesting questionnaires was to ensure that the respondents were comfortable with the questions and answered them in relation to the research. Moreover, it assisted the enumerators to identify the questions that were not well understood by both them and the respondents and therefore review their strategies of asking the questions. At the end of this stage, the researcher tried to identify items that confused respondents or those which took unnecessarily long to complete. Any weaknesses detected in the questionnaire were rectified to ensure that it was clear and user friendly before the final study was conducted. From the pilot study a rough estimation of the average time that is required to administer the questionnaire was assessed. The data subjects were used in the pilot study and were not be used in the final study. This study used a research assistant who had a comprehensive geographical knowledge of Mau Forest complex. The researcher educated assistants on the importance of allowing the respondents to complete their answers without any form of biasness and to probe further in cases of hesitation from the respondents. The assistants were also very useful when it came to collecting back the questionnaires as they were aware of the topography of the mau complex and as such the researcher did not have to be afraid of getting lost in the massive complex. Many people when doing a research on a complex as big as Mau, one has to have a map to be able to interpret locations or have someone who knows the topography of that region in and out.

1.12.7 Data Collection Procedure

Enumerators in 2 wards in Mau Forest Complex were used to collect the data. The enumerators interviewed the respondents for about 30 to 45 minutes for 4 days. Some respondents took a shorter period while others took a longer period. This was as a result of different personalities of the respondents as well as the length of time that some had lived in the mau forest complex. Those respondents who had lived longer had a lot of information to offer than those who had lived for a shorter period of time. The survey had a pretest of 20 questionnaires done in one day in order to find out the reactions of both the respondents and the enumerators. In the beginning the respondents were quite afraid of filling the questionnaires as they thought that it was a trap to have them detained for being in the mau complex even after the evictions that were carried out by the government very recently. The enumerators had to intervene and advise the respondents that the data collected would be treated with confidentiality and its only after this, that they accepted to participate in the pre-test.

1.12.8 Data Analysis

This study combined both quantitative and qualitative data. Descriptive statistics such as frequencies and percentages were used to analyze quantitative data from the questionnaires. This data can be measured and it could be age of respondents, gender of respondents, marital status of respondents as well as how many years one has lived in the mau hills complex. Concurrently, the qualitative data from interviews was analyzed using content analysis. For one to determine the presence of specific words or concepts that are in texts or sets of texts then, content analysis as a research tool is the most suitable. It works through using a set of categorization for making

inferences that are replicable and valid from data to their context.⁴⁴ Researchers finally compute and analyze the presence, the meanings and the relationships of such words and concepts, thereafter make conclusions about the messages within the texts, the writer(s), the audience, as well as the culture and time which are greatly a part of it.

1.13 Scope and Limitation of the study.

1.13.1 Scope of the Study.

The geographical extent of this study was limited to Kenya, with much of the information to be collected within Nairobi and in the Mau Forest Complex. As Kenya's seat of government offices, commercial and industrial center, are based in Nairobi with entire relevant regulatory and oversight institutions like KFS and the Ministry of Environment and Natural Resources. Nairobi is center of academic research, so it facilitated access to some of the leading scholars in the topic of this project. For these reasons, and also for practical considerations of effective reach, the study used Nairobi and the Mariashoni, Nakuru East wards for the research.

1.13.2 Limitation of Study

This Study was limited due to several subject matters. In terms of primary data collection, it was limited in its geographical scope to Kenya, even though its implications will be valid for the other Eastern Africa region, at least. Otherwise the paper was subject to several other constraints including: logistical challenges that may prevent the researcher from physically sampling a maximum number of respondents; inadequate finances; time factor as the researcher is a full time employee; and the course requirements itself for projects of this nature. In addition, the

⁴⁴Baulcomb, J, "Management of change through force field analysis," *Journal of Nursing Management*, (2003), 11 (4): 275-280

researcher noted that land issues and resources, including their ownership, distribution and governance, are very sensitive in Kenya. The researcher noted that respondents may be subject to fear of victimization for ‘speaking out’, while government officers may be reluctant to be seen to criticize the government or its policies on the subject matter.

1.14 Chapter outline

This study entails four more chapters where chapter two discussed the issues of land governance looking at the various forms, causes and characteristics of land degradation. Chapter three examines the literature that exists regarding the environmental governance and also land degradation management taking into consideration the various examples in different countries globally and also in the area of study based on the interview that was conducted during the study. In addition, chapter four reports the findings of the survey from the interviews that were conducted. In conclusion, chapter five seeks to give recommendations of the findings that were found.

CHAPTER TWO: LAND DEGRADATION

2.0 Introduction

In this chapter there was focus on principal drivers of land degradation, environmental effects of land degradation, challenges affecting legal and institutional framework put in place to govern Mau Forest Complex. This literature will help to pursue further research and explain the links between environmental governance in the management of land degradation. Also, it will help to establish the gaps that are there in the literature review. It will be important in guiding the researcher to come up with the appropriate theoretical and conceptual frameworks which will guide and analyze the study.

Land is a very important resource to humanity just the same way as water and air. Land degradation is the progression whereby there is continuous deterioration or loss of productivity of land for the current times and for the future. Land degradation is taking place at a very high rate and hence causing a huge concern locally and globally. This is one of the global most pressing ecological challenges and it keeps on getting worse day after day and hence a remedy is needed urgently to reverse its effects.⁴⁵

In the world approximately 25 percent of the entire land area has experienced land degradation. Nitrous oxide and soil carbon are some of the items released to the ether when the land is degraded hence making the degradation of land to be a very vital component in the change of climate. This affects a good number of people globally especially in the rural dwellings, the poor in the society and the small scale farmers.

⁴⁵ FAO, *Sustainable Land Management in Practice Guidelines and Best Practices for Sub-Saharan Africa*. (Rome, 2011).

2.1 Forms of land and soil degradation

2.1.1 Water and Wind Erosion

The first form of degradation of land that is normally looked at is erosion (both wind and water erosion) this is associated to both human and biophysical causes. Usually erosion removes the fertile topsoil leading to low productivity of agricultural products. Erosion is a process that takes place naturally as it is instigated by the vigorous activities of erosive agents like wind, water, air, human beings and animals. Erosions that are as a result of nature are controlled or influenced by the act of physical surviving geomorphic drivers for example wind scratch, rainfall, debris flows and landslides.

A larger part of land degradation is caused by increase of population increase over the past decades in the China Loess Plateau. Due to this, land has been left bare leading to major problems related to rill and gully erosion during rainy season. In places like the Ethiopian highlands where the soil is shallow and land is sloppy, there can be irreversibility of soil loss leading to land degradation.⁴⁶

Natural calamities such as floods and droughts lead to degradation. At the Horn of Africa, individuals were forced to migrate to areas that were less affected in order to easily access better food and water. Other reasons for deforestation and land degradation have been burning of charcoal and farm residues after harvest⁴⁷.

⁴⁶ Zheng F, He X, Gao X, Zhang C, Tang K, *Effects of erosion patterns on nutrient loss following deforestation on the Loess Plateau of China*. Agriculture, Ecosystems and Environment,(2005) 108: 85–97

⁴⁷ Feng X, Wang Y, Chen L, Fu B, Bai G, *Modelling soil erosion and its response to land-use change in hilly catchments of the Chinese Loess Plateau*. (Geomorphology,2010) 118: 239–248

2.1.2 Chemical degradation

This results from acidity and salinization. It is the continuous accumulation of hazardous chemicals that affect negatively the properties that control the processes of life in the soil. The soil is seen as an organism that is alive and hence it needs to be healthy for it to produce healthy outputs. There is need therefore to develop systems for soil salinity detection and monitoring to guard the soils from accumulating much salts and acids. This has often resulted into low crop yield as a result of low water and nutrient uptake by the crops. The soil erosion caused by chemicals is the second most common form of soil degradation and hence posing a great threat to the finite resources of soil as it leads to the soil being less usable. Hence it is paramount to understand the ways which land resources are degraded chemically. One way that the soil is degraded chemically is by contamination from localized sources or diffusion. Drivers such as chemical fertilizer application, acidification of soils, use of pesticides and salinization, all tend to assist the process of soil chemical degradation. A mixture of two or more tools of assessment aids in the restoration of the soil process. Soils degraded chemically may be irreparable in most cases and therefore its prevention will play a key role in agricultural sustainability.⁴⁸ Contamination done locally is an emerging issue, this usually affects regions with a high density of urban population and with a long tradition of heavy industry, or environs of military installation. The main contaminants witnessed in these areas are mineral oils, organic contaminants such as chlorinated hydrocarbons and heavy metals. The effects caused by these contaminants are their absorption by plants, loss of soil function, water pollution and health complications to humans through direct contact.

When contaminants are degraded chemically by bacteria or any biological means, then this is referred to as biodegradation which is both either through biotic degradation or decomposition.

⁴⁸ Richmond Narh Tetteh (2018) *Chemical soil degradation as a result of contamination: A review*

For organic matter, degradation can happen in without oxygen (aerobically) or with oxygen (anaerobically). Biodegradation can be classified as a natural process(es) because in most cases, it operates through aerobic conditions. Anaerobic conditions are rarely experienced unless in situations where microbial organisms are degrading inorganic chemical species that are not responding to treatment. Therefore the simplest definition of biodegradation is the natural process by which spilled inorganic chemicals or wastes can be broken down into nutrients that can be consumed by other organisms. It can further be defined as the main process of reducing or disposing inorganic chemical compounds at hazardous waste sites. The needed contaminants must therefore be exposed to appropriate conditions. The success of the process will however depend on the ability to identify these conditions and maintain them in the contaminated environment. living microorganisms (primarily not only bacteria but also yeasts, molds, and filamentous fungi) can alter and/or metabolize various classes of inorganic chemicals.⁴⁹

2.1.3 Physical degradation

The level of soil sealing relates to the density of population and land use this is in concurrent with the definition of soil sealing which involves water logging, sealing and subsidence. With the rate of urban growth globally, the fear of increase physical degradation due to sealing in the future increases. Sealing is experienced all around the world with Europe at 9% while in the urban areas of Germany at 52%⁵⁰. The use of heavy machinery especially in the buildup areas leads to compaction of the soil particles and this results in blocked drainage affecting soil

⁴⁹ DR.James G. Speight (2017) *Transformation of Inorganic Chemicals in the Environment*

⁵⁰ Tamene, L, Vlek PLG,(2007) *Assessing the potential of changing land use for reducing soil erosion and sediment yield of catchments: a case study in the highlands of northern Ethiopia*. (Soil Use and Management,), 23(1): 82-91

aeration. Physical soil degradation is amongst the major threats and risks identified by the European Thematic Strategy for soil Protection.⁵¹

2.2 Drivers to degradation of Land

The main cause of degradation of land and desertification is unsustainable human activities that taking place in already delicate areas that have been intensified by natural occurrences such as drought or floods. According to Kenya's 2002 National Action Programme report on the whole issue of desertification there's a lot of evidence that the existing ecological conditions especially in the dry lands are severe and fragile. These kind of conditions are increased by recurrent famine and the inflow of people coming from high potential areas to the dry lands.⁵² In addition, subdividing land into small and uneconomic land parcel sizes as well as excessive overgrazing arising from cattle keeping have worsened land degradation.⁵³

The eastern part of Mau is the highest hit by most of the changes arising from land use and this has led to land degradation. Large scale farmers such as Sebiens Ngundu and Wright Njokerio who initially were large producers of wheat, flowers and dairy products for commercial reasons, have subdivided their land to small scale farms whereas others through the land subdivision process have been converted into small arable and grazing plots. The change of land use in the forest has left grounds bare and reduced productivity of grass from both natural and grassland. For this reason, there is low production of leaf area and low biomass production affecting the rain level and surface detention capacity suffer rapid decrease. In the process the soil moisture

⁵¹ Winfried E. H. Blum (2014) *Physical Degradation of Soils, Risks and Threats*

⁵² Mueller ND, Gerber JS, Johnston M, Ray DK, Ramankutty N, Foley JA, *Closing yield gaps through nutrient and water management*. (Nature, 2012), 490: 254-257

⁵³ Nordstrom KF, Hotta S, *Wind erosion from cropland in the USA: a review of problems, solutions and prospects*. (Geoderma, 2004), 121: 157–167.

content reduces due to high evapotranspiration levels. There is a lunar landscape which has the potential for landslide disasters during storm events that has been created in areas near Lake Nakuru specifically Baruti area. This has been done through the haphazard and inadvertent sand mining together with quarrying activities carried out in the area.⁵⁴ The biggest causes to degradation in the complex region are logging and other illegal activities. Rivers such as Lake Nakuru, Naivasha and The Mara River which is a vital resource for the Maasai Mara Game Reserve are rapidly drying because of both licensed and unlicensed logging activities. For logging activities to stop then the lands should be recognized as people or government properties.

Kenya stands at a good position in infrastructure provision when compared to other states in the Greater Horn of Africa. This is as a result of it being a financial and communication hub as well as market-oriented economy. Just like many other emerging and developing states in Africa, the main economic activities are agriculture and tourism – these are very key in foreign exchange earnings for Kenya.⁵⁵ The forestry sector is another major activity in adding significantly to the energy production, timber products, construction and manufacturing.⁵⁶ Land degradation has

⁵⁴ Mueller ND, Gerber JS, Johnston M, Ray DK, Ramankutty N, Foley JA. 2012. *Closing yield gaps through nutrient and water management*. (Nature, 2012) 490: 254-257

⁵⁵ Zingore S, Murwira HK, Delve R, Giller KE, *Influence of nutrient management strategies on variability of soil fertility, crop yields and nutrient balances on smallholder farms in Zimbabwe*. (Agriculture, Ecosystems and Environment, 2007), 119: 112-126

⁵⁶ Trigo E, Cap E, Malach V, Villarreal F, *The case of zero-tillage technology in Argentina*. (IFPRI Discussion Paper. Washington D.C.: International Food Policy Research Institute, 2009).

⁵⁷ Lal R, Reicosky DC, Hanson JD, *Evolution of the plow over 10,000 years and the rationale for no -till farming*. (Soil and Tillage Research, 2007), 93: 1–12

⁵⁸ Whitford WG, *Ecology of desert systems*. (London, UK: Academic Press, 2002).

Maestre FT, Salguero-Gomez R, Quero JL, *Introduction: It is getting hotter in here: determining and projecting the impacts of global environmental change on drylands*. (Philosophical Transactions of the Royal Society, 2012), B367 3062-3075.

therefore been caused by these activities in one way or the other with human beings struggling to fit in the market economy. The economic activities and living standards of Kenyan a majority of Kenyan population are at high risk of reducing because of the change in the rain patterns.

In the eastern Mau Forest, majority of land has been exposed to erosion because of the less attention that has been given to measures that should conserve soil for example contour ploughing together with conservation plowing that overtime have proven effective in soil and water management. Subsequently the water quality is deteriorating and this is epitomized by the risen levels of dissolved nutrients (NO₃ and PO₄), and eutrophication based processes, more so within Lake Nakuru.⁵⁷ There was a lot of rivalry due to people gaining rights for both land and property caused by the expansion⁵⁸

2.3 Land degradation and its effects in Mau complex

Land degradation may mean permanent or temporary reduction of the productivity capacity of land because of human action. Degradation of land is acknowledged as a widespread problem, and is severe in some areas. Degraded land has affected 1.5 billion people and land service around the world.⁵⁹ However, exact severity and extent of degradation of land in the sub-Saharan Africa has not been agreed up on. Indeed, the main obstacles for improving productivity in agriculture, reduction of degradation of land and its management sustainable facilitating were due to missing of information and knowledge.⁶⁰

Failure of institutions and poverty are identified as factors contributing to the degradation of resource. The degradation of land is seen to be contributing to the decline in agricultural

productivity thus leading to increases in poverty.⁶¹ Poor soil properties, shallow soil and topographic conditions in marginal land make it unsuitable for production and with higher prone to degradation. The causes of degradation of land can be placed into two groups; the proximate and underlying cause. Proximate causes are the factors that directly affect the terrestrial bionetwork. They may include biophysical (natural) conditions related to event of extreme weather such as droughts, coastal surges climatic conditions which may cause land to become saline.

Proximate causes are similar to the management of unsustainable of land practices (anthropogenic) like over-cultivation, excessive forest conversion and overgrazing while factors that are indirectly affect proximate causes are underlying causes. Failure to have proper institutions, insecure of land tenure and poverty can lead to the degradation of land through incentives hampering to invest in the sustainable land management (LM) practices.⁶² Soil erosion is the other major proximate causes to unsustainable agriculture: herds overstocking, land clearing, charcoal burning, wood extraction, burning of bushes, pollution of water and land sources, mining, soil nutrient and steep slopes cultivation. The continuous demand for land to cultivate, timber that is used as fuel, charcoal burning, material for construction, timber logging for large-scale and people resettlement of people into forested areas are linked to deforestation

⁵⁹ IPCC (Intergovernmental Panel for Climate Change), *Climate Change 2007: synthesis report*. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (Eds. Core Writing Team, Pachauri R. K., Reisinger A.), (Geneva, Switzerland: United Nations, 2007), 104.

⁶⁰ Trigo E, Cap E, Malach V, Villarreal F., *The case of zero-tillage technology in Argentina*. (IFPRI Discussion Paper. Washington D.C.: International Food Policy Research Institute, 2009).

⁶¹ Masuda T, Goldsmith PD, *World Soybean Production: Area Harvested, Yield, and Long-Term Projections*. (International Food and Agribusiness Management Review, 2009), 12 (4) 143-162

⁶² EEA (European Environment Agency), *Urban Sprawl in Europe: The Ignored Challenge*. EEA, Copenhagen, EU, 2006).

processes. This often occurs with the connivance of ineffective institutional mechanisms to preserve forests.⁶³

Climate change will cause enormous biological and financial challenges. Hence in such situations, reducing dehumanizing paucity and obtaining SDGs will become more complex. In Kenya, environment has gradually degenerated which involve deforestation, illegal logging, non-indigenous plantations, excessive cultivation and other forms of human invasion. This has caused threats to water catchments vital for the country's agriculture, livestock and tourism and energy sectors. The revenues that are created through the ecotourism sector are reduced because of the migration of birds to other water bodies that they can easily get enough food and clean water. Change in land usage for instance forest converted to agricultural and grazing land has affected the hydrological cycle of river drainage by increasing evaporation and soil erosion due to run off. Value of natural resources on environmental governance with the native people and the local laborer communities have long been managing the tropical forests and have to a large extent gained legal access to the base of the resources. The continuous upcoming of small and medium forest enterprises (SMFEs) presents an opportunity for solidification of the livelihoods of these natives and taking great care of the natural resource base through the management of forest in a sustainable manner and timber processing and non-timber forest products (NTFPs). The benefits experienced at the grass root from SMFE development may include investment in public goods, wages and employment, political empowerment, capital accumulation, profit sharing, cultural empowerment and increased maintenance of forest environments through long-term sustainable management.

⁶³ GoK, "National Action Programme: A Framework For Combating Desertification in Kenya in the Context of the United Nations Convention to Combat Desertification". (Government of Kenya, Ministry of Environment and Natural Resources, 2002).
<http://www.unccd.int/actionprogrammes/africa/national/2002/kenya-eng.pdf>. (Accessed on 30 December 2008)

Although there is a lack of dedicated research in Social-Cultural factors in forest management, there is evidence to suggest that the culture and traditions of different communities is an important factor in forest and land management. Among the range of factors limiting the impact of environmental management policies identified by the United Nations Environmental Program (UNEP) were traditional and cultural elements.⁶⁴ The group found that despite warnings in national guidance, desire for quick results often leads to rushed processes that do not adequately consult and build consensus among existing power structures at community level. For example, the lack of buy-in from local clan leaders prevented success of a regeneration project. But once the clan leaders were involved, afforestation happened at pace. Kenya's agriculture is mostly affected by the food security situations. Kenya energy sector depends on water flows and its reduction affects the production of electricity to run industries and house hold use and this slows down the economic growth. Soil erosion due to degradation also affects food production and hastens desertification.

Concern Universal's own experience on, for example, conservation agriculture or efficient cook stove distribution shows that cultural or social norms can affect the success of such interventions. Such factors include traditional perceptions of the roles of men and women, the opinion or even absence of comment from Chiefs about a new approach, and common belief in magic and witchcraft.⁶⁵ For example, some conservation agriculture practitioners were accused of

⁶⁴ GoK, "National Action Programme: A Framework For Combating Desertification in Kenya in the Context of the United Nations Convention to Combat Desertification". (Government of Kenya, Ministry of Environment and Natural Resources, 2002). <http://www.unccd.int/actionprogrammes/africa/national/2002/kenya-eng.pdf>. (Accessed on 30 December 2008)

⁶⁵ Luke Omondi Olang and Peter Musula Kundu, *Land Degradation of the Mau Forest Complex in Eastern Africa: A Review for Management and Restoration Planning, Environmental Monitoring*, 2011), Dr Ema Ekundayo (Ed.), ISBN: 978-953-307-724-6, InTech, Available from: <http://www.intechopen.com/books/environmental-monitoring/land-degradation-of-the-mau-forest-complex-in-eastern-africa-a-review-for-management-and-restoration>

witchcraft because they were seen to get higher yields with less labor effort. Such beliefs may be a strong influence on community management of forests too.⁶⁶

The level of social capital in an area can further affect the viability and sustainability of any development intervention. On the other hand, social coordination mechanisms can be destabilized by external forces, such as increased finance flows or changes in property rights.⁶⁷ Inflows of resources, such as incentives for forest conservation even finance in the long-term would significantly raise the stakes for community forest management structures and could test their resilience.⁶⁸ It is also known that many of the tribes in Africa traditionally use forest areas for initiation ceremonies, burial sites, and as a source of medicines. However, the extent to which these cultural and traditional practices are still influential factors in forest management is not known.

Degradation of land is believed to be contributing to agricultural productivity decline thus leading to increases in poverty.⁶⁹ Topographic conditions, shallow soil and poor soil properties in marginal land make it unsuitable for production and with higher prone to dilapidation. The causes of degradation of land can be placed into two groups; the proximate and underlying cause. Proximate causes are the factors that directly affect the terrestrial bionetwork. They may include biophysical (natural) conditions related to event of extreme weather such as droughts, coastal surges climatic conditions which may cause land to become saline.

⁶⁶ Dr. Shazia Chaudhry. *The Impact of Climate Change on Human Security: The case of the Mau Forest Complex*, 1963 – 2012.

⁶⁷ Dr. Shazia Chaudhry. *The Impact of Climate Change on Human Security: The case of the Mau Forest Complex*, 1963 – 2012.

⁶⁸ Shivoga, W. A, *The influence of hydrology on the structure of invertebrate communities in two streams flowing into Lake Nakuru, Kenya*. (*Hydrobiologia*,2001), 458, 121-130.

Proximate causes are similar to the management of unsustainable of land practices (anthropogenic) like over-cultivation, excessive forest conversion and overgrazing while factors that are indirectly affect proximate causes are underlying causes. Failure to have proper institutions, insecure of land tenure and poverty can lead to the degradation of land through incentives hampering to invest in the sustainable land management (LM) practices.⁷⁰ Soil erosion is the other major proximate causes to unsustainable agriculture: herds overstocking, land clearing, charcoal burning, wood extraction, burning of bushes, pollution of water and land sources, mining, soil nutrient and steep slopes cultivation.

The continuous demand for land to cultivate, timber that is used as fuel, charcoal burning, material for construction, timber logging for large-scale and people resettlement of people into forested areas are linked to deforestation processes. This often occurs with the connivance of ineffective institutional mechanisms to preserve forests.⁷¹ In response to land loss and degradation and in recognition of the importance of conserving forest cover, a range of initiatives are or have been underway in Kenya. Many interventions attempt to tackle the causes of land degradation through, for example, efforts to reduce firewood demand, providing sustainable wood fuel sources, increase agricultural productivity, introduction of agroforestry and so on. The Government itself has promoted wide ranging tree planting activities and in 2006 through the National Forest Policy laid the ground for a key role for environmental management. It was

⁶⁹ Guthiga, P.M., J. Mburu, and K. Holm-Mueller. (2008). Factors Influencing Local Communities' Satisfaction Levels with Different Forest Management Approaches of Kakamega Forest, Kenya. *Environment Management* 41:696-706

⁷⁰Owino, J., Owido, S. F. O. & Chemelil, C. M, *Nutrients in runoff from a clay loam soil protected by narrow grass strips*. (*Journal of Soil and Tillage Research* (Elsevier) 2005), 88, 116-122

⁷¹ Lal, R., Safriel, U., & Boer, B, *Zero Net Land Degradation: A New Sustainable Development Goal for Rio+ 20*. [A report prepared for the Secretariat of the United Nations Convention to Combat Desertification, 2012).

thought that it could help tackle the problems associated with open access land the ‘tragedy of the commons’ by providing communities greater ownership rights over forest land.

2.4 Land degradation and climate change

Dry lands, permafrost areas, river deltas and low –lying coastal areas are the areas that show high confidence level of land degradation due to climate change. From the satellite observations, it has been noted that between 1961 -2013, the annual area of dry lands in drought has amplified, on average by at least 1% per year, with large inter-annual variability. In 2015, about 500 (380-620) million people settled in areas that experienced droughts between 1980s -2000s. Experiencing low confidence of degradation the areas that were most affected were Middle East, East Asia, North Africa and Arabian Peninsula.

Climate change is seen to be a minor cause of land degradation if compared to the extensive and excessive human activities however there are three processes where climate change is a leading regional or global pressure and is the main push of their current acceleration. These are coastal destruction as affected by increased storm frequencies which could be medium evidence or high agreement, sea level rise, permafrost defrosting which is as a result to warming (robust evidence, high agreement)⁷² and amplified sweltering responding to the process of warming and changing precipitation regimes (robust evidence, high agreement)⁷³ The preceding valuation points to the fact that climate change not only worsens many of the well acknowledged ongoing degradation of land processes of managed ecosystems (i.e., pastures and croplands), but becomes a major pressure that introduces fresh degradation pathways in semi natural and natural

⁷² Liniger, H. P., et al., *Sustainable Land Management in Practice—Guidelines and Best Practices for Sub-Saharan Africa. Terr Africa*, (World Overview of Conservation Approaches and Technologies (WOCAT) and

⁷³ Liljedahl et al. (2016) *Pan-Arctic ice-wedge degradation in warming permafrost and its influence on tundra hydrology*

⁷⁴ Jolly et al. (2015) *Climate-induced variations in global wildfire danger from 1979 to 2013*

environments. The impact of an increase of carbon globally on the atmospheric concentration of carbon dioxide will be felt with just a small increase of global soil carbon. A 1% carbon increase in the top meter soil would be higher than the amount corresponding to the annual anthropogenic CO₂ emissions from fossil fuel burning. The most cost effective and efficient ways to both climate change mitigation and adaptation, conservation of biodiversity and increased food production is through reversing land degradation and increasing soil organic carbon. Climate change has greatly contributed to species invasions and the degradation that they cause by enhancing the colonization, transport, establishment, and biological impact of the invasive species, but also by damaging their control practices (medium evidence, medium agreement)⁷⁴

2.5 Conclusion

From this chapter it is evident that land degradation takes many forms and it is a long term process that is irreversible. In the case of Mau Forest complex, degradation has affected many areas including agricultural sector, ecotourism, population and settlement among many others and in the worst cases, it has led to death. When discussing issues of land, it is very important to talk about climate change because the two are closely related and in some areas of the world especially in the coastal areas climate change has been known to be the most common cause of land degradation. With an intention to address this issue, the different causes of land degradation as discussed earlier in the chapter should be understood by every land user with an aim to manage and control any kind of land mismanagement.

CHAPTER THREE: ENVIRONMENTAL GOVERNANCE

3.0 Introduction

This study was conducted with an aim to examine the role of environmental governance in regards to the management of the degradation of land. This chapter therefore seeks to assess the literature that exists in regards to the governance of environmental in respect to degradation looking into the different case studies in different countries across the world and also putting into consideration what the residents of MFC think in regards to the state of land in their region.

Environmental governance is the intention formulated in environmental policy which promotes the ability to ensure that there is utmost care on managing the human activities which are Economic, social and political. United Nations Environment Programme (UNEP) is involved in coordinating environmental activities that belong to the organization and supports assists developing countries in coming up with sound practices and policies concerning the environment. It has played a very critical role in coming up with international environmental conferences.

In 1972 United Nations conference on Human Environment discussed the effects of Industrial revolution that occurred in the 1960s and 1970s. Amongst the topics discussed here were changes in environment, nature disasters, marine life, resources protection and the biological changes. From this conference a declaration on Human environment and setting up of body to manage the environment was brought forth. This was later named United Nations Environmental Programme (UNEP). The headquarters for UNEP was set in Nairobi Kenya with 300 employees of different professions.⁷⁵ UNEP shares data and information on the global environment to all the key international bodies and the general public for purposes of working towards sustainable

⁷⁵ United Nations Environment Programme. *Africa Environment Outlook: Past, Present and Future Perspectives*. Nairobi, (UNEP, 2011).

development goals.⁷⁶ Between 1975– 1995 UNEP provided guidance on ways to use in order to mobilize people on environmental awareness. It was able to launch ‘Connect’ which was an environmental newsletter which would provide environmental education.

3.1 Environmental Governance and issues of land degradation

Several attempts have been made over the years with an aim to record the extent of degradation of land globally with the use of remote sensing technologies to generate a global overview.

Despite the fact that the field is rapidly growing, the assessment faces some challenges based on inferring data in ecologically and climatically different regions combined with the low level of relevant and up-to-date data available at sub-national or national levels. Out of this a wide range of approximations of degradation of land can be found, from a low of 15% to a high of 63% ⁷⁷.

Environmental governance in the past has shaped land cover and use patterns of the present.

The world’s population is currently at 7 billion with an estimated increase of 2 billion by 2050. For survival of all these population, there has to be high level of dependence on healthy land for food production and settlement. This therefore calls for positive attitude towards our soil care for sustainability in the future. to achieve sustainable development, then the current generation needs to take all the necessary precautions to protect the future generations from land degradation. For sustainability of good land management to exist, there has to be policy and financial instruments put in place with an aim to increase soil organic matter that in the long run will increase soil

⁷⁶ United Nations Environment Programme. *Africa Environment Outlook: Past, Present and Future Perspectives*. Nairobi, (UNEP, 2011).

⁷⁷ Uriel N. Safriel (2007) *The Assessment of Global Trends in Land Degradation*

fertility, assist in climate change resolutions and adaptation measures and simultaneously combat desertification.

In the process of looking for economic stability, human activities can one way or the other in addition to contextual biophysical environmental factors, can lead to extensive land degradation. Despite the global attempts to measure monitor and assess the level of degradation that has/is taking place, quantifying and qualifying the exact combination of interacting drivers of land degradation is still a challenge. The need for more focused research that cuts across the local to national levels in order to point out particular pathways or syndromes that result in a higher risk of degradation and the processes to be put in place so as to be able to mitigate into the future should be treated with urgency.⁷⁸

Unfortunately, all this mentioned processes are expensive and left at the expenses of the poorest local and marginalized communities while the main causes of degradation are caused by political and economic processes. From this, a clear line that there should be an assessment of the whole economic value of land and an evaluation of the external costs of degradation carried out especially in areas where there is community land managed by the community members. The should be because some land users can be land greedy and would want to over use their share of land by overgrazing causing conflicts especially where there are inadequate organization policies and regulations. OSLO, 2011 recommends that the discount rates to assess the present soil value should be reduced because the high rates make the policy makers to compromise policies with the greed to maximize profit.

⁷⁸ Eric F. Lambin and Patrick Meyfroidt (2002)*Global land use change, economic globalization, and the looming land scarcity*

3.2 Challenges in monitoring, measuring and assessing the status and trends of degradation

Against the fact that land degradation has different forms that are affected by a collaboration of different factors, attempts to map out the current status and trends of the degradation all across the world. From the observations, some more parts are more vulnerable and at high risks of land degradation compared to others due to some environmental and socio-economic practices. A good example would be dry lands where both the human population and land were so vulnerable in the current years and the future⁷⁹. The major task in estimating changes in biomass and growing-stock volume is the lack of programmes from the government for the consistent checking of resources found in the forest areas. Despite the fact that many countries did a number of forest inventories, very few of them have actually completed them at national level and very few have monitored their progress given the fact that with time, priorities and capacities are changing. This is a gap to information on the status and trends in the national forest resources is evident and this call for development of institutional capacity and knowledge strengthening in the assessment and analysis of forest data.

Kenya doesn't have a comprehensive legislative framework for environmental governance and regulation. Environmental governance was known to common law and a number of related issues scattered in several sectors such as health, forestry, water, agriculture and industry.⁸⁰ A significant increase in matters environment involvement has been noted in the recent years in addition to the enactment of the Environmental Management and Coordination Act (EMCA) which was granted the responsibility to coordinate the activities of various agencies.⁸¹

⁷⁹ Middleton N, Stringer LC, Goudie AS, Thomas DSG. 2011. *The Forgotten Billion: MDG Achievement in the Drylands*. UNDP, New York

⁸⁰ Mbuvi, M.T.E., P.O. Ongugo, J.O. Maua, and C.K. Koech, *Emerging values of forests: a Blessing for Participatory Forest Management (PFM)-The case of Kenya*. (Paper presented to the 3rd International PFM Conference. Addis Ababa, Ethiopia, 2007).

To benefit both the environmental and local communities a program (Kenya Indigenous Forest Conservation Kenya Programme (KIFCON)) was funded by the United Kingdom in 1991 and 1994. The project recommended that Ogiek families be settled in a suitable sector of the forest. However, this recommendation and the list that it generated was soon hijacked and used to further marginalize the Ogiek. Out of a primary KIFCON approximate of 1,800 families, the new record rose to 3,500, of which it was claimed that only 200 were Ogiek. As at the time the first settlement scheme (25,000 hectares) began in Kiptagich, in 1996 in southwest Mau, the families number had rose to 9,000.⁸² Alice Njoki a woman who has been married in the MFC for about 17 years confirms this stating that there are a lot of land wrangles in the region sometimes forcing them to be dislocated in search for peace and better lives. She went ahead to explain that there is no provision of title deeds by the government and often times the government itself decides to reallocate the residents of Mau.

According to a survey by The Global Assessment of Soil Degradation (GLASOD) an estimation of 16.7% of SSA was experiencing severe land degradation in the 1980s while in 1990s 20% of SSA was affected by slight extreme degraded land which was reported through standardized criteria and expert judgment. GLASOD relied on record structuring of the severity, type and deepen extent of degradation even its key causes. Based on the land degradation hotspots mapping that was done Kenya (25%), Ethiopia (14%), Tanzania (13%) and Malawi were the most affected within Eastern Africa region.⁸³ No other uniform survey globally with source of data of land degradation apart from GLASOD.⁸⁴

⁸¹ Government of Kenya (GoK), *Kenya Forestry Master Plan Development (Implementation Programmes)*. Nairobi, Kenya, 2004).

⁸² Daily Nation, "How Moi allies acquired land meant for Ogiek," Internet, <http://www.nation.co.ke/News/-/1056/818058/-/vnkkoe/-/index.html> (Accessed: 8 May 2019)

⁸³ Vlek, P., Le, Q.B., Tamene, L., "Assessment of land degradation, its possible causes and threat to food security in Sub-Saharan Africa". In Lal, R., Stewart, B.A. (Eds.), *Food Security and Soil Quality*. (CRC Press,

The weaknesses in the environmental legislative framework include environmental regulations are all over across the various sectors, hinders a coordinated approach to environmental management and which is still a problem.⁸⁵ Second, the legislative framework vests enforcement discretion in government officials who do not act to enforce the law resulting in persistence of environmental loss. Third, the environmental law predominantly provides for criminal sanctions which do not require persons degrading the environment to pay for injuries caused by their acts. The assessment on Global Forest Resource done recently shows that most countries were not able to give a report on a variety of forest related parameters. Data had not been collected in some instances and others were not yet processed, this shows that data on the degradation of forest land is probably difficult to obtain.

Recently, TERRASTAT, a satellite-based system that studies and reports on land resource statistics at regional and county level has been used by FAO.⁸⁶ The data of TERRASTAT set classifies the degraded of land through degree of relative severity of degradation. For SSA, there exist four sub-categories of land degradation; (24%) is light, (18%) moderate, (15%) severe and (10%) very severe.⁸⁷ It shows that in Ethiopia, for example, (32%) degradation was identified in sparse vegetation areas. In Kenya (46%) of degradation occurred in area with forest while 42% each was noted at shrub-land, crop and mosaic vegetation.⁸⁸ The current existing laws do not

Boca Raton, Florida, 2010), pp. 57 - 86.

⁸⁴ Yalaw, A. W, "Natural resources management and agriculture in Sub-Saharan Africa". (Research Journal of Agriculture and Environmental Management, 2014), Vol, 3(1), 004-010.

⁸⁵ Ongugo, P.O, *Participatory Forest Management in Kenya: Is there anything for the poor? Proceedings: International Conference on Poverty Reduction and Forests*. September, 2007. Bangkok, Thailand, 2007).

⁸⁶ Yesuf, M., et al;, *The impact of climate*.(2008) Available at: http://gcmd.nasa.gov/records/GCMD_terrastat.html (Accessed May 8, 2019).

⁸⁷ Nkonya, E., et al;, *Economics of Land Degradation Initiative: Methods and Approach for Global and National Assessments*, (2013), (No. 158663).

allow local communities and small scale producers to own or use land resources for their own benefit. This will therefore force the relevant stakeholders to employ professional foresters to explain and implement the management of forest plans which will be expensive taking into consideration that they are typically low production volumes. Approval from the governmental agencies will also be sought regarding their internal regulations and statutes that govern monitoring and the implementation of their management plans for the forest. This is not same in all cases where suitable forms of business organization have not yet been developed to take into account the particular organizational arrangements of environmental management and their quest of both economic and social objectives. They often have inadequate financial and technical resources and political connections needed to effectively maneuver through the administrative process or persuade change in the political-legal framework.

The agricultural sector is majorly affected by both the local and national policies since they have direct impact on the farmers' decisions on land use and management. Exact programs and policies that affect many of these institutional factors and socioeconomic comprise those relating to agricultural research, land governance, irrigation, extension, infrastructure development, admittance to credit and famers' cooperatives, regulating input and output markets and organizations. This calls for robust policy and intervention of governance and an effective oversight system planning. While interviewing a farmer who has lived in MFC for over 10 years, Joseph Ziruel stated that one of the main challenges he faces as a farmer is the fact that there are no common frame works that are being used by the agricultural stakeholders and projects. Each one of them wants to come up with its own way to practice agriculture hence confusing farmers and leading to a lot of land disturbances.

⁸⁸ FAO, *Sustainable Land Management in Practice Guidelines and Best Practices for Sub-Saharan Africa*. (Rome, 2011).

3.3 The role of United Nations Environment Program (UNEP) in environmental governance

Since 1972, UNEP's role is to be the leading global environmental authority. It has the responsibilities of delivering scientific assessments from professional experts, availing platforms that are international in nature for environmental negotiations and decision making. It has an environmental sub-program that ensures both regional and global environmental cooperation and governance through promotion of informed environmental decision making. UNEP also works with stakeholders and nations by regularly reviewing the state of the global environment, identifying any environmental threats at their early stages, developing realistic environmental policies and assisting in effective implementation of these policies to bridge the science and policy gaps that exist.⁸⁹ UNEP work on environmental governance focuses on four key areas:

3.3.1 Proved science for decision making

Using the Global Environment Outlook which is its assessment flagship and the only UN report which gives provides regular update on the current state and trends and possible changes on the global environment, UNEP identifies different policy options analyzing their benefits and cost effectiveness and delegates awareness creation of these policies and possible solutions to the stakeholders. To minimize and eventually close the gaps that exist between policy and science, UNEP is creating scientific networks with researchers, scientists and policy makers and development authorities. It has also assisted countries and states to design tools that they can use in their regular monitoring of the God given resources and keep their ecological situation under close review.

⁸⁹ United Nations Environment Programme. *Africa Environment Outlook: Past, Present and Future Perspectives*. Nairobi, (UNEP, 2011)

3.3.2 International cooperation

UNEP works together with governments, various stakeholders, inter-governmental bodies and UN agencies to promote cooperation and harmony between environmental policies. It emphasizes on ensuring that countries are at par with the international laws, regulations and standards with the targets, goals and objectives that were identified in the UN's Programme for the Development and Periodic Review of Environmental Law. To update the global community on emerging issues, challenges and trends, UNEP uses annual reports as part of their alert services.⁹⁰ Moreover, to steer global policy dialogue, it uses many assessment and indicators on the global environmental state. To continue setting global agenda, UNEP helps to create linkages between the regional agendas and national agendas by way of amalgamating the priorities set by the sub-regional and regional ministries that deal with environmental issues for the Governing Council/ Global Ministerial Environment Forum.

3.3.3 International policy setting and technical assistance

UNEP carried capacity building for governments by assisting them in designing and sharpening their sub-regional, regional and national laws, institutional frameworks and policies that underpin environmental governance and help them in developing environmental management tools and methods.⁹¹ In addition, it helps them to develop political, judicial and legal frameworks that are covers environmental issue. Since stakeholders are the key people in any environmental problem where they offer both technical and financial support, UNEP actively partners with both private and public stakeholders and also those in the civic society in order to develop a strong participatory effective, efficient and sustainable result oriented approach in addressing environmental challenges.

⁹⁰ United Nations Environment Programme. *Africa Environment Outlook: Past, Present and Future Perspectives*. Nairobi, (UNEP, 2011)

⁹¹ Ibid

3.3.4. National development planning

For environmental management to be counted and measured the issue of sustainability of the measures put in place and the there-after impact on the community members and their surroundings have to be discussed. UNEP is therefore assisting governments to make policies that will address environmental sustainability by utilizing fully the UN Development Group podium. Reliable and continuous flow of data for future reference and informed decision making as to ensure and in conjunction to this, UNEP is assisting both the national and regional institutions to understand, analyze and manage environmental data and information.⁹² It is also working with the regional institutions to assist them to strengthen and develop institutional agreements across the world that are in support of proper management of the shared natural resource in a manner that is sustainable and are addressing issues concerning environmental trans-boundaries. Poverty has been in the previous years linked to poor use and management of different natural resources. In close partnership with the United Nations and Development Programme (UNDP), a joint Environment and Poverty Initiative- a worldwide program that helps nations and states to understand how proper use of the natures resources can lead to poverty reduction and improved livelihood. The programme is currently being implemented in 22 countries globally with provision of relevant financial and technical support given in order to assimilate the sustainability of environment into policy and budgeting.⁹³ Additionally, the One UN and UN Development Assistance Frameworks processes integrates principles that promotes the sustainability of the environment across UN services at the regional, country and global levels.

⁹² United Nations Environment Programme. *Africa Environment Outlook: Past, Present and Future Perspectives*. Nairobi, (UNEP, 2011)

⁹³ Ibid

3.4 Conclusion

For serious management and proper use of land, there has to be regulations that govern the users all across the Mau Forest Complex. This will prevent over usage like overgrazing and mismanagement of land by both the residents and the various stakeholders involved in land issue within the complex. The governance of environment with regards to land degradation is an issue that has been looked into in different countries and even part of Kenya. It therefore, calls upon each and every individual and group to know their roles and responsibilities towards prevent, controlling and managing land degradation within their surrounding putting in mind the future generation.

CHAPTER FOUR: DATA ANALYSIS

4.0 Introduction

This chapter examines the findings of the research based on the responses different respondents from the residents of MFC to stakeholders involved in land use and management 3in MFC. The results of the research were analyzed using SPSS program. The data that was analyzed was both qualitative and quantitative based on the questionnaires that were issued to the respondents.

4.1 Quantitative data

4.1.1 Gender of the respondents

From the respondents that participated in the research, 61 % were male while 39% were female. This shows clear signs of gender disparity towards the male and therefore most of the resources and decisions made are in favor of the male. Figure 4.1.1 indicates the gender of the respondents.

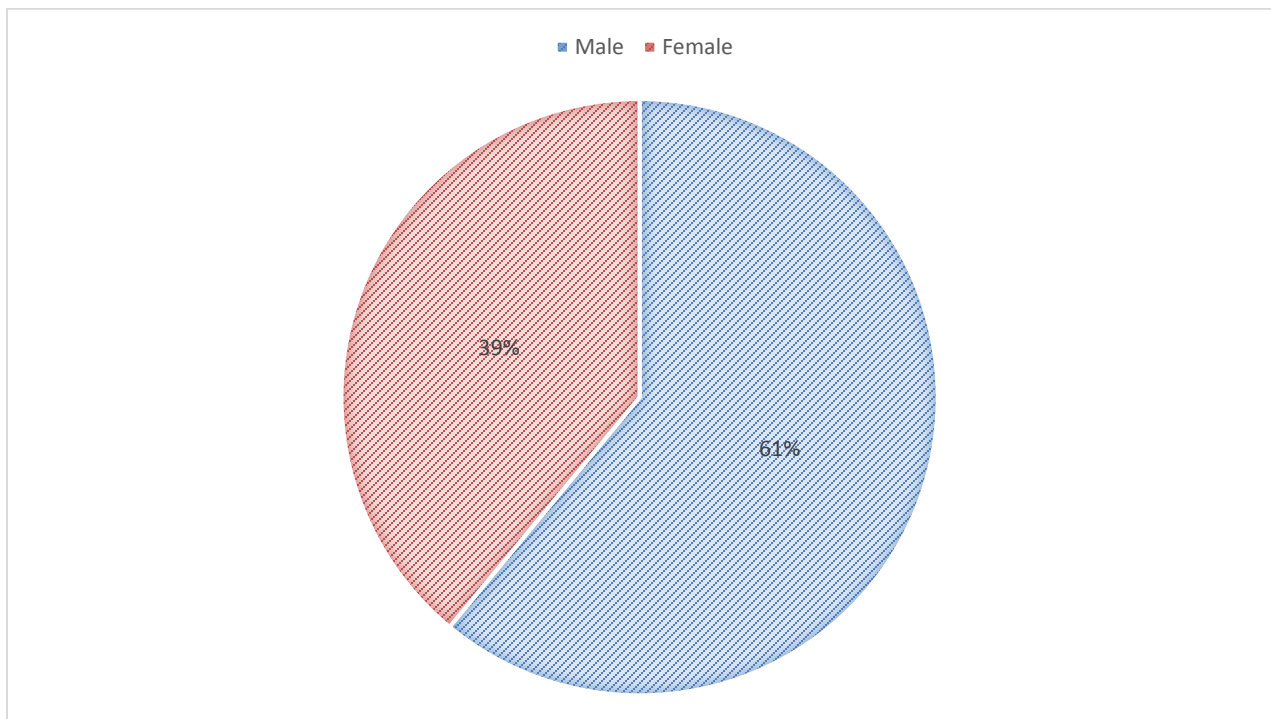


Fig. 4.1.1. Gender of the respondents

4.1.2 Marital status

Fig. 4.1.2 indicates a big number of the respondents were married at a percentage of 68% while the remaining were either, single, widowed, divorced/separated and the distribution was at 27%, 0.5% and 4.5% respectively.

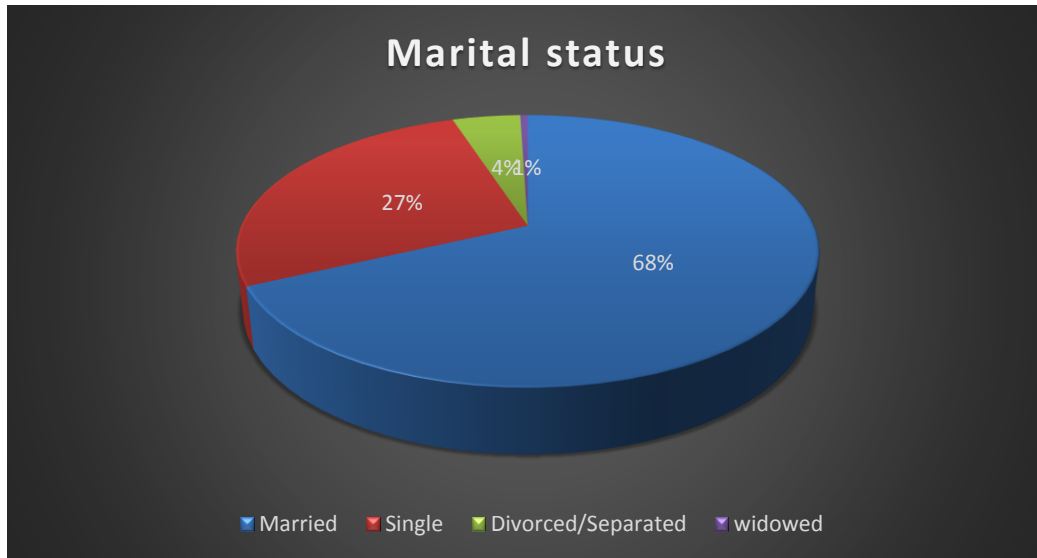


Fig. 4.1.2: marital status of the respondents

4.1.3 Age distribution of the respondents

From the findings, most of the respondents (46%) were between the age of 41 – 50 years. 35% were between the ages of 31-40 while 12% were of 50 years and above. The minority of the respondents were between the ages of 21-30 years at 7%.

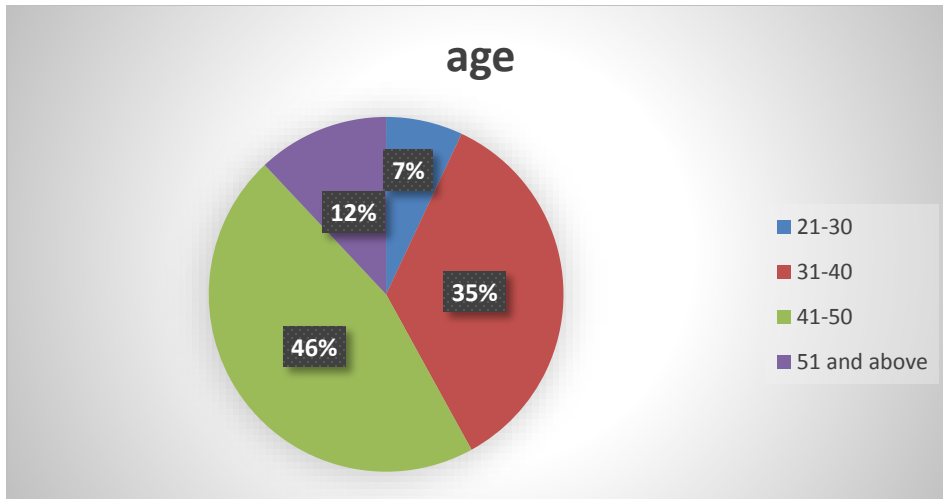


Fig. 4.1.3 illustrates the Age of the respondents

4.1.4 Education level

From the findings, 3% of the respondents did not receive any kind of formal education while 6%, 54% and 37% reached primary, secondary and tertiary levels of education respectively.

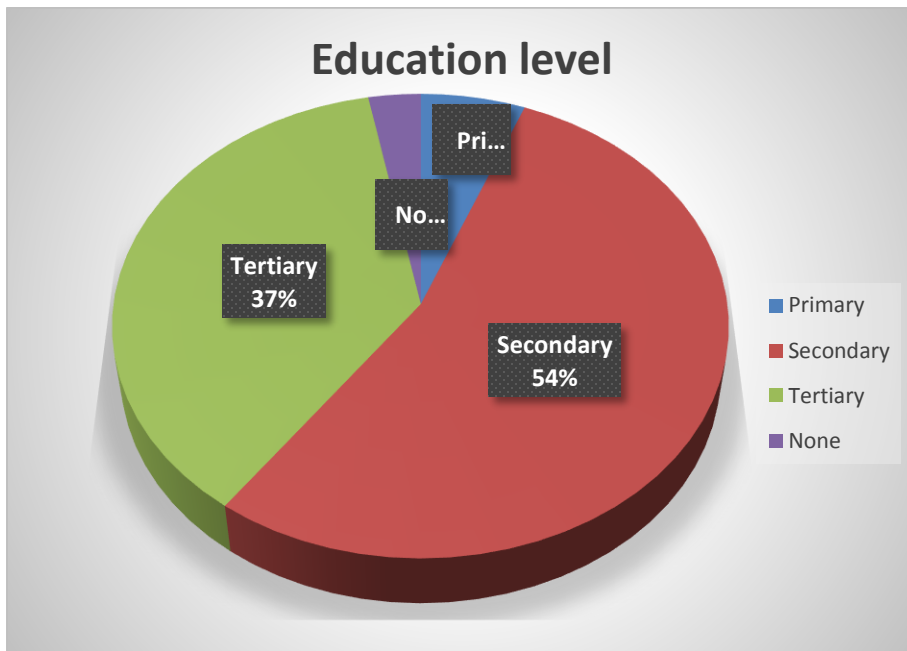


Fig. 4.1.4 indicates the education level of respondents in MFC

4.1.5 Duration of living

The results indicate that (20%) respondents had stayed in MFC for less than 3 years, 15% had a duration of 3 – 5 years. Those who has lived in the complex for a period of 5 – 7 years and 7 years and above were distributed at 27% and 45% respectively.

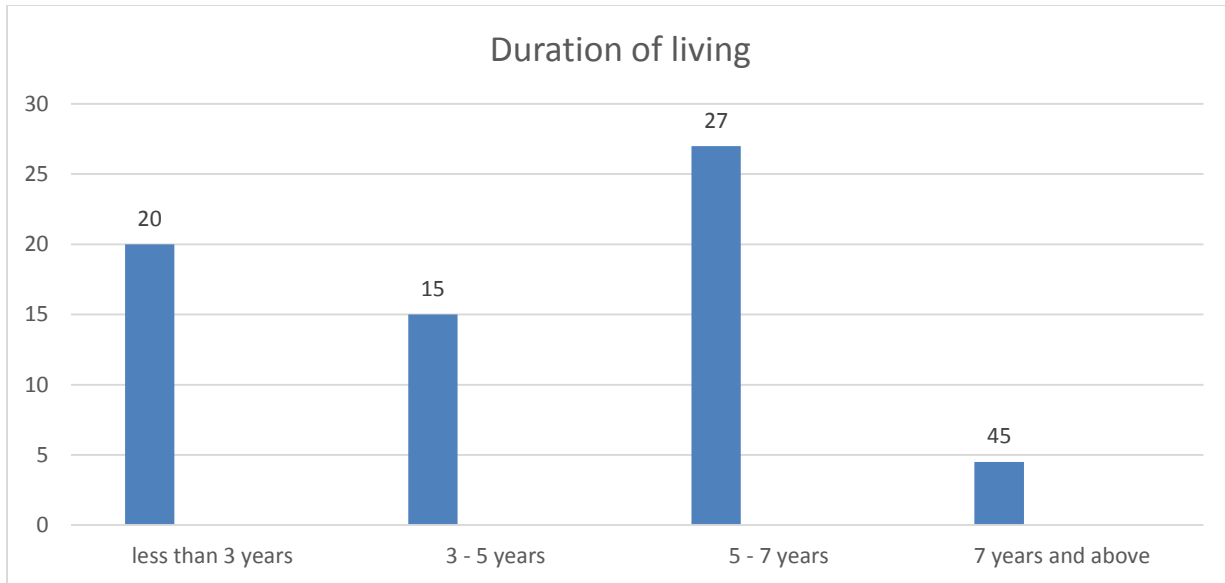


Fig. 4.1.5 Duration of living in MFC

4.1.6 Land ownership and distribution in MFC

Based on the findings, 72% of the respondents owned land in the MFC while 28% do not own any land and lived in either other people with their relatives, spouses or rented houses. Out of the 72% of the land owners, 20% owned less than one acre of land, 39% had 1 – 3 acres of land, 32% had 3 -5 acres, 7% more than 5 acres while 2% did not respond to this question with different reasons. Fig4.1.5 (a) shows the distribution of land ownership while figure 4.1.5 (b) shows the acreage owned by the respondents in the MFC.

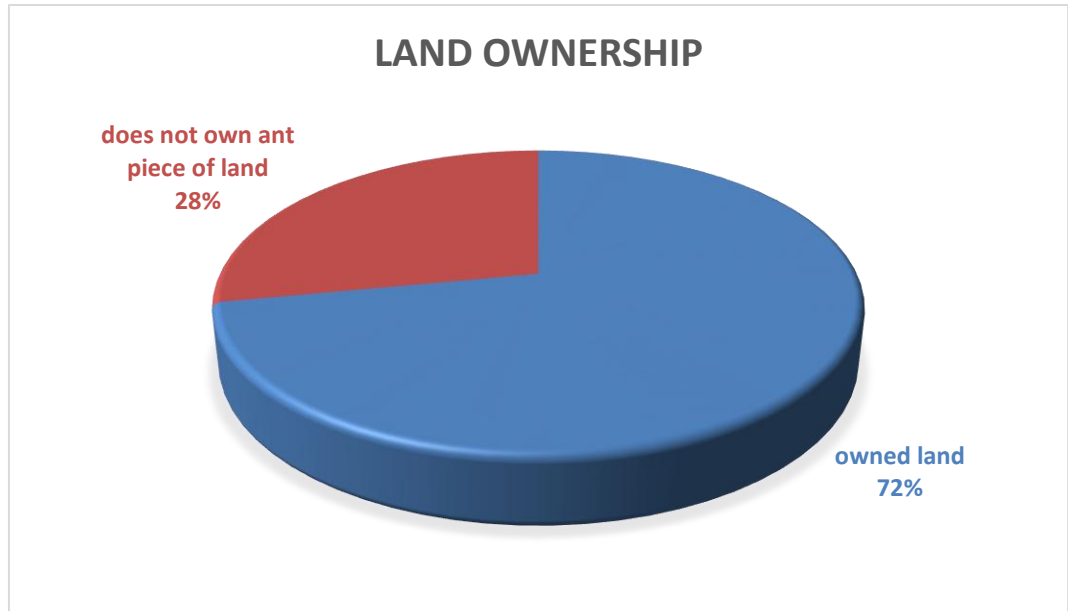


Fig.4.1.6

(a) Land ownership of respondents in the MFC.

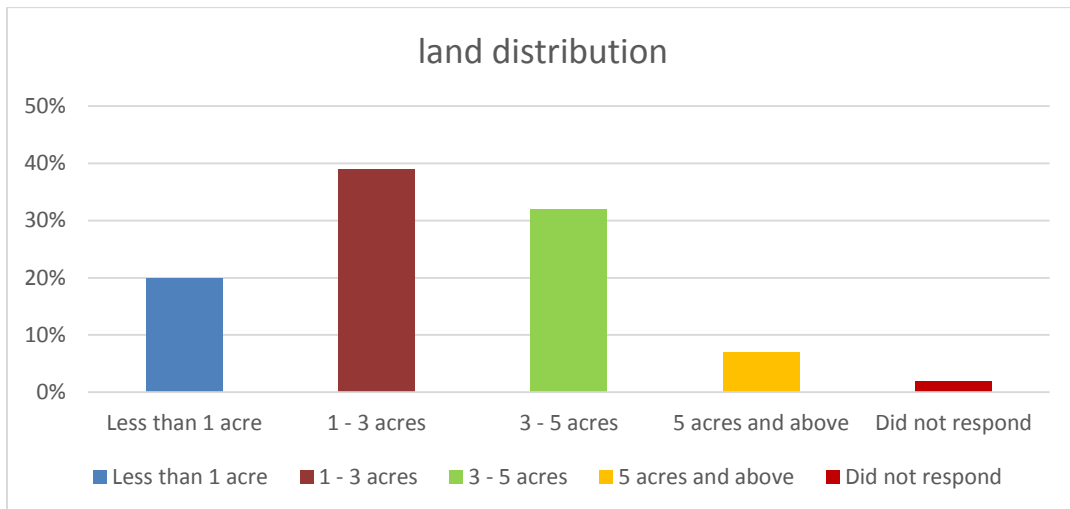


Fig.4.1.6 (b) shows how land is distributed among the owners of land in MFC.

4.2 Qualitative data

4.2.1 Key drivers to land degradation in MFC

When asked about the main activities that they carry on the pieces of land that they have, most of the respondents settled for farming and cattle grazing which had 27% and 35% respectively. Some of the respondents (4%) thought that human migration and settlement was a major cause of degradation of land, (2%) mining was also a cause to be mentioned while 4% mentioned, land redistribution and change of ownership since new members came up with totally different activities for the land use 7% came out strongly on road construction being one of the greatest cause of degradation 17% Charcoal burning was a key cause while 3% mentioned lacked of clear policies to govern the land in MFC. 1% of the respondents associated land degradation with community clashes and wars. The decisions on land management is majorly influenced by the male which is a significant percentage population in the region. The men are responsible for providing for their families and in order to that they clear land for economic farming. A close interaction of gender, age and education level of the respondents can be related to the ignorance level, decision making and land usage within Mau Forest Complex.

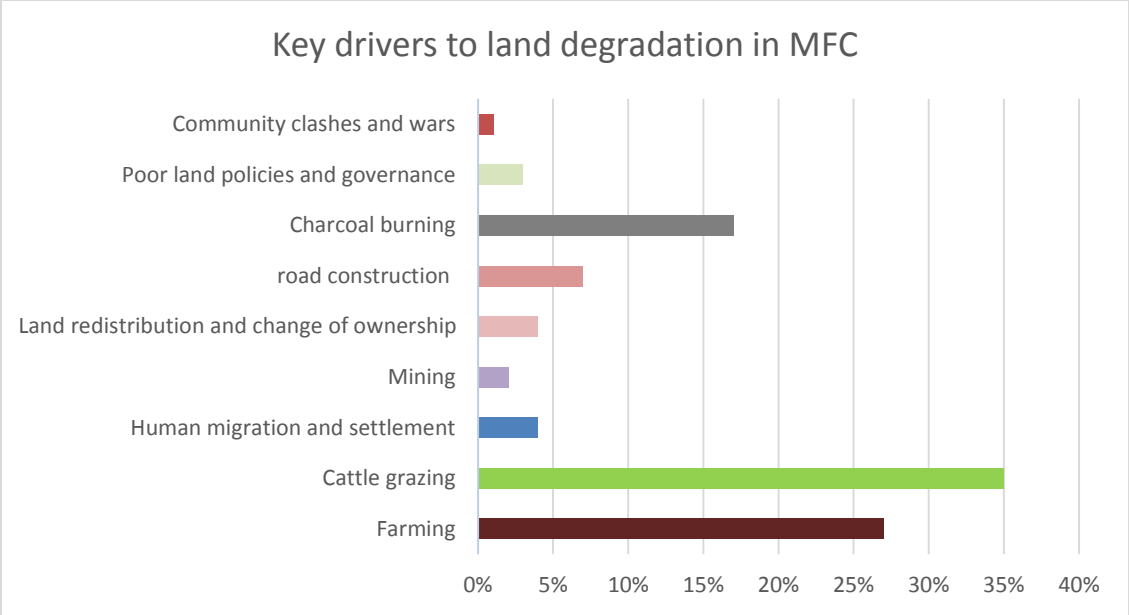


Fig. 4.2.1 shows the key drivers to land degradation in MFC

4.2.2 Effects of land degradation to MFC

During the survey, the greatest effect of land degradation at 85% was on effects on economic losses as well as social consequences followed by negative influence on agriculture as it has created climatic change leading to lower productivity at 72%. 65% of the respondents thought land degradation has led to devastating effects to the environment that slowly turns the tropical zones desert leaving depletion of water resources at 62%.

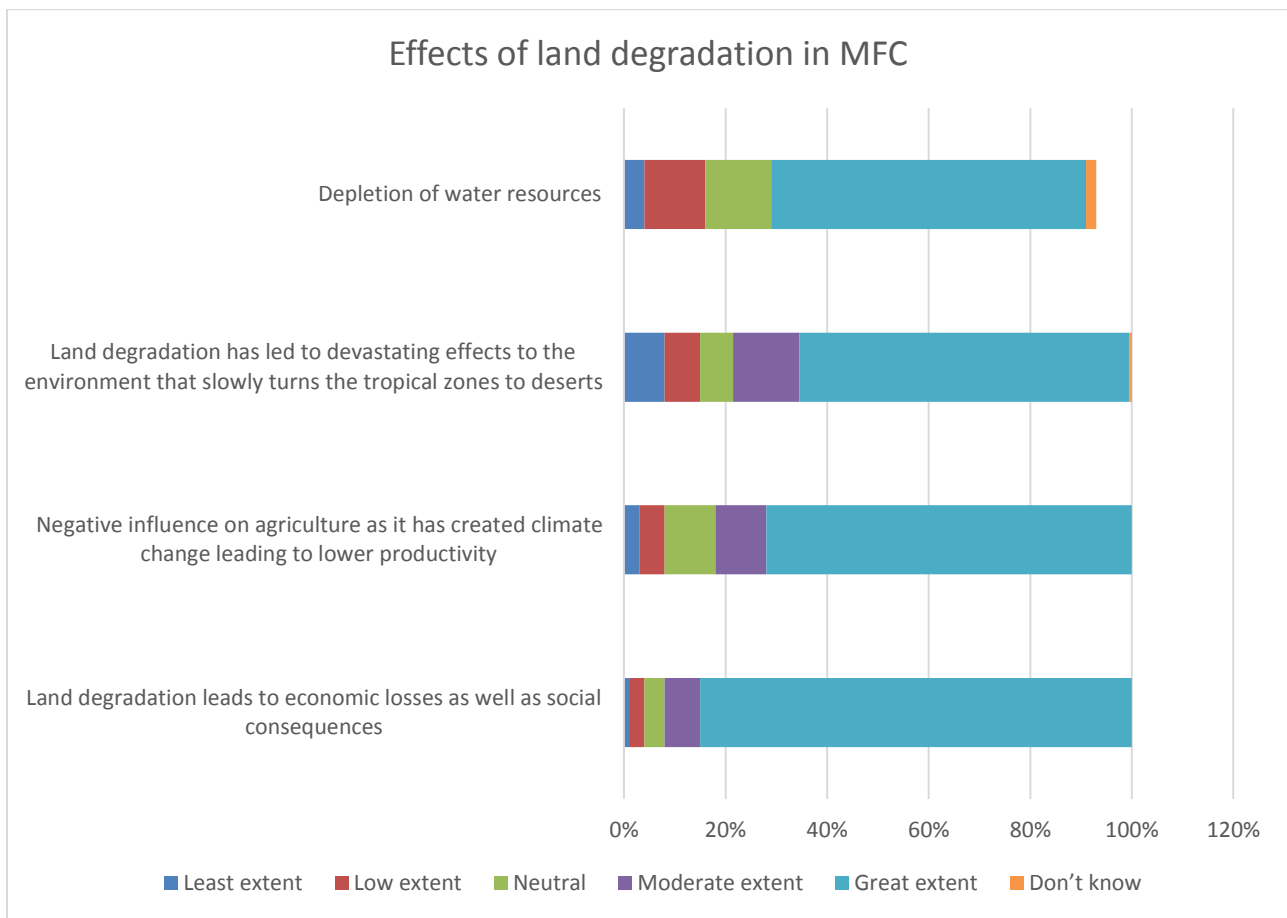


Fig 4.2.2. Shows the ratings on the effects of land degradation in MFC

From the study, most respondents related land degradation to low yields from agricultural produce based on soil erosion that was highly experienced in MFC. Due to land degradation the

level of poverty has increased among the residents of MFC given the fact that sometimes the farmers spend a lot of resources on farming only to be affected by either drought or floods which has been because of climatic changes caused by poor land management. In the past years, residents have been forced to relocate while others have been left homeless based on the aftermath of degradation such as landslides. In addition, the level of tourism activities has reduced because birds and animals are forced to drift to other places where they can easily get good shelter and enough food to eat. Land degradation has caused pollution of River Nile and therefore reducing the activities along and on the water body.

4.2.3 Key stakeholders involved in land management and use in MFC

From the findings, some of the key stakeholders who were mentioned in addressing land degradation areas in MFC were: Kenya forest Services (KFS), Water Resource Management (WRM) in collaboration with the Water Resource User Associations (WRUAs), Ministry of Agriculture (MoA), Local administration inclusive of the chiefs, assistant sub chiefs, village elders, etc., County government, Ministry of Lands and private organization ssuch as FAO, UNEP, World Bank, USAID among others.

4.2.3 The challenges faced in managing land degradation in MFC

The main challenges that stood out during the survey from the key stakeholders in implementing policies, laws and projects that are related to land degradation in MFC were as follows, rebellion from the community members with the believe that their land was going to be taken away from them and sold to others. Lack of strict policies that govern the land around MFC. The small scale farmer is usually disadvantaged since the land policies in existence are agrarian and favor

large scale commercial farmers. The consistency aspect is not considered with their characteristic of varying from one region to another depending on the land tenure system. This has therefore led to misuse of resource, confusion mismanagement and poor usage of land resources which at the long run lead to degradation.

Political rivalry and interest is hard to cup hence restrictions on the area coverage to work on when implementing some policies and projects. To gain support during politics, parts of land in the forest are distributed to supporters of a specific politician as repayment or as a way of owing the individual for future favors. Community wars and rivalry has contributed to a lot of degradation of land in the past and still in the present making land issues a sensitive issue to handle.

The highest level of Kenyan population is in the agricultural potential land and this has therefore caused congestion in the forest that is viewed as a free land that has potential for agricultural activities. A lot of pressure is always put in the forests especially the Mau Forest where the neighboring surrounding want to gain benefits from its resources. Land degradation and deforestation go hand in hand. Charcoal burning is a key activity in MFC which is a high cause of deforestation and without this being addressed, land degradation cannot be addressed easily in the MFC. Furthermore, institutional frameworks and policies in regards to land use and management vary making it extremely difficult to solve community challenges on a common ground.

The main issue that may lead to degradation is the increased production of cash crops like tea and horticultural products in the Mau region. These products are produced for exportation the level of production is increased regardless of the use of land method. The Ogiek have however observed that planting pyrethrum and application of pesticides on farms have in the previous

years killed the bees making bee keeping a difficult economic activity. Developed countries promote the export of raw materials rather than value added products. Since the economic oriented structural adjustments programmes by the World Bank that had less favor towards the conservation of the environment that is sustainable, intensive exploitation of forests have been done exposing the communities living around to climatic change and global warming as more carbon dioxide is released into the environment due to poor carbon sequestration.

4.2.4 Environmental governance and land degradation

Environmental governance and land degradation are interlinked and from the survey, some of the environmental activities and policies in place affect land in MFC in one way or the other. 66% of the respondents thought that live hoods have led to negatively increase in human population hence reduced farm sizes within MFC while 79% were in strong agreement that decline in crop productivity is directly related to land degradation. The overall ecological situation of Mau Forest has been affected by the various nature of human activities that in most cases lead to soil erosion. This was powerfully agreed to by 70% of the interviewees within the region. In addition, 80% of the population strongly agreed that the increasing rates of water pollution was caused by both animal and human activities. 68% strongly felt that as a way of dealing with degradation, it was important to augment skill levels in order to meet the different needs and on-going investments in the complex. The relationship is illustrated in fig 4.2.4 below.

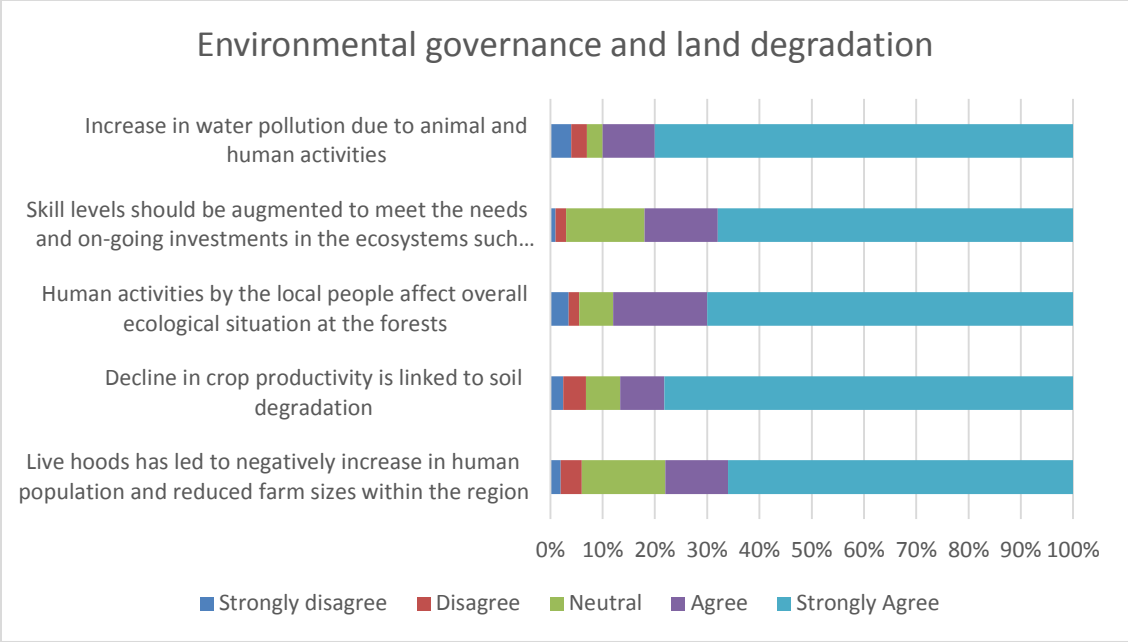


Fig. 4.2.4. Shows the linkage between the environmental governance and land degradation

4.3. Conclusion

From the findings, this chapter concludes that there is a very strong relationship between environmental governance and land degradation since the decisions on land management and usage amongst the residents are affected by the policies that are made. The effects of land degradation have affected the residents in various ways including low yields, water pollution hence lack of clean water to use. From the survey, it was clear that the policy makers need to work together with the residents of Mau Forest Complex to reduce and mitigate cases of land degradation and current mismanagement of land that will slowly lead to high capacity of land destruction.

CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 Summary and key findings

The study provides an extensive collection of material that links Environmental governance and management to land degradation, which has not been covered and documented in an all-encompassing manner. Humans living near or within forestlands, understanding of the resources, the terrain, opportunities and their constraints, and are apparently in a better place to respond in a faster way to such emergencies as encroachment, timber poaching and fire outbreaks. The general aim of this study is to examine the role of environmental governance in the management of land degradation in Mau forest complex.

Mau Forest Complex has a coverage of 400,000 hectares with the largest closed forest ecology amongst the East African countries. Mau waters also play a very important role for the trans-borderline of Nile river and Lake Victoria. Mau has other functions such as filtering and regulating underground water, storing water, controlling local and regional climate, protection of the soil from degradation and provision of habitats for different biotic diversity. Mau Forest Complex is a region with a whole lot of potential in terms of growth and development. This is however, being dragged because of the land degradation effects which has led to poor agricultural produce hence poverty and unemployment. This study was undertaken with an aim to assess the principal drivers of land degradation in the Complex at the Mau Forest, analyze the environmental effects of land degradation by the Mau Forest complex and examine the legal and institutional framework put in place to govern the Mau Forest complex.

The study creates awareness and understanding of environment policies and management by all stakeholders. This study helps unravel some of the main drivers which have continually contributed to degradation of land and environmental in the MFC. It helps throw some light on

the major reasons of similar degradation and how it affects the management, thus affording all the concerned agencies and authorities the singular hope of instituting effective counter-measures at the most nascent level, the resource management and conflict prevention and its management. That way, many lives may be saved as destructive rhetoric by politics, who often whip up ethnic and political tension, can be headed off. That would also help in ensuring harmony and stability and throw in towards the achievement of Vision 2030 of Kenya goals, among others. Degradation of land is a progression that is slow and cumulative and takes a long time for its effects to be felt on the environment or by people living around the affected area.

The study showed that farming and cattle grazing are a major contributors to land degradation in the Mau Forest Complex. Mau forest has been the center of attention due to the continuous encroachment of the forest land by the communities around the forest. The is identified as Kenya's most important water towers and is located in the Rift Valley region with four wards – Narok , Kericho, Bomet and Nakuru. The foremost economic activities in Mau Forest Complex area are tea plantation, tourism and energy sectors which generate more than 20 billion Kenya shillings in a year. Most of the urban areas in the Rift Valley region depend on it for water supply.

The study also revealed that the greatest effect of land degradation was on economic losses as well as social consequences followed by negative influence on agriculture as it has created climatic change leading to lower productivity. Soil properties that are poor, shallow soil and topographic conditions in marginal land make it unsuitable for production and with higher prone to degradation.

As conceptualized in the people centered development theory, the study has shown that the society members increase institutional and personal capability to manage and mobilize resources to that would enable them in the production of sustainable and well spread improvements in their worth of life. The main challenges that stood out during the survey from the key stakeholders in implementing policies, laws and projects that are related to land degradation in MFC were as follows, rebellion from the community members with the believe that their land was going to be taken away from them and sold to others. Lack of strict policies that govern the land around MFC. Political rivalry and interest is hard to cup hence restrictions on the area coverage to work on when implementing some policies and projects. Community wars and rivalry has contributed to a lot of degradation of land in the past and still in the present making land issues a sensitive issue to handle. Land degradation and deforestation go hand in hand. Charcoal burning is a key activity in MFC which is a high cause of deforestation and without this being addressed, land degradation cannot be addressed easily in the MFC. In addition there are different policies that vary from organization to organization making it difficult to address community members on a common ground level.

5.1 Conclusion

Rehabilitation of land degraded areas, and good management and usage of land is not an individual's activity. Moreover, it requires a lot of discipline from community members. There is also need for organizations and institutions harmonize the policies that govern the land use. To avoid some of the key drivers to land degradation in Mau Forest Complex, good land practices should be introduced in the curriculum as part of awareness creating. Since land and water resources are the main ingredients to the livelihood of the people at the Mau Forest complex, it is

of great importance to rope them in when trying to bring about the solutions to the issues of land degradation. This chapter therefore tries to come up with recommendations for the findings of the research with an aim to fill the gap that exists in the role of environmental governance in land degradation.

5.2 Recommendations

5.2.1 Needs assessment

To enable effective address on the issue of land degradation in MFC, different stakeholders should carry a needs assessment in the region to identify what the social, cultural and economic community needs are. These should involve the cost-benefit assessment of the sharing of the land and water resources with the local communities.

5.2.2 Public awareness to the community

Some causes of land degradation are based on own ignorance and lack of knowledge on them by the community members. Through different forums like public barazas, churches among others, there was the urgency to bring about public awareness on the causes, effects and mitigation measures of land degradation. This can be done by both the private and public sectors involved in MFC management plan. In matters policy formulation, decision makers should be reoriented to ensure they involve the local stakeholders. Formulating an integrated and all inclusive land policy that aims at attaining sustainable development is very important and should therefore consider natural resources in whole and not the usual segmentation or sectors. What is currently in place should thus be harmonized. This means that the process of making decisions as well as the intervention of the policies have to be restricted to ensure there's collaboration in

forest management and security of tenure for the rightful governments, individuals and the community at large. The board of trustees that are gotten from various forest stakeholders should be entrusted with the management of the forest. This individuals should be people of integrity, principled and lacking in politics. The parliament both at County Assembly level and at the National level should table a bill that empowers ministers at these levels to look into the decision making process and ensure that is consultative right from grassroots level. There should be advocacy at Global level to raise public awareness to industries and consumers on accepting goods such as products whose origin is the forest, sustainably produced cash crops and have world bank initiate responses towards environment in terms of their action plans and their policies. These plans could include promoting conservation of forests through sustainable harvesting of products and reforestation.

As part of awareness, the ministry of education should incorporate this in the school curriculum at all levels of education so as to impact the knowledge and understanding of good land management strategies on students as they grow up.

5.2.3 Relocation, Resettlement, Support of livelihood and Development

MFC has many demarcated areas that there is on - going human settlement. People should be relocated and settled in identified land by the government. The government can then look into the modalities of compensating the relocated people depending on their verified claims. There could also be capacity building incentives whereby local communities can be empowered and enlightened on the proper ways of land use.

5.2.4 Surveys on Boundaries, Title Deed Issuance, Monitoring and Enforcement

Demarcation of boundaries to be done, title deeds to be issued and resources shared among the communities fenced and protected to avoid community conflict in the future, all these are done in collaboration with both national and county governments. There is also need to have the Kenya Forestry services enforce the earlier policy on buffer zones which are set at 100 meters all around the forest.

5.2.5. Development of Institutional Frameworks and effective land policies

A framework can to be established with an aim to look into the complex land and its management so as to ensure proper usage. A committee should be elected to closely follow up the activities that are being done at the complex. Attention should be given to the specific areas noted during the implementation of the system of registration which would be focusing on registration of community land, how to implement the system information on land, land adjudication, land planning, land valuation, survey, land administration, research and advocacy, programmes on settlements including the settlements that are informal, building institutional capacities, protection of fragile ecosystems and documentation of natural resources. Effective land policies can be put in place with strict consequences to be met failure to adhering to them. All institutions can have harmonized policies to follow that are environmental friendly agreed upon by all the stakeholders involved. The Kenya Forestry Services should also be well funded to enable them follow up and ensure adherence of the agreements arrived at by the various stakeholders. Very harsh penalties should be put as part of disciplinary measures for those who are involved in the destruction of forests through charcoal burning or illegal logging without the political interference. Well defined measures should also be actualized so as to allow the people

in the community access to relevant information in a timely manner which is a means of empowering them and increasing their confidence and ownership in the whole process. This is especially crucial when the county government or even the national government is considering very enormous infrastructural developments which will cut across these brittle ecosystems.

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APPENDICES

APPENDIX I: PERMISSION LETTER TO CONDUCT RESEARCH SURVEY

REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN MAU FOREST COMPLEX

Dear Madam,

My name is Benjamin Mwaura - R50/62897/2010 a student undertaking Masters of Arts in International Studies of the Institute of Diplomacy and International Studies University of Nairobi in Nairobi campus. I am currently doing my thesis research under the topic Role of Environmental Governance in the Management of Land Degradation in the East Mau Forest Complex, Kenya. This project will be conducted under the supervision of Dr. Shazia Chaudhry. I am hereby seeking your consent to conduct a study survey in the East region of Mau Forest Complex and different stakeholders involved land management and land policy making. I have provided you with a copy of my thesis proposal which includes copies of the measure and consent and assent forms to be used in the research process.

Upon completion of my study, I intend to share with the school a copy of the full research report.

In case of any inquiries, kindly don't hesitate to contact me on 0721798702.

Thank you for your time and consideration in this matter.

Yours sincerely,

Benjamin Mwaura

University of Nairobi.

APPENDIX III: INTRODUCTION LETTER

BENJAMIN MWAURA

R50/62897/2010

INSTITUTE OF DIPLOMACY AND INTERNATIONAL RELATIONS

UNIVERSITY OF NAIROBI,

NAIROBI.

25/3/2018.

Dear Respondent,

RE: A STUDY ON ROLE OF ENVIRONMENTAL GOVERNANCE IN THE
MANAGEMENT OF LAND DEGRADATION IN MAU FOREST COMPLEX.

I am a post graduate student pursuing a Master of Arts degree in International Studies at the University of Nairobi. I am conducting a study titled as indicated above.

You are kindly requested to take part in the study by answering the attached questionnaire. All the information you give will be treated with utmost confidentiality and the end results of the research be shared with you. The information you give will only be used for the purpose of the study.

I look forward to your honest participation.

Thank you.

Yours Faithfully,

BENJAMIN MWAURA

APPENDIX II: QUESTIONNAIRE

Section A: General information

1. What is your gender? (Tick one): a) Male b) Female
2. Marital Status:
 - a) Married:
 - b) Single:
 - c) Divorced/Separated
 - d) Widowed
3. Age (tick one): 21 -30 31- 40 41- 50 51 and above
4. What is your academic background?
 - a) Primary
 - b) Secondary
 - c) Tertiary
 - d) None
5. How long have you lived in the Mau Forest Complex?
 - a) Less than 3 years
 - b) 3 to 5 years
 - c) 5 to 7 years
 - d) Over 7 years

Part B; Environmental Effects of Forest Deforestation

6. Do you own any piece of land? Yes No

(If yes move to question 7. If no move to question 8)

7. What acreage of land do you own?

Less than 1 acre 1 acre to 3 acres 3 acres to 5 acres More than 5 acres

8. How do you use land in your region?

- a) Farming
- b) Cattle keeping and grazing
- c) Mining
- d) Human settlement

e) Others

(specify).....
.....
.....

9. Name the human activities causing forest and land degradation in Kenya?

.....
.....

10. How has/is land degradation affecting you and the whole of Mau Forest Complex as a whole?

.....
.....
.....
.....

8. Kindly rate the following factors that affect the land degradation of the Mau Forest in Kenya. 1= Least extent, 2= Low extent, 3= Neutral, 4= Moderate extent and 5= Great extent

Description	1	2	3	4	5
Land degradation leads to economic losses as well as social consequences					
Negative influence on agriculture as it has created climate change leading to lower productivity					
Land degradation has led to devastating effects to the environment that slowly turns the tropical zones to deserts					
Depletion of water resources					

Part C; Environmental Governance and Degradation

9. Kindly rate the following factors by indicating 1= strongly disagree, 2=disagree, 3= Neutral, 4= agree and 5= strongly agree.

Description	1	2	3	4	5
Live hoods has led to negatively increase in human population and reduced farm sizes within the region					
Decline in crop productivity is linked to soil degradation					
Human activities by the local people affect overall ecological situation at the forests					
Skill levels should be augmented to meet the needs and on-going investments in the ecosystems such as the Mau forest.					
Increase in water pollution due to animal and human activities					

Thank you for your participation!!!

APPENDIX III:

INTERVIEW GUIDE FOR HEAD OF ORGANIZATIONS

1. What are some causes of land degradation in Kenya and especially in Mau Forest Complex?

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Are their major effects of land degradation in the Mau Forest Complex? Yes No

If yes, what are the environmental effects of degradation on the local population living in the Mau Forest Complex?

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2. How has your organization been involved in managing land degradation issues in Kenya?

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3. Are there any other stakeholders you work/ collaborate with in order to address land degradation cases in Kenya? Please name them.

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4. What are some of the challenges faced when implementing environmental governance in land degraded areas?

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5. What is the role of environmental governance and management in reduction of land degradation in Kenya?

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6. How does the government assist in the governance of the Mau forest?

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7. What do you think should be done in order to ensure that the evaluation of the Mau Forest land governance and management is done as required?

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Thank you for your participation!!!