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INSTITUTE OF DIPLOMACY AND INTERNATIONAL STUDIES

MASTERS RESEARCH PROJECT

FOREST PLANNING AND MANAGEMENT FOR HUMAN DEVELOPMENT IN AFRICA: A CASE OF KENYA

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DECLARATION

I, **Soi Andrew Cheruiyot** certify that this is my innovative work and has not been given out for the ward of degree or diploma in whichever other University or other institutions

Signature---------- Date----------

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SUPERVISORS' RECOMMENDATION

This is to confirm that project paper submitted for examination with my endorsement as University Supervisor

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DEDICATION

I bestow this research study to mother Sahara Ngerechi, family: spouse Catherine Mshilla Soi and my children, Granville, Pauline, Brenda, Emmanuel and Brian for their encouragement, patience which motivated me throughout the pursuing of this study.

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ABSTRACT

Planning and management of forests are very important activities that enhance the survival and conservation of forests, thus, supporting human development. Ideal forest planning requires stakeholder's participation particularly the local community around forests. Overall objective of the study was to determine the link between forest planning and management and human development Africa specifically Kenya. The precise objectives were to find out the role of forests in human growth in Africa, to explain how communities can be involved in planning and management of forest in Africa and to recommend ways through which benefit from forest products is divide between the government and community members. Green Theory and Social System Theory formed the basis of study. Green Theory contains an element of values and ethical issues and therefore supports the redefinition of climate changes phenomena in relations to long-standing environmental values. Social Systems Theory involves the analysis of humanity on how they acclimatize to their environment through adjustments in its structure, with imperative insinuations for the understanding of social order. The hypotheses were stated as per objectives as: Null hypothesis (H_0); There is positive correlation between forest and human development and (H_1) There is a correlation between forest and human development, Null hypothesis (H_0) Forest planning and management has positive impact on the community and (H_1) Forest planning and management has an impact on the community and null (H_0) There is no clear benefit from sharing of forest products between governments and communities and (H_1) There is a clear benefit from sharing of forest products between governments and communities. The study engaged a case study research design which forms a framework of an entire work, in order to get in-depth of the studies. A target of 100 members drawn from community forest association forms a study population. Sample size was determined using a mathematical formula given Krejcie and Morgan. Data were collected through focus, group discussion and key informants. Findings were summarized and concluded as per the given specific objectives. Study concluded that forests play essential roles in human development in a country by providing goods for and services. The recommendation was to inform policy makers and further research is also provided.

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List of Acronym

AFLRI	African Forest Landscape Restoration Initiative
ASAL	Arid and Semi-Arid Land
AU	Africa Union
CBD	Convention on Biological Diversity
CBO	Community Based Organization
CO_2	Carbon dioxides
FAN	Forest Action Network
FAO	Food and Agriculture Organization
FLR	Forest Landscape Restoration
GDP	Gross Domestic Products
HRM	Human Resource Management
DI	Development Index
ITPGR	International Treaty on Plant Genetic Resources for Food and Agriculture
KFS	Kenya Forest Service
LSD	Least Significant Difference
NGO	Non-Governmental Organization
NTFP	Non Timber Forest Products
NWFP	Non-wood forest products
PELIS	Plantation Establishment and Livelihood Improvement Scheme
IRP	Intellectual Property Rights
UN	United Nations

UNDP	United Nation Development Programme
UNFCCC	United Nation Framework Convention on Climate Change
WTO	World Trade Organization

Operational definition of terms

Aesthetic values: the value that state of concerns (the natural environment) enjoys in asset of its capacity to provoke desire or irritation when appreciated or experienced appealingly.

Agro forestry: Integrate plants and undergrowth into farming arrangements to increase positive interfaces with crop growing

Brown agenda development: an effort to place developing countries at the vanguard of both environmental and expansion arguments to challenge detach between global environmental green problems and the problems antagonizing cities.

Climate mitigation: It is the justifications which engross declining in human emissions of greenhouse gases. Mitigation is achieved by planting more trees to accumulative carbon sequestration capacity of e.g. Plating and replanting practices

Developing stock: Describe the size of existing trees present in forest or woody areas that have than a certain diametric size. It is normally determined in solid meter cube (m^3).

Elite-tree: A genetically superior tree or a tree which have good genetic characteristics.

Even-aged forest stands: A stand where age characteristic age variation is less than 20 percent of the rotation age and normally stand height are almost the same the same, and thus forming in a sole canopy.

Farm forestry: Is the planting of trees on farms as crops and managed them for commercial purpose

Felling series: Specific area in sub-compartments of a forest management unit that are ear marked for felling within a specific time bound. It sub-divided in form of portion and harvest yield are determine in term of volume.

Forest Beat: The smallest administrative unit in a forest

Forest block: The forest block is an administrative area in a forest with permanent boundaries smooth manages of the forest. It is sub-divided into compartment.

Forest compartment: is a permanent, physically identifiable component of forest area outline the establishment for setting up, prescription, accomplishment, checking and footage of forest maneuvers. It is sub-divided into sub-compartment.

Forest planning: refers to the evaluation of forestry activities in relations to costs and communicate to the anticipated results that are really imperative for the financial and economic forecasting at the enterprise.

Forest product: Composed of materials that are obtained from trees for domestic or saleable use, such as timber, wood fuel, poles withies, and fodder, herbal medicine wild fruits and transmission posts among others.

Forest Stand: Is an extended population of plants species which have been grown at the same time and have even in configuration, assembly, phase and magnitude, distribution, spatial arrangement as differentiate it from contiguous communities.

Forest: Involve multi layered deco system entailing mostly plants that cover the earth and maintains a numerous of life forms.

Green agenda development: attentions on how urban-based manufacture, consumption and waste generation contribute to ecosystem interruption, resource reduction and worldwide climate change.

Human development: It is the progression intended to empower society to contribute in the enhancement of their well-being.

Hydrological cycle: designates the nonstop flowing of water on the surface, overhead and underneath the surface of the earth.

Perpetual forest management: encompass the dealing forests to realize specified goals.

Plus-tree: Phenotypically superior tree or a tree which its physical features are superior to others

Rehabilitation of degraded: It is described as actions taken to return the ruined area back to the ideal point where ecological progressions fast-track recovery of forest structure, ecological functioning and biodiversity levels.

Seed orchard: is a plantation managed clearly for the heap production of genetically better-quality seeds for the setting up of new forests.

Seed stand: An established plantation from genetic quality materials that are selected from seed orchards

Silvicultural systems: is the method of treating, reaping and restoring a forest for different intentions to meet the owner's end use (timber, fuel wood, transmission pole) as indicated in forest management.

Site reconnaissance: It is the pre-visiting the actual area to be surveyed before the actual work commences.

Sub compartment: Is a zone with similar land use, plant species, and environmental conformation, stage, retreating and gathering operations and requires to be accomplished as a solitary unit. It is divided into sub-beats.

Sustainable yield: Yield/harvest/capture quantity that can be removed though preserving the environment's stability and function.

Tree Rotation: A period which a forest crop takes between its formation and final felling

Uneven-aged forest stands: A stand characteristic where age variation fluctuates significantly, the different in ages surpasses 25 percent of the scheduled lifecycle for an age class.

Woodlots: A land set aside in a farm for establishing a commercial stand by a farm

Working circle: It is a distinct principal unit of forest management with precise boundaries centered on topography and big enough to supply maintainable yield of forest products satisfactorily to support reliant on industries or communities.

CHAPTER: ONE

1.1 Introduction and Background to the Study

The chapter comprises a study topic which is forest planning and management for human development in Africa, with specific case of Kenya. There is need to correlate forest establishment and conservation with human development through planning and management of forests.

Human development is defined as a systematic way that endeavors to interpret how and why human public, of all ages and states of affairs alters or remain the same everywhere. This includes the study of human conditions, majoring in human ability approach[1]. United nation applies inequality human adjusted Human Development index as method of determining real Human Development advancement, focal point being either economic growth or social justices

The human development idea was established by economist Mahbub Ul Haq in the 1970s who argued that human intention is choice and not chance then foremost measures for human growth failed to expand people well-being.[2] Mahbub Ul Haq advanced the theory of human development first. Its highlights of growth indicate that domestic income are used to progress well-being of people and its improvement can be checked through the Human Development Index (HDI).[3]Comparing Africa and developed countries in terms on human development, Africa lags yet they have enormous forest resources and availability of cheap labour that can be employed as factors of production to create wealth.

Human Development Report of 2016 stated that Human Development emphasizes on the productivity of human lives relatively to richness of economies. The concept of Human development is the growth of the people and constructing human abilities through the

[1] Amratya sen 1985:Amartya Sen's "capabilities" approach to understanding **human** well-being, which emphasizes the importance of ends

[2]Sanya Barumah bub Ul Haq and human development tribute

[3]Khadija Haq 2017 *economic growth with social justice* September 27th 2017copyright © oxford university press 2018

public taking in the developments that outline their existence. Sustainable planning and management of forest resources through public participation will not only enhance equitable distribution of resources, but also eradicate poverty[4].

African economic outlook argued that Human Development in Africa has enhanced, though there is disparity as well as low investment in the continent.[5]The rate of Human Development in the continent should not be slow given that there is huge natural resource wealth which can be diversified to improve Human Development and subsequently improve people's lives involved. Human Development (HD) is a progression intended to boost human existence directly compared to financial expansion. It involves the growth of physical things proposed to achieve human requirements. Human expansion allows people to contribute to improve their own welfare and this can be accomplished through appropriate planning and management of their resource where state and community participates. In African, Human Development Index has slowly improved over the period, however notwithstanding the advancement, African continent remain behind other global regions in HD.[6]

The growth of Africa on the Millennium Development Goals remains unevenly distributed in the continent as per 2015 target approaches. The results have shown that notable improvement has been made, particularly in the thematic areas of human progression, like primary school registration, gender equality in both primary education and secondary schools, the affirmative action example women representation in decision-making, poverty alleviation as well as immunization coverage in addition to stemming the spread of HIV/AIDS. Nevertheless, the advancement, some thematic areas like malaria which is the most children killer disease within sub-Saharan Africa and various places in the globe and environmental protection were prioritized. Economic transformation through good governance, minimizing susceptibility to social, economic and environmental effects should be threaten as a particular priority for Africa continent

[4]Human Development Report 2016 Published for the United Nations Development Programme(UNDP)

[5]African Economic Outlook2013, *Human development in Africa*n DB, OECD, UNDP, ECA 2013

[6]Human Development Research Paper 2010/08 *Human Development in Africa* Augustin Kwasi Fosu and Germano Mwabu

and should broaden gap between wealthy and poor reduce individual in the societies.[7]The transformation can be achieved through the application of relevant method such as analyzing problems that are responsible for slowing human development and formulation of relevant policies and activities to increase society welfare through safeguarding of equitable, sustainable and stability in Africa.

In Kenya, Human Development has been developing gradually since independent in 1963. Political and socio-economic has been increasing since then. Country's Human Development index (HDI) for 2017 is 0.590. By 1990 to 2017, Kenya's HDI value increased from 0.468 to 0.590.[8] Education and technology are some of the main factors that has been steering and continue to steer development in Kenya particularly in forest sector. The application of forest science and the continuous innovation of forest technologies such as farm forestry, agro forestry and upper greening among others have been progressively improving timber industries in the country. The challenges which nexus forests and development in Kenya is space, there is spatial completion between industrialization, farming, settlement and the urbanization. This has led to the excision of forests, and consequently hinders the development of forests.

1.2 Statement of the Research Problem

Development of human beings ties with needs such as foods, shelter, clothes that are necessary for survival of people residing in urban and rural areas. Forest provide tangible products such as fuel wood, transmission poles, structural timber, medicinal herbs and fodder among others and intangible like climate mitigation (the reductions of greenhouse gases emissions in the atmosphere through carbon sequestration by plants), hydrological cycle, persistence flow of water on, above and below the Earth's surface aesthetic values, the worth items that trees provide in the form nature which is pleasant to human being and rehabilitation of degraded areas which is there-establishment (restoration) of the

[7]Ellen Johnson Sir leaf 2015: *25 Years of Human Development, an African Perspective*; by Ellen Johnson Sir leaf, President of Liberia2015 marks the 25th anniversary of the first Human Development Report

[8] UNDP 2018 *Human Development Indices and Indicators: 2018 Statistical.* Technical note no 1-5 htt://hdr.undp.org/en/data

forest to the original state through afforestation or reforestation programmes in order to deliver forest products and services. However, the dilemma in Kenya is that most communities living near the forests are relatively poorer. Indicators of the poverty are the type of structures located there and food scarcity among others. The issues lie on the facts that forest ownership and communities around the forest have little or no access to forest goods and services. This raises several questions that this study will attempt to answer. What roles do forests play in human development? How can the planning management of forests be done by both government and communities? To enhance an understanding on how best benefits gained from forest products be shared between the government and the communities in support of development?[9]

1.3 Objectives of the Research

Overall research purpose was to establish nexus between forest planning and management and human development Africa specifically Kenya.

1.3.1 Specific Objectives

i. To investigate role of forests on human development in Africa and specifically Kenya: chapter 2
ii. To explain how communities can be involved in planning and management of forest in Africa generally and Kenya specifically: Chapter 3
iii. To recommend ways through which benefits from forest products can be shared between the government and community members

1.4 Literature Review

This chapter is concern with the reviewing work done by other people. Reviewed literature were related with this work in order to find a knowledge gap which formed foundation of this study

[9]Richard Jolly 2010: *Employment, basic needs and human development; elements for a new international paradigm in response to crisis*. Journal of human development and capabilities> a mult-disciplinary journal for people-centred development volume 11, 2010- issue1: employment, inequality and globalization p 11-36 published online

1.4. 1 Forest and Human Development in Africa

FAO defined forest as a Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent. It does not include land that is predominantly under agricultural or urban land use.[10] In Kenya, forest contains both indigenous and plantation trees in state, community or private forests. Young stands of trees are also considered as young forest because finally will attain maximum heights as per tree species. According to global assessment, Forests cover 31 percent of the world's land surface which equivalent to over 4 billion hectares.[11] Worldwide forest is declining due to increasing population leading to demand of social factors such as urbanization, farming, industrialization and settlements that have spatially occupied forest areas. These activities have influenced on social welfare of the communities who depends on forest. Africa forest area is estimated to be 635 million hectares, same as 21 percent of the total land area.[12]

Forests and other vegetation sustain environment which vital to human nature as well as mitigating climate, thus strengthening human survival, forests areas stock up of raw materials that are essential for human growth. Trees conserves flora and fauna which embrace more than three-quarters of the global and biodiversity, provides tangible goods and intangible services that promotes human socio-economic.[13] Forests are considered to be important worldwide because of their multiple functions which are essential to mankind. Economic growth of any state is partly contributed by forest in terms of water for irrigation, hydroelectricity, wide range of biodiversity, habitat for wildlife and

[10] Adams (2012): *World Forest Area Still on the Declin*ing working paper 144/e Rome 20110 *e*; Eco-Economy Indicators Forest Cover August 31, 2012

[11]working paper 144/e Rome 20111Emily E. Adams (2012): *World Forest Area Still on the Decline* Eco-Economy Indicators Forest Cover August 31, 2012

[12] Kelatwang and Garzuglia (2006): *Changes in Forest Area in* Africa 1990–2005 International Forestry Review 8(1):21-30. 2006 https://doi.org/10.1505/ifor.8.1.21Published by: Commonwealth Forestry Association

[13]FAO 2000a (FRA 2000 Main Report) Forest includes natural forests and forest plantations

influence hydrological cycle in addition mitigating climate through carbon sequestration.[14]

Research has shown that countries which increase trees annually, scores highly on the UN's Human Development Index while countries with net annual forest loss scores lower.[15] This proves that human development goes along way with good planning and management of forests. Forest and human development relationship is essential for the growth of humanity because society depends on diverse functions of forests which produce tangible and intangible goods and services respectively such as forest products, environmental protection, social and cultural purpose, embraces spiritual, sports and representative role of forests.[16]

The association between forests and human growth is composite issue, for it is anticipated that more than one billion people worldwide who are poor depends on forests for their survival.[17] Forests and human development is indispensable yet natural resources diminishing rapidly. Therefore, there is need to plan how to use them in a sustainable basis for current and future generations. This can be done through inclusive planning by the entire concerned stakeholder especially the local community who are adjacent to the forests.

Studies have found that a third of the global population utilizes wood as source of energy for domestic. World jungles have potential to contribute around 40 percent of international renewable power in the form of wood fuel; whereas three-quarters of the

[14]Karjalainen, Sarjala and Raitio 2010: *Promoting human health through forests: overview and major challenges* Environ Health Prev Med. 2010 Jan; 15(1): 1–8. Published online 2009 Mar 25. doi: 10.1007/s12199-008-0069-2PMCID: PMC2793342PMID: 19568838

[15]Kauppi and Lipponen (2018): *Forest resources of nations in relation to human well-being*. Plos one 13(5): e0196248. https://doi.org/10.1371/journal.pone.0196248

[16] Raffaelli, Gios and Notaro 2003: *Recovering the relationship between human beings and forests in the alps:* sustainability, participation, partnershiphttp://www.fao.org/docrep/article/wfc/xii/0578-c1.ht

[17]Study by CIFOR exploring the forest-poverty link

earth's manageable clean water originates from wooded watersheds.[18] Forests have potential can be over exploited by both state and communities if planning and sustainable management are not adhered to, hence study endeavored to the nexus forest planning and management with Human Development for sustainable exploitation of forests.

Forests in Africa cover approximately area of 675 million hectares representing about 17 percent of earth's forest area and 23 percent land mass in the region. Africa contains 25 percent of the global rainforests and higher than seventy percent of the inhabitants in Africa Sub-Saharan relies on jungles and woods for their living as follow: a fifth of rural communities' daily requirements come from forests and Woodlands and forests supply roughly 60 percent of all fuel woods.[19]African forests are mostly found in Central and Southern Africa 37 and 28 percent respectively, forests differ from tropical forests to temperate forests due to elevation and latitudes. Global forest cover is roughly 31 percent of the world land mass, which consist of natural and planted forests. Planted forests cover approximately seven of percent of total forest area.[20]

Eastern African region comprises of Somalia, Rwanda, Burundi Djibouti, Eritrea**,** Ethiopia Tanzania, Kenya and Uganda**.** They are various forest types across the region, but are some forest cut cross the boundary such as mangroves and coastal forests along the eastern African coasts stretching from the coastal Somalia to and the Miombo woodlands of Tanzania. Forest provides considerable economies to both local and national besides the endurance of rural communities especially the forest contiguous communities who are in most cases poor. It has been projected that forestry sector contributes to an average of 3percentof the countries' Gross Domestic Product through trade; adjoining community households especially the poor who earned their living from

[18] Laird, Ford, Laseter, and. Vose 2011: *Long-term Forest Management and Climate Effects on Streamflow* p 108

[19] Yemshaw 2010: The *African forest forum and its engagement with the promotion of SFM in Africa.* Africa forest Forum, a platform for stakeholders in Africa forestryWWW.Afforum.org

[20] FAO 2012: Forestry Forest Management Plan Serapium Forest Plantation, Ismailia (Egypt) 2012 GCP/RAB/013/IT

forest resources.[21] Hence forests are a monetary and fiscal safety grid for communities above and beyond a buffer zone to prevent climatic conditions

Forest contribution to the well-being of Eastern African countries has been undervalued for a long time; tangible goods like woods and non-wood has been valued, intangible services such as environmental protection, hydrological and cultural services has not been seriously considered in the valuation. It is imperative to account for all the above values when considering the entire monetary value of forests. A study has found that total valuation is worthy because it indicate the value of resources as well as its benefits.[22] The information on the value of forests assists the policy makers, planners and managers likewise entice the companies, Non-Governmental Organization and donors in addition wishers to support forest conservation projects.

Somalia's land area forests cover about 12percentof which 4percentof the land has dense tree stands. It is one of the few areas in the world where frankincense is produced. According to IUCN categories I-V Somali has total of 394 tons of carbon in living biomass.[23] Rwanda is on progression to reach its objective of cumulative forest cover to 30percentof entire land area by 2020 notwithstanding enduring populace and land gravities. Status of forest cover in 2017 29.6 per cent, they anticipate to reach 30 percent goal is by 2018, two years before the deadline. Forest play significant role of preventing of land deprivation and fortification of watershed, therefore. Rwandese society gains from the restored forests through enhanced food security and poverty alleviation.

In Burundi forested area cover is 6.7percent about 172,000 ha of which 23.3 percent 40, 000 ha is classified as primary forest, the most biodiverse and carbon-dense form of forest. It has 69,000 hectares of plantation forest. The country lost 40.5 percent of its

[21] Mwangi, Erutti and Nasi 2018: *State of forests of Eastern Africa:* CIFOR Editors Esther Mwangi, Paolo C Erutti and Robert Nasi: 27 April 2018

[22]Karanja 2001.*Why economic valuation is important to East Africa's forests,* Produced as an output of the Integrating economic instruments for the reduction of forest biodiversity loss into sectoral policies and strategies in East Africa (Project, No UNTS/RAF/008/GEF, P. O. No: 93330) of the UNDP-GEF-FAO Project Reducing Biodiversity Loss at Selected Cross

[23]Country Environmental Profile for Somalia

forest cover between 1990 and 2010. Burundi's forests contain 17 million metric tons of carbon in living forest biomass, Biodiversity and Protected Areas.[24] Djibouti has 0.3 percent approximately 6,000 ha forested, the biodiversity and safeguarded areas in the state, has roughly 509 known species of amphibians, birds, mammals and reptiles. Eritrea has about 15.2 percent or 1,532,000 ha of the land is forested. It has 34,000 hectares of plantations. From 1990 to2010, the country vanished nearly of 4,450 ha or 0.27 percent annually in total between the same period.

Forest cover in Ethiopia is about 11.2 percent or 12,296,000 hectares of its total land is forested, plantations cover total areas of 511,000 hectares. Forest cover change between 1990 and 2010, was a loss of average 140,900 ha or 0.93 percent annually. In total between 1990 and 2010, the country's forests enclose about 219 million metric tons of carbon in forest biomass.[25]Tanzania's forest stores 2,019 million metric tons of carbon inform of biomass. It has a forest cover of 37.7 percent approximately 33,428,000 hectares of its total area and 240 000 hectares of the forests are plantations. Tree cover inform of forests and woodlands in Uganda is almost 14percentof Uganda's land surface, the percentage has been reducing for last 30–40 years because of the increase population and consequently decrease in supply of forest products for domestic and industrial use. It is due to agricultural development, illegal settlement and weak structures of forest management policies. Importance of Uganda's forests contributes about 5.2 percent of the Gross Domestic Product (GDP) from marketable and non-marketable values from forest goods and services. Forest Sector Review Report from Ministry of Water in 2008 specifies that in 2004, the total commercial value of Uganda's forests, counting all lands and environment, shows that wood and non-wood from forests are about Ushs210 billion (USD 109 million) or 2.75 percent of the GDP.[26]

[24]SSaatch 2011 of Caltech's Jet Propulsion Lab and colleagues published a paper in PNAS MAY 2011

[25] ibid

[26]J Obua, Agea and Ogwal *Status of forests in Uganda,* P. 853 African Journal of Ecology (Afr J Ecol) Publisher: East African Wild Life Society, Wiley

Though Eastern African forests play importance roles in provision of goods and services, they have challenges that weaken their potential contribution to their preservation, poverty mitigation and financial growth objectives. Examples are climate change, over grazing, infrastructure development, over exploitation through logging, frequent forests fires, agricultural practices such as irrigation, diseases and pests. Uncoordinated conservation efforts and lack of regional forest policy provision to complement national policy for are trans-boundary forests are another constrains in forest conservation effort. All these impend to alter the types and condition of forests.

Forests are important for Human Development by sustaining livelihoods through supporting food production, generating hydropower and providing freshwater for industrial and domestic use. Major closed-canopy montane forest are state's water towers and forests subsidize over 3.6 percent of the country's Gross Domestic Product, forested sceneries are significance for storing rainwater, regulating river flows and preventing runoff in water towers. Landscapes assist in recharging groundwater aquifers, enhance soil fertility, safeguard rivers and river banks from soil sediments and in addition, forests mitigate climatic conditions and act as carbon pools and sequestration, therefore, benefits of forested ecosystems outweigh the gains of deforestation through anthropogenic activities. Forest sector in Kenya play vital roles in the income of the populace through the delivery of instrumental goods and services. The supreme significant role of sector is the supply of energy for internal and manufacturing processes, provision of timber for construction. Trees sequesters carbon by taking in carbon dioxide from the atmosphere and releasing oxygen through process known as photosynthesis, CO_2 are used for structural development or as building block inform of simple and complex sugar, consequently, reduced the concentration of greenhouse gas and mitigate the effects of global warming too. Dead trees in the soil from fossil fuels like coal and gasoline products which are importance for human development.[27]

Forest resources and forestry development activities contribute significantly to the economy by supplying raw materials for timber industry and generating employment.

[27] Kamau 2016 : *Saving Mt. Elgon and Cherangani Water Towers Kenya water towers* March 21, 2016

Therefore contribute to the national economy; it is assumed that over 80 percent of the population uses fuel energy, while urban growth and hydro energy rely profoundly on water. Trees have unquestionable role in influencing rain, provide a cover above the top surface of earth, preventing excessive heating up from solar rays. Forests not only protection environmental, but also contribute noteworthy income and livelihood options for more than one billion people. They also avail a wide range of products such as timber, fruit, medicine, beverages and fodder. Wooded area offer services like carbon sequestration, shades, beautification, and erosion control and soil fertility, this mean that without trees human life would be unsustainable.

1.4. 2 Role of community in forest planning and management

Forest planning is a circumstance which significant for sustainable and continuous with economical efficient and ecological sound, it is a long-term planning which takes a minimum of one rotation period (tree lifespan). Issues to be considered during planning are: (i) Afforestation includes Site suitability, Location, area of the propose site, Species selection and Environmental impact (ii) Existing forests, evaluation and forecasting, Replanting, operationalization of policies, rules and management plants as well as Harvesting (iii) operational activities'; Accessibility, Security, Silvicultural practices, Maintenance, human wild life conflict, and networking with statutory bodies.[28] They are indispensable planning issues for enhancing forest survival which play important role in human development. Forest management planning aims to propose a rational set and schedule of actions to the management of a forest; this is to maximum sustainable provision of goods and services and minimizes forest threats.[29]

Plan is a framework that guides forest staffs on why, what how, when, and by whom they propose, analyze, and decide upon projects and activities.[30] In my opinion, Planning is a system where process, procedure, and technique are set to realize goals through

[28] Forest focus 2019 > growing forests> forest planning

[29] Korjus 2014: *Challenges in Forest Management Planning*, Forest Res 3: e110. doi:10.4172/2168-9776.1000e110

[30]USDA Forest Service October (2008): Foundations of Forest Planning Volume 1 (Version 3.1)

identifying, assessing and ranking the options in order developing strategies for achieving desired options. Theories form planning foundation because they inform the practices as Whitmore outline describe interdisciplinary and trans-disciplinary as essential to justifiable planning and provides another useful tool to comprehend and classify planning methods.[31] The theory integrates many actors in planning like academician, professionals (from line agencies).

Participatory forest planning contribute to the zonation forest areas for various uses by the stakeholders, involve many stakeholders, provides plan that guide forest activities to be done against cost and time schedule. Michael Elliott gave the function of planning as follows; Improve efficiency of outcomes, hence optimize productivity, enhance social welfare and subsequently balance interests and engage justice, widen the range of choice by creating visions and enhance options and enrich civic engagement and governance, thus Expand opportunity and understanding in community.[32] These functions are applicable if forest planning and for optimum production of forest products that can be used to improve the well-being of the people therefore forests conservation require joint management between the government and the communities.

Forest management is an arrangement of practices for supervision and use of forest land aimed at fulfilling relevant maintenance (including biological diversity), economic and social functions of the forest in a sustainable manner.[33] In my opinion, forest management includes the planning of nursery establishment and management, tree planting, protection silviculture operations and harvesting techniques. All these require a written plan to be adhered to, else the development such plans should participatory activity where the communities are involved. Forests are distinct for their diversity of the flora properties and land services they offer and their possible to be renewed under

[31] Whitmore 2015: *How Planners Use Planning Theory*: The University of North Carolina Department of Urban and Regional Planning identify planning theory in everyday practice. JPER | February 2, 2015, 9am PST

[32] Elliott 2014: *History and Theories of Planning:* Michael Elliott, School of City and Regional Planning, Georgia Tech February7, 2014

[33]FAO, 2001: Global Forest Resources Assessment 2000, Rome, Italy

sustainable management practices. The physical resource and life maintenance functions delivered by forest terrestrial are essential predominantly in developing countries.[34]

Forest management plan is a document, which prescribe activities to be done in forest stands for in sequence manner purposes of achieving the desired goals. The plan could be Long-term (10-year or more years) or short-term goals targeted, with precise performance and agendas. The constituents of a Plan include the following: Goals and Objectives which should be clearly stated, they are precise, quantifiable, achievable, accurate and time bound, Site Description involve the physical description of the forest resources like provision of maps (include a soils map) which clearly define boundary, access points, coordinates slope and remarkable information known on forest management. Management operations must be recommended management activities which refer to as silvicultural operations and their schedule time centered on objectives and anticipated goals. The activities are site preparation, actual tree planting, weeding, pruning, thinning and final harvesting besides coppice management for some tree species like *eucalyptus* species, the entire activities should be done in sequences. Protection and Maintenance are important component of the plan for its take of fire prevention, destruction by animal and human beings in addition to monitoring of diseases and pests. The utmost value of having a management plan is that it acts as a road map to goals' achievement. Success is the attainment of the preferred goals.[35]

Forest management in Kenya is a division of forest which deals with administration, financial, lawful, and social aspects, in addition to application of scientific and technological characteristic including Silvicultural practices, protection and forest rules in order to maximize production. It's the thoughtful human involvement in extending from activities that are intended, to protection and sustaining the forest ecology and its functions. This to support economically valuable collections of tree species to enhance goods and services production to sustain inter and infra generations

[34] Raj and Lal 2015: Forestry principles and application p 39 scientific publishers India

[35] Jackson, Irwin, Dickens, Shelton, and McConnel 2017: *Writing a Forest Management Plan*, Publication WSFNR-17-50 December 2017.The University of Georgia Warnell School of Forestry and Natural Resources

Maintaining forest management is the undertaking practices such as tending which involve weeding and protection, civil-cultural operations are measures taken in forest stands for the purpose of achieving stand-specific objectives which entail Escapement, pruning and harvesting activities in order to obtain sustainable yield.[36]This practice is necessary because the world population is increasing and subsequently the demand for forest products too, but the forest cover is globally reducing. Forest management comprises basic elements including national procedure and lawful context, security of forest resources and effective protection of spatial areas where Forests are located, ideas on forest ecosystems and preservation of site quality, forest organization arrangement, targets and purpose of forest management practices, meaning of forest resources, relevance of suitable silvicultural systems, reduction of undesirable environmental forces, consideration of Communities who rely on forest, Sustainable market and production administration and monitoring of administrative Performance. [37] In Kenya Forest management plans are used as frameworks that guide organizational set up to carry out management of forests sustainably, according to the Forest Act and subsidiary regulations. They are systematic frameworks that show all activities to be undertaken in forest or part of it during a period of at least 10 years.[38] They are various plans that are applied in Kenya to enhance conservation and management of forests and allied resources. They are annual plans which guide the forest operation in every forest station, felling plans which show a series of plantation that are earmarked to be felled within a period of one year and indigenous forest is called a coupe. Forest management plans are supposed to be developed and used by various forest stakeholders to co-managing forests together with the state. Management plans exists in Kenya, however the implementation, especially with the inclusion of other stakeholders such the communities have not be clearly defined and this has led to a misunderstanding between the state workers and the public agitated by the politician

[36]Mathews 1989. *Silvicultural systems*; Clarendon Press, Oxford 284 p

[37] Gadow, Timopukkala and Tome: *2000 Sustainable forest yield*. managing forest ecosystem p 4: Kluwer Academic publishers ISBN-13;978-1-44020-0728

[38] GOK; The Kenya Forest Act, No 7 of 2005: Kenya Law

Forest planning is getting the most out of forest into to successful management plan after determining the intended management objectives and goals. The major points of orientation to be considered when planning comprises of: First administration approach are management prospective and substitute actions and practices existing that can be employed in order to realize the desired goals. Second zonation of the forest into different management units the users and site characteristics such plantations areas, conservation areas, cultural areas and grazing areas among and also wildlife habitat, others. Third classify short-term (five years) management objectives like manage for conservations or plantations working circles of kind of goods to produce for such as saw logs, transmission poles, firewood, botanicals, grazing and herbal medicine and manage an area as even-aged or uneven-aged. The following should also be considered when planning; accessibility of roads throughout the year regardless of the weather conditions, compatible harvest techniques to the site topography. Species planting depends on the, site conditions and working circle. Fourth calendar preparation for short-term organization development activities for each zoned area. The plan activity provides the comprehensive phases and actions to undertake every year covering issues such as who (a person or a group) is tasked, what is to be done (operation to be performed), where to be done (management unit to carry out the activity), when should be done (season when the activity will take place) and how to be done (the techniques to be applied during the operation). Fifth describe the organization criteria and strategies, ensuring management plan meets the anticipated to objectives and goals for forest stand. Lastly, measure continuity of the activities as indicated plan, this confirms whether the plan activities are in the right track.[39]

1.4.3 Key challenges to planning and management

Demand of forest goods and services by the society has been increasing rapidly over decades. It has brought many challenges, therefore altering planning and management of

[39] Megan Hanacek 2018 *Private Forest Landowners Association* Mandlo September 5, 2018 at 7:52 am Email: info@pfla.bc.ca, Web: https://www.pfla.bc.ca

*(a) Lack of stakeholders' forum***:** there is no platform where f forest stakeholders can converge to discuss matters concerning environmental issues especially planning which is paramount to environmental protection.[40]

(b) Conflict of interest among stakeholders: Stakeholders have different attitudes and perceptions about forest conservation; hence they have misunderstandings regarding their differences[41]. This is because of the way the different interpretation of their attitudes and perceptions; this is a challenge to forest planning. Different forest agencies have different attitudes and different usage of forest according to their mandates, for example Kenya Forest Services, emphasize on conservation and sustainable use forest for perpetuity, Kenya wild life service is concern with preservation of flora and fauna, agriculture ministry of agriculture deals with crops, community wants to benefit from forest. These interests among stakeholders are unfavorable to forest planning.

(c) Land and ownership tenure: are challenges of forests planning and managements are; the issue of forest ownership that the communities around the forest has little or no access to forest goods and services, thus denied them the dependency of forests.

(e) Political influence: Forest planning has been jeopardized by political interference; several forests station has been exercised to pave way for other development such as settlement, construction of institutions, agricultural activities and industries in addition to sewerage construction

(f) Lack technical knowhow: Some of the forest stakeholders lack technical knowhow on forest planning because forest conservation and management requires both science and art to carry out forest operations. Planning for these activities is a problem to some stakeholders especially the community, there is lack of information data for most of the indigenous is another challenge to forest planning because planning without available

[40] Buchy and Hoverman 2000: *Understanding public participation in forest planning*: a review Policy and Economics, Elsevier BV publisher(s) ISSN: 1389-9341, Vol: 1, Issue: 1, Page: 15-25

[41] Leskinen, L.A. 2004a: Purposes and Challenges of Public Participation in Regional and Local Forestry in Finland, Forest Policy and Economics 6: 605-618.

data on species diversity and uses, seedlings propagation, silvicultural treatment and harvesting is impossible. There is technical limitation such as insufficient software and outdated computers that hampers forest planning and staff issues such scarcity of trained personnel is also a problem [42]

(g) Inadequate funds: Lack funds to facilitate planning and management, planning involve several stakeholders who space and materials, therefore funds are required for logistic arrangement emanate

(h) Land degradation and climate change: It has render forest areas to deplete; hence they can no-longer sustained plants, therefore affects afforestaion and reforestation planning programmes. Climate change has change rain patterns in the country, thus affect planting calendar in most part of the country and subsequently caused frequent forest fires, diseases and bests besides

(i) Under valuation of forest information: Planning forest development, conservation and management for any situation is exceptional, has challenges in setting goals to forecast, long-term period (rotation) and developing forest valuation models and risks appraisal.

1.4.4 Knowledge Gaps

Based on the literature review, role of forests in human development is crucial, hence the impact of forest on communities living adjacent to forests have not been positively felt or the realization is very minimal and there is no clarity on benefit sharing formula. However, accessing the resources (forest products and services) by the local community are limited, for the reason that forests are owned by states, hence this study sought to find nexus between planning and management of forest and human development through investigating role forest planning and management on human development, discussed how to involve communities in the planning and management of forest in Kenya as well as determining the best way to share benefit from forest product between government and community.

[42] Bettinger, Bosten, Siry and Creber 2009: forest planning and management , academic press>Eseviver

1.5 Justification of the study

The study findings were intended to contribute to academics based on knowledge gap arising out of the conceptualization of literature on the following ideas human developments, ecological theories as well as forest planning and management. Knowledge gap on the basis of empirical literature from specific objectives are as follows: Investigating role of forest design and control to human development. The results provided clear aspects on how forests planning management play an important role in human development owing to increase in wealth, due to better utilization of forest on sustain yield basis. The knowledge gap from communities' involvement in setting up forest management in Kenya assists to enhance conservation of the forests and the knowledge gained from the objective issued by academician and researchers for further studies. Better benefits sharing of forest products between the government and community members leading to sustainable management of forests thus produces sustainable yield for intra and inter generation, therefore it acts as study model that can be replicated in the entire country. The study of existing knowledge gap from body theoretical and empirical wills the literatures add knowledge to academia sphere. The study findings assist policy makers, forest agencies, and other forests stakeholders in making rational decision on environmental issues that are threats human security besides hindering forest development. For instance, climate change, land degradation and globalization. FAO stated that several developments among them globalization, devolution and privatization have affected the way forests are governed and call for forest products and services for the growing and urbanized population. Nonetheless, the policies of forest conservation and management also need to review that forestall outlook needs and trends that help to shape a broader vision for the country in the years to come.[43]

According to e.g. Iyer-Raniga and Treloar (2000) the sustainable management of the natural resources requires proactive involvement by the public. Public participation as a communicative process helps decision makers better understand the knowledge possessed

[43] FAO 2010 *Developing effective forest policy* a guide Food and Agriculture Organization of the United Nations, Forest Paper 161 Rome, 2010

by and the values of the participants, or allows the stakeholders to directly influence planning and decision-making (e.g. Leskinen 2004a).[44] Policy and relevant of study

1.6 Theoretical Framework

Overall objective of research is to find out if there is nexus involving forest planning , management and human development in Africa specifically Kenya. The connection is generally solution to climate change for it requires value and morals that changes human attitude towards forest conservation and managements, theories that best link phenomena are; Green and Social System Theories. Green theory form the basis of the study because it contains an element of values and ethical issues and therefore supports the redefinition of climate change phenomena in relations to long-standing environmental values instead of temporary political welfares.

The theory provides new planning merit opinion for evaluating forest conservation and management and it permits a wider conservation viewpoints human interests as well as highlighting rational adoptions that can be definite within the environmental limitations of climate change as an alternative to political margins of economic benefit[45]. Green theory contains some elements such as undertaking inequality, focus on societal enlargement as a foundation for support forest maintenance in addition to indispensable individual civil liberties. It provides firm framework that can be exploited to unravel global problems includes; inequality in accessing forests products and services by the local communities, unclear method of benefit sharing of forest products and menace of climate change can be addressed and subsequently contributes towards the growing human development.

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[44] Working Papers of the Finnish Forest Research Institute 38: 66–69 Working Papers of the Finnish Forest Research Institute 38 Forest Planning in Private Forests in Finland, Iceland, Norway, Scotland and Sweden Proceedings of ELAV seminar 23-24 March 2006, Koli, Finland http://www.metla.fi /julkaisut/working papers/2006/mwp038.htm Purposes and Challenges of Collaborative Forest Planning Leena A. Leskinen

[45] Goodin 2012: *International Ethics and the Environmental* Crisishttps://doi.org/10.1111/j.1747-7093.1990.tb00247.xPublished online: 28 September 2012

The theory comprehends anthropogenic commercial and political practices that can result to direct proportional consequence to climate change, particularly the exploited natural resources are responsibility of humans for destroying the entire ecosystem. Green theory is related to green economy because of the kind of politics that associates with numerous explicit characteristics of which some are tribal, confines to growth and the regionalization of power.[46]

Social system theory highlights on human interaction with forest and other natural resources through the formation of institutions and system. For instant, they are two types of institutions: traditional institution which involves the Elders, Age set, Clans and the Family and modern instructions includes: Kenya Forest Service (KFS), Forest Action Network (FAN) Community Based Organization (CBO), Non-Governmental Organization (NGO) and Ministries. The institutions which act as entry points for people to interact with forests, the Miji Kenda conserving Kaya forest in the coast are a good example of traditional institution and the KFS mandate of developing, tending conserving and manage forests and allied resources is an example of modern institution. The question is how the institution can be merging so that they give the best conservation and management techniques to assist in managing state forests efficiently and effectively.

Systems theory entails the scrutiny of society on how it adapts to its environment through modifications in its structure, with imperative inferences for the considerate of social order, the theory tells the difficulty of social progression and, stresses the restricted likelihood of directing society. The main feature of social variation is the approach in which occurs, or how alterations in the structure of the arrangement relates to the developments of the system, total organism is continued by the several processes that maintain its function and survival.[47]

Systems Theory describes how human behaviour impacts the interface of many unified systems such as ecosystem. Issue regarding individual, families, organizations, societies,

[46]Patterson 2009: *Green Politics'*, in *Theories of International Relations*, Burchill, S.,

[47]Barry Gibson2007 *Systems theory Sociology;* The Editors of Encyclopedia Britannica SAGE Publications' *Encyclopedia of Governance* (2007)

and other structures relating to forests development and sustainable conservation are ultimate and must be considered when trying to comprehend and how best can the individual, family or the societies as well as organization can be assisted. Bestowing to the theory, the entire systems are interconnected parts instituting methodical whole and respective subsystem affects other parts of the whole.

Systems Theory develop all-inclusive opinion of individuals within an environment and is best employed in situation where numerous systems inseparably connect and impact one another. It can be hired in circumstances where contextual understandings of conduct can lead to the most suitable practice intervention for example of how systems theory is engage to comprehend how interrelated factors contribute to conservation efforts. In this case, where there are over exploitation of forests through individual or societal behaviors towards mismanagement of forests, individuals or society systems theories, must appraised not in separation, but in the framework of the individuals or society functions as a unit. The central concept of the theory is the three-way relationship (triangle), whose common form is a human behaviour-forests relationship, the two helping each other, but the triangle is incomplete, it's clearly missing one corner and thereby the of conservation attitudes is missing. Subsequently the theory helps to identify the missing pillar so that the concerns institution embarks on awareness creation through capacity building to the societies that depend on forests for their livelihood.

1.7 Hypotheses

These are the assumptions that were used to break the gap from the problem statement into to specific objectives: Null (H_0) There is positive correlation between forest and human development in Africa specifically Kenya and (H_1) There is no correlation between forest and human development in Africa specifically Kenya, Null (H_0) Forest planning and management has positive impact on the community in Africa specifically Kenya and (H_1) Forest planning and management has no impact on the community in Africa specifically Kenya and Null (H_0) there is no clear benefit from sharing of forest products between the government and the communities and (H_1) There is a clear benefit from sharing of forest products between the government and the communities.

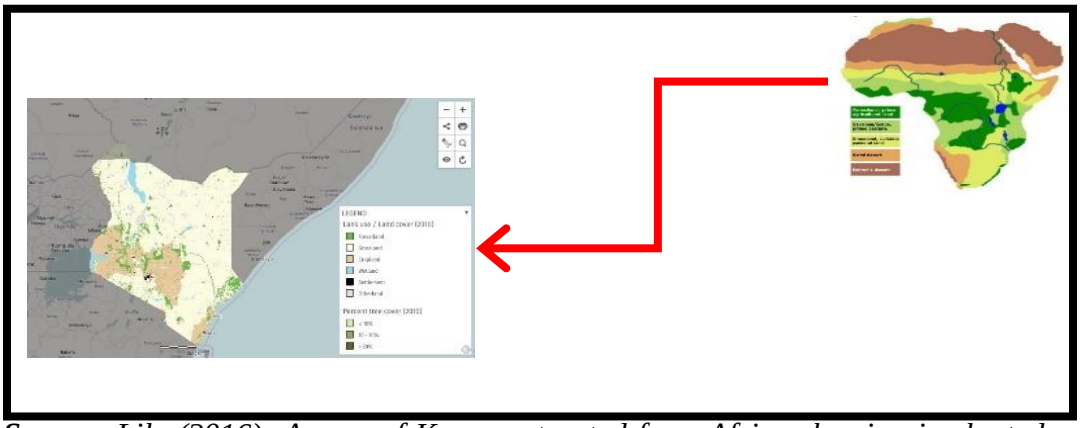
1.8 Research Methodology

This sub chapter deals with the research designs, methodology and approaches that were used in the study. It encompasses study areas, survey methods, sample design, source of data, field procedures and data analysis.

1.8.1 Study Areas

The study will take place in Kenya cover 10 counties of 47 which will be purposely because they have forests as follows Kajado, Nairobi, Kiambu, Bomet, Kericho Nandi, Narok, Uasin Gishu Trans Nzoia, West Pokot and Elgeyo Marakwet

Map of Kenya



Source: *Lily (2016): A map of Kenya extracted from Africa showing is planted a forest the size Lily Kuok September 9, 2016*

1.8.2 Research design

The best research design reduces the biasness and increase dependability of the data collected and also delivers minimum errors after the analysis of data. Design that conveys maximum evidence and offers the chance to consider several features of the problem and find out the most suitable and efficient design, therefore a good design is related to the purpose or area of the research and the core of the phenomena being investigated.[48]Case study research design to be employed in this study in order to get both in-depth study and conclusive finding basing on inferential statistics, the design is common outline of

[48] Kothari: *Research methodology methods and techniques* 2nd edition. New age international publisher limited India 3003 p 41

qualitative analysis and involves a cautious and absolute reflection of a social component, it also stress complete scrutiny of limited quantity of situations along with its interrelations like combination of qualitative and quantitative research approaches Quantitative method used in research, defined and clarified the phenomenon that was under investigation, while qualitative method was used to get an in-depth study of the research. Quantitative research designed relied on data collection and analysis data to describe, explain, predict and control variable of phenomena interest.[49]

1.8.3 Population, Sample Design and Sample Size

A target population was determined from assembly of individual to which investigator was interest to generalized findings from. It embraced all untapped respondents that made up a study group[50] Selected population for a study from 10 selected counties which have forests. 10 people were picked from Community Forest Association from each County. An investigator took random sampling from target population and use it study because of time and fund constraints[51]

Researcher used a combination of cluster and purposive sampling techniques because of clustering 10 counties and purposively target registered Community Forest Association members who are the main users of forests as stipulated conservation and management Act 2016. Determination of sample size when the population is known is given by,

$s= x^2NP\ (1-P)/d^2(N-1) + x^2P(1-P)$

[49]Gay, Mills & Airasian 2009: *Educational research: Competencies for analysis and applications* (9th edition). Upper Saddle River, New Jersey: Prentice Hall

[50]Mugenda & Mugenda (2003), Research methods: *Quantitative and qualitative Approaches*. Nairobi: African Centre for Technology Studies

[51]Kervin 2004: Method of business research New York Harper Collins publisher inc

Where s= required sample size, x^2 =tabulated Chi square (1.96x19.6 = 3.841), N= population size, P= population proportion (assume 0.5), d^2 = the degree of accuracy articulated as a magnitude (0.05)[52].

Note: 1.96 is standard error at 0.05 percent

Given that the population target of the study is 100

Therefore, s =3.841 x 100 x 0.5(1-0.5)/ $(0.05)^2$(100-1) + 3.841 x 0.5(1-0.5) = 79.507 rounded up to 80. So the sample size will be 80 respondents from a target population of 100 people.

1.8.4 Data Collection

Primary data is described as the first hand information that the researcher gathers from target participants.[53] The primary data was collected using Focus Group Discussion (FGD), Key Informant Interview(KII) and Likert Scale instruments/tools: (i) FGD: It is data collection approach in which numerous respondents were interviewed in form of a group of 6 to 12 people and the moderator.[54]The method contains two elements namely, group interview in which several respondents meet and discuss the intended topic in details, as the one is writing minutes of the discussion. The other element is focus interview in which the respondents are selected because they are conversant with the topic to be discussed.[55] This a method that was used to answer objective one and objective two, to investigate the role of forests planning on human development and to

[52]Krejcie and Morgan: *determining sample size for research activities educational and psychological measurement* 1970, P 30, 607-610. Robert V. Krejcie University of Minnesota, Duluth Daryle W. Morgan Texas A. & M. University

[53]Agresti and Finlay 2007: *Statistical for social scientist* 4th edition. Pearson prentice hall upper saddles river NJ07458

[54] Bryman**:** social research methods 4th edition. pp 502. Published in United States by Oxford University press Inc... New York @Alan Bryman 2012 ISBN 978-0-19-958805-3

[55]Merton et al 1956*:The methodology of Focus Groups*: the importance of interaction between research participants' PP 103

discuss how to involve communities planning and management of forest in Kenya respectively.

The main idea of conducting FGD on the respondents was to get as many different ideas and perspectives as possible and the rationale of using a focus in this study were the concept that: individuals where combined to form a group which, comprehended the general topic which was the investigator's attention in details with diverse involvements. The practice allowed researcher to develop thoughtfully on how people feel, the way they understood issues about the topic, the respondents were able to engage in real issues they thought dominant and substantial in relation to a topic, FGD Suggested to the researcher chances in which individual collectively made intelligence of phenomena and hypothesized the meaning around it and the argument in the discussion process by individuals gave a researcher an opportunity to understand challenges about the phenomenon under investigation.

(ii) Key Informant Interview (KII) is the method of collecting information from the respondents who understand the topic of the discussion very well. For this study, the KII were the registered Community Forest Association who is forest stakeholders. Carter & Beaulieu, (1992) described KII data collection method as in-depth qualitative interviews. It was used to interview Members of Community Forest Association who know what takes place in forests. Aim of key informant interview was to obtain information from different members of CFA who utilizes forests included farmers, grazers, herbalists, beekeepers, seedlings producers/venders, fuel collectors and saw millers have firsthand knowledge about the forests management. Their know-how on particular information and understanding, can offer detailed nature for planning, management problems and they propose possible solutions to them.

Face-to-Face interviews format used was time consuming because of scheduling and logistical planning involved, but advantages to the method provides a free-exchange of ideas between the interviewer and the respondents hence detailed responses were obtained. The lists on key informant respondents were compiling with their corresponding mobile numbers and the designated key informant interviewer place, date

and convenient time was scheduled. Before meeting the interview, an interview tool was prepared. Its entails the following components: a guide schedule and a list probing questions for relevant to specific objective to be discussed were assembled. During the material day, the researcher introduced himself and explained the reason why they were chosen to be interviewed and explained what would have happened with the information collected and how the community would benefit from it. After that, the researcher requested the key informants (respondents) to introduce themselves and thereafter requested to interview them. The researcher used designed questionnaires to interview the respondents one by one. When the introduction was over, the interview begun using the interview tool to administer the discussion for the intended objective.

Interview took 30 minutes and when all the questionnaires were filled, before the closing remarks, the respondents were given opportunities to give any additional information or comments and also them to provide their recommendations or solutions in addressing the problem and summarized the major comments heard throughout the interview. Finally, the participants were told how the information would be used and conclude the interview by appreciating the respondents for sparing their time for interview. The key informant technique is used to collect data whose objective is to seek the best way to share benefit from forest product between government and community.

(iii) Likert scales was used to rate the closed ended questions using five-point scale where 5 (five) indicated very strong rating and 1 (one) very weak rating. The scale was used to find out deeper details on a specific topic and to find out (in greater detail) what the community forest association thought about forest planning and management of their adjacent forest. Likert scales are used broadly to measure attitudes, perception in addition to opinions about a phenomenon to be studied with a greater degree of distinction than a simple yes or no question. It presuppose that the intensity of understanding is linear and it can be measured, it was used to measured CFAs' opinions at scale of one-five: 5 stand for strong rating and 1 stand for weak rating. Respondents were given of five options pre-coded responses with the neutral point being neither very strong nor very weak at scale 3. The five-point scale which allowed the individual to express how much they rate forest planning and management with a particular statement of very strong or very weak. The

advantage of Likert Scale is that they do not expect a simple yes / no answer from allow the respondents, some degrees of opinion or give no opinion at all. Hence it is used to attain quantitative data meaning that the data can be analyzed statistically.[56]

(b). Secondary data collection: it is the information that has been collected by someone else other than the researcher for resolve certain problem and has already subjected to statistical analysis, but also be used by the current investigator. Secondary data were in all three specific objectives to complement the primary data; they were sourced from internets, journals, books, minutes from governments, NGOs and private offices. The data were synthesized and gathered together to make a report that answered the research questions, meeting research objectives as well as linking with the hypotheses.

1.8.6 Data analysis

Data analysis is a process of evaluating data using analytical and logical reasoning to examine each component of the data provided. The main purpose of analysis was to find out what the data would inform the investigator as well as simplifying the findings of the collected data. Data collected were cleaned, coded rearranged and presented in form that conform to research standard. Qualitative analysis where the in-depth study will be carried out in all objective and Quantitative statistics will also be used to supplement qualitative analysis. For objectives one, Chi-square (x^2) distribution to measures association between the role forests planning on human development given as $x^2 = \sum \frac{(0-E)^2}{E}$

Where: O = Observed frequency, E= Expected frequency

The two distributions are observed and theoretical (expected). If the same, then x2 equals to zero (0), the degree of freedom (d.f.) = (*c* – 1) (*r* – 1). Where '*c*' means the number of columns and '*r*' means the number of rows.[57]

[56]McLeod 2008: *Likert scale simply psychology*. Retrieved from https://www.simplypsychology.org/likert-scale.html, published 2008

Procedures for determining Chi-square are as given below:

The data collected from closed ended questionnaire in a Likert scale form is used in the following steps to determine chi-square

i) Determine the predictable frequencies on the basis of given hypothesis or on the basis of null hypothesis. It is given by:

$$\text{Expected frequency} = \frac{\text{Raw total for raw of that cell x column total for that column cell}}{\text{Grand total}}$$

(ii) Using the formula$(\mathbf{0} - \boldsymbol{E})^{\mathbf{2}}$, find the difference and the square between observed and expected frequencies

(iii) Employ $\frac{(\mathbf{0}-\mathbf{E})^{\mathbf{2}}}{\mathbf{E}}$ all the cell frequencies or the group frequencies.

(iv) Calculate the summation of $\frac{(0-E)^2}{E}$ as $\Sigma\frac{(\mathbf{0}-\mathbf{E})^{\mathbf{2}}}{\mathbf{E}}$ and this is the require chi-square (x2)

The calculated x2 value is compared with critical tabulate value of c2 and then deduction is drawn on the basis of the finding.[58]

Quantitative determination for objectives 2 (two) unpaired t-test was applied to find out how communities can be implicated in planning and administration of forest. The hypothesis testing technique for differences between means where null hypothesis for testing of difference between means is generally stated as: *H*0:µ1=µ2=µ3= µ4=µ5=µ6=µ7=µ8=µ9=µ10 and the alternative are given as Ha: µ1 ≠µ 2 ≠ µ 3≠µ 4 ≠ 5 ≠ µ 6 ≠ µ 7 ≠ µ 8 ≠ µ 9 ≠ µ10

Where µ1 is population mean of one population and µ2……. µ 10 is population means of the 10th population form the 10 counties, assuming that the population is a normal

[57] Agresti and Finlay 2007: *Statistical for social scientist* 4th edition. Pearson prentice hall upper saddles river NJ07458

[58] Kothari: *Research methodology methods and techniques* 2nd edition. New age international publisher limited India 3003 p 41

distribution. Data is collected using a Likert scale form of closed ended questionnaires. The procedures for testing the hypothesis between different means from different populations are shown below.

$$t = \frac{\bar{X}1 - \bar{X}2 - - - \bar{X}10}{\sqrt{\frac{\sum(X_1 - \bar{X}1)\delta_{s1}^2 + \sum(X_2 - \bar{X}2)\delta_{s2}^2 + - - - + \sum(X_2 + 10)\delta_{s2}^2}{n1 + n2 - - - + n10 - 10}} X \sqrt{\frac{1}{n1} + \frac{1}{n2} + \frac{1}{n3} + \frac{1}{n4} + \frac{1}{n5} + \frac{1}{n6} + \frac{1}{n7} + \frac{1}{n8} + \frac{1}{n9} + \frac{1}{n10}}}$$

The degree of freedom = (n1 + n2 + 10– 10). The calculate *t-value* is compared with critical tabulated two- tail *t-value*.[59]

Objective three, Analysis of Variance (ANOVA) was determined in order to check benefit sharing relationships from forest product between government and communities. The elementary norm of the test to examining the quantity of variation within and between the samples the changes among the means of the populations

$$F = \frac{\text{Estimate of population variance based on between samples variance}}{\text{Estimate of population variance based on within samples variance}}$$

The application techniques are as follows:

(i) Get the mean of each sample using the formula given as:

$$\bar{X}1 + \bar{X}1 - - - + \bar{X}10$$

Where 10 represent mean samples from 10 counties where samples are collected

(ii) Evaluate the mean of the sample means given by

$$\bar{\bar{x}} = \frac{\bar{X}1 + \bar{X}2 - - - + \bar{X}10}{n_{1+}\, n_{2 - - - - +}\, n_{10}}$$

(iii) Determine the sum of squares for variance between the samples (SS between) using the formula given below

$$\text{SS between} = n_1(\bar{x}2 - \bar{\bar{x}})2 + \; n_2(\bar{x}2 - \bar{\bar{x}})2 - - + n_{10}(\bar{x}10 - \bar{\bar{x}})2$$

[59] S. P. Gupta 2002: *Statistical methods* Sultan Chand & sons' Educational publishers. New Delhi

(iv)Using the results from step (iii), calculate the mean square (MS) between samples by dividing with the degrees of freedom between the samples given as:

$$\text{MS between} = \frac{\text{SS between}}{\text{n} - 1}$$

Where (n – 1) signifies degrees of freedom (d.f.) between samples

(v) Obtain the sum of squares for variance within samples (SS within), allegorically written as

$$\text{SS within} = \sum(\bar{x} - \bar{\bar{x}}1)2 + \sum(\bar{x} - \bar{\bar{x}}2)2 - - + \sum(\bar{x} - \bar{\bar{x}}10)2$$

(vi)Use the result (SS within) obtained in step (v) is divided by the degrees of freedom within samples to find out mean square (MS) within samples. It is calculated as

$$\text{MS within} = \frac{\text{SS within}}{\text{n} - 1}$$

Where (n – 1) denotes degrees of freedom within samples, n = total number of items in all the samples i.e., n1 + n2 + … + 10 = number of samples taken from ten counties.

(vii) Calculate the sum of squares of deviations for total variance by totaling the squares of deviations for the individual items in all the samples that were taken from the mean of the sample means as shown below

$$\text{SS for total variance} = \sum(\bar{x} - \bar{\bar{x}}1)2$$

The total should be equal to the sum of the result obtains from step (iii) and (v) SS for total variance = SS between + SS within respectively. The degrees of freedom for total variance will be equal to the number of items in all samples minus one (n – 1). The degrees of freedom for between and within must add up to the degrees of freedom for total variance (n – 1) = (n– 1) + (n – 10).

(viii) Determine F-ratio. It's given

$$\text{F} - \text{ratio}\,\frac{\text{MS between}}{\text{MS residual}}$$

Compare calculated F-value and the critical tabulated-value and make conclusion according

This is summarized as in tabular form as indicated below

Source of variation	**Sum of squares (SS)**	**Degree of freedom**	$\frac{\mathbf{MS}}{\mathbf{D.F}}$	**F-ratio**
Between samples	$SS\ between = n_1(\bar{x}2 - \bar{\bar{x}})2 + n_2(\bar{x}2 - \bar{\bar{x}})2 - - + n_{10}(\bar{x}10 - \bar{\bar{x}})2$	n-1	$MS\ between = \frac{SS\ between}{n-1}$	$F - ratio \frac{MSB}{MSR}$
Within samples			$MS\ within = \frac{SS\ within}{n-1}$	
	$SS\ between\ rows = \sum(\bar{x} - \bar{\bar{x}}1) + \sum(\bar{x} - \bar{\bar{x}}2)2 - - + \sum(\bar{x} - \bar{\bar{x}}10)2$	1-n		
Total	$SS\ for\ total\ variance = \sum(\bar{x} - \bar{\bar{x}}1)2$	n-1		

Source author 2018, a summary of ANOVA, M$SB = MSBetween, MSR = MSResidual$

The findings were presented in form of detailed descriptive statistics and inferential statistics, inform of charts, frequencies and percentages, mean, standard deviation, standard error, coefficient of variation and confident interval would be used for used for comparison.

1.9 Scope and limitations

The scope of this study will be: To answer research questions as follows: What is the role of forests on human development in Africa specifically Kenya? What is the impact of forest planning and management in Africa specifically Kenya? And how best can payback from forest products be divided between government and the communities in Africa specifically Kenya? It also intends to measure the hypothetical statements that were used in the study as the following: Null hypotheses (H_0). Forest planning and management has positive impact on the community in Africa specifically Kenya the time scope would be a period of one year and the spatial location scope of ten counties in Kenya. The Limitations of the study includes; the instruments/tools that will be used might not be developed to the standards or could be inaccurate, thus may not provide precise measurements from the variables, the correlation of measurement and actual measure could have not match because of inconsistency by the measurer/ investigator, the study was limited to the objectives and geared towards the generalization to scientific study or knowledge production and the purposive samples taken from parts of the ten counties were used to generalized the entire country and Africa as a whole.

1.10 Chapters Outline

Chapter one outlines brief summary of each topic, definition of terms which is the outlining operational terms that will be in this study such as forest planning and management, human development and a list of biography. Chapter Two: Deals Role of forests on human development in Africa, Chapter Three: Community's involvement in planning and management of forest in Africa, Chapter Four summarized field data collected using questionnaires then by discusses the findings. The analysis was done using both qualitative and quantitative systems. The questionnaires consisted of two sections. The first section was concern with personal data such as age, gender and level of education. The second section dealt with questions as per objectives, each question was designed to have two types of questions opened end and closed end that was used in the analysis. Chapter: Five summarized, conclude and recommendation established from the findings of the analysis. Conclusion was drawn as per objective, while they are two categories of recommendation: for both policy makers and further research

CHAPTER: TWO

ROLE OF FOREST AND HUMAN DEVELOPMENT IN AFRICA

2.1 Introduction

The chapter main aim was to find out the nexus between forest planning and management and Human Development in Africa, a case of Kenya. This was done by using a specific objective that is Role of Forests Human Development in Africa specifically Kenya. The findings were carried out as research work through reviewing published work which is related to the objective. The review covered forest development and its contribution to human survival in the continent.

2.2 Role of forests human development in Africa

2.2.1 Social benefits

Globally forest play a very critical role in provision of tangible goods inform of forest products both timber and non-timber forest products (NTFPs) such as energy, structural timber, poles and posts, withies, furniture's, foods, fodder and medicinal herbs. Most of the poorest people in world living rural areas rely on forests and trees for income and food security, evidences indicated that around 40 percent of the extreme rural poor stay in forests and have a right to use forest products, goods and services. A number of studies have proposed that forests provide about twenty percent of for rural domestic earnings in developing countries in form cash returns and survival desires. Products from (NWFPs) supply food, proceeds, and dietetic diversity ranging from wild fruits, mushrooms, leaves as vegetable, suckers among others. This sustains several people around the world, particularly women, children and landless farmers in addition to vulnerable situations.[60]

Researchers have noted that there are many poor people who rely on forest products to their meet domestic use.[61] Nevertheless, the degree to which forests can reduce poverty

[60]The State of the World's Forests 2018: Forest pathways to sustainable development

[61]FAO 2006: *Using forests to reduce poverty* Better forestry, less poverty: a practitioner's guide 2006. FAO Forestry Paper 149, Rome, FAO. ISBN 92-5-105550-5

and advance food security for the community has not be planned and managed well, therefore policy-makers need to be sensitized on the role of forests in poverty diminution

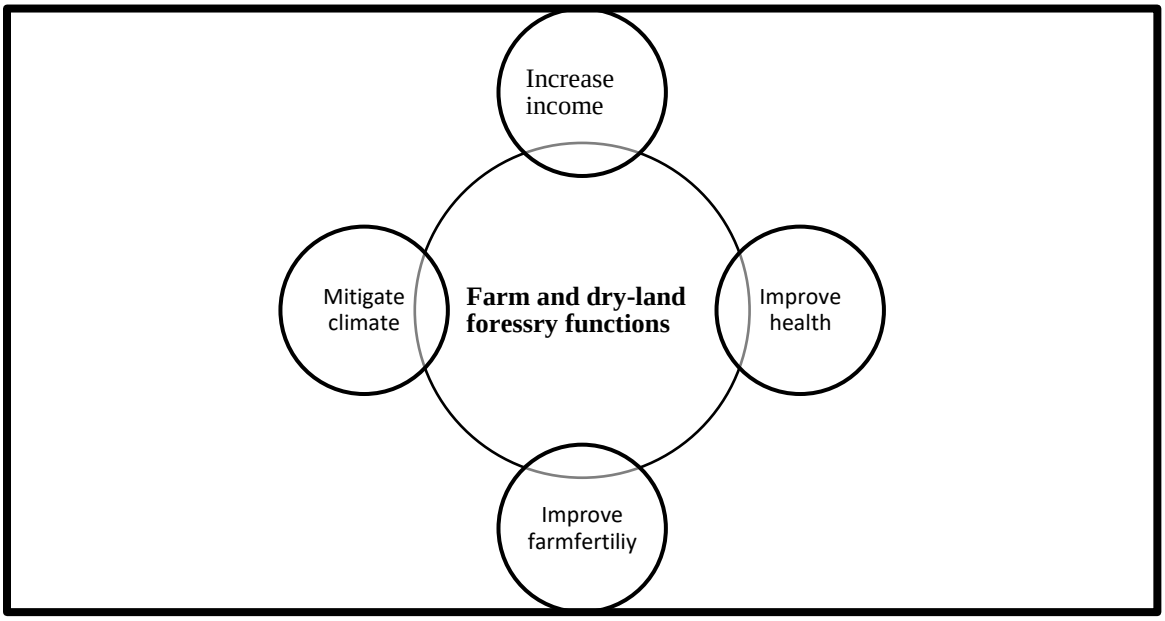
Most part of the world's population especially in developing countries uses energy from traditional biomass fuel wood for household cooking and space heating.[62] Fuel wood is relatively cheaper and ready available than other sources of energy, as compare to solar, electricity, petroleum and gas. Forest ecologies donate to the diets and forest inhabitant survival and gradually market-oriented financial system by offering substantial percentage of the foodstuff and medication consumed by urban dwellers.[63]The statement acknowledging that forests resources are essential for local livelihoods and the welfare of the communities and nation at large, forests provides investment opportunities that promote forest management and research that Integrate conservation with planning aiming at decreasing poverty (increasing food security and disease reduction) through formulation and implementation of policies.

Farm forestry, agro forestry and community forests Produced forest products inform of logs for structural timber, transmission poles, posts, furniture and pulp, woodlots for fuel wood and charcoal that are used as source of energy. They also produce of fruits (farm and wild fruits); trees improve oil through nitrogen fixation, provision of shed for multistory farming such as intercropping of crops in layers like climax, intermediate and ground cover crops, nutrients circulation from deep soil layers and herbs production for both human and animals.

[62] Smith 2005: Health impacts of household fuelwood use in developing countries

[63] Johns and Maundu Forest biodiversity, nutrition and population health in market-oriented food system

Important of Farm and dry land forest to community



Author *Researcher, (2019) Illustration of Farm and dry-land forest functions.*

2.2.2 Economic benefits

In Africa, bulks of the rural population are needy on forests for their livelihoods. Some of the rural families depend on forest for their daily desires. They are employed to work direct in forest sector to work in tree nurseries, field operations, or in the forest offices, employed in timber industries, or farm in forests in a programme called samba system or plantation for livelihood scheme in Kenya. Twenty five percent of the world's remaining rainforests are situated in Africa and the activities in these forests contribute a lot to the Africa GDP of several countries in the continent.[64]

It has been found that millions of rural households in developing countries advance substantial income, food, fuel and shelter from forests, which likewise contribute to local

[64]World Bank Africa Region 2017: Forest, trees, and woodlands in Africa: an action plan for World Bank engagement (June 2012).: World Bank Africa Region Last Updated: 02-24-2017 © 2017 PROFOR, all rights reserved

and national economy.[65] Though, forests vibrant in human well-being, the success is usually overlooked by policies such agriculture, economic and water poverty-reduction policies. Only conservation and management policy is applicable in most part of African countries.

Forest sector contributions over 45 million jobs and $580 billion in labour income annually, this is an informal segment which provides huge employment, therefore planners should endeavor to consider policies for changing forestry jobs into the formal sector**.** Globally, revenue generated from NWFPs amounts to an estimate of $88 billion as a research carried out in Uganda found that the non-cash value of forest foodstuffs (charcoal and building materials) was two to four times more for the local population than the cash raised by their sale.

Studies have shown that green economy from forests upgraded human well-being and societal equity besides meaningfully reducing environmental risks and ecological scarcities. Its conceptualization links green economy closely with human wellbeing, emphasizing a communal aspect as well as an environmental feature. Question, can it be translated into key issues of specific green economy plans and policies. Forests are underpinning of green economy that sustain wide range of sectors and livelihoods.[66] Its contribution to green economy is higher than the production of saw log. Forests develop people's safety in numerous ways: directly by providing resources for basic needs such as energy, shelter and foodstuff; and indirectly by contributing the ecological fundamentals for GDP in many other sectors: agriculture, tourism, water supply, health etc. Considerable attention is being given now to the role of forests in climate change mitigation under the banner of REDD+. This can also be an entry point for recognizing

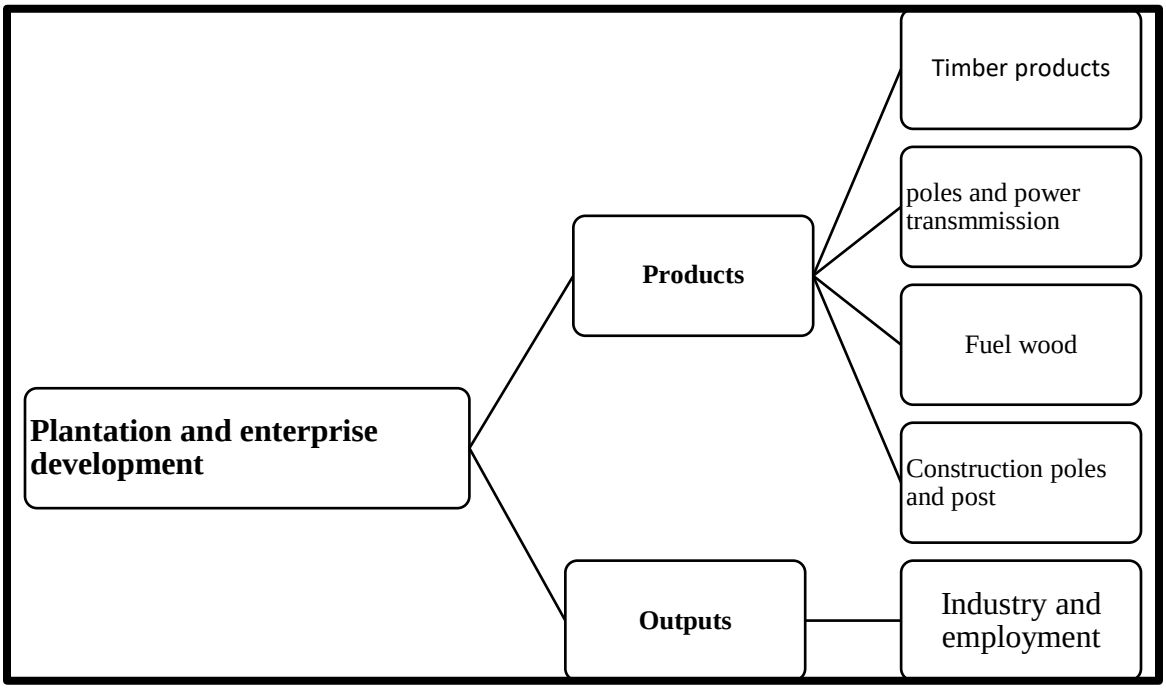
[65]CIFOR 2017: *Forests and human well-being Center livelihoods, ecosystem services, Series*: Factsheet Publisher: 2p Center for International Forestry Research (CIFOR), Bogor, Indonesia 2017

[66]Fedrigo and Brink 2012: UN*EP report on green economy*; UNEP Division of communication and public information Nairobi Kenya

the various non-marketed or under-valued services that forest landscapes provide beyond climate change mitigation. [67]

In Kenya States, community and private forests are sources of for woodlots production for timber and pulp, production of poles and post, production of fuel wood, soil nutrient conservation, production of oils and resins and ornamentals. Forests contribute to blue economy in the country because of coastal line which is surrounded by mangrove and other aquatic plants. They provides breeding spaces for fishes and other aquatic animals, attract tourists, provides raw material for construction among others

Tabulated Economic important of plantation development



Author *Researcher, (2019) Illustration of plantation functions*

[67] Grieg-Gran, Bass, Booker and Day 2015: *The role of forests in a green economy transformation in Africa* pp 7 Published by UNEP, August 2015. www.unep.org/publications ISBN: 978-92-807-3533-8 Printed on recycled paper with vegetable-based inks

2.2.3 Aesthetic benefits

Studies which focused on role of forest on human being, found that there is positive psycho physiological effects on human health and well-being as a result from exposure to nature on people who regularly visit forests, parks and arboreta, because they are sources of recreation that balances a stressful and inactive lifestyle.[68] Forest improves psycho physiological effect of the rural people. Forests play important cultural, spiritual and recreational role to many societies, they are symbolically important in most of the major religions. Trees symbolize historical continuity, link the earth and heavens and in many traditions, are home to good and bad spirits, and the souls of ancestors.

Forests tender recreational opportunities and spiritual solace, they are powerful symbols, a physical expression of life, growth and vigor to urban, rural and forest dwellers. Medicinal products from trees help to cure diseases and increase fertility. Forest are venues where sport events takes place, community held discussions and marriages. In some communities, trees are planted when a child is born and at burial sites, trees are the unsung heroes of our environment and they add value to homes as well as providing cooling effect to surroundings, they also beautify Cities and towns besides serving as architectural and engineering functions.

2.2.4 Ecological benefits

Forests and trees play significant roles in human lives, they offer unquantifiable benefits.[69] Forests cover a third of all terrestrial on Earth, providing vital biological organization for a number of the planet's thickest, best varied collections of life. It's maintaining countless species of animals, birds as well as 7 billion plus human livelihoods. Forests are habitats for a variety of several insects some are beneficial to human being for they play important roles within the forest ecosystem like as pollinations, decomposing of organic matter in the carbon retrieve process, biological control agents of other insects and plants.

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[68] Forests and society – Responding to global drivers of change

[69] Kinuthia, (1990) *Kenya Guide to tree planting in Kenya*. The guide was designed by scientists from Kenya Forestry Research Institute (KEFRI) Infonet

Water is indispensable for human health and growth, access to clean and safe water is an elementary human right and a constituent of efficient and effective policy for health protection. [70] Forests are not only sources of Water, but also purify water as they discharge, consequently disturbing catchment areas pollutes water quality and therefore affects water down streams. So, planning for forest land use should consider the protection of catchment areas. Forests provide essential elementary human necessity and wildlife territory, flora and fauna biodiversity as well as soil conservation in addition regulating water flows besides carbon sequestration. The country has rich forests with full of biological diversity and anchorage high concentrations of widespread species. Forests comprehend lowland rainforest in western Kenya, and montage forest in the central and western highlands and peaks and mountains.

Forests in Kenya are classified under the following categories: closed canopy or montage forest, referred to as water towers example are Mt Kenya and Mau forests, semi tropical rain forests: which are the remnants of Congolese forest for example Kakamega and Nandi forests, lowland rain forest like the Arabuko Sokoke forest in Coast region, Delphic or Mangrove forest along coastal areas of Indian ocean, dry land woodland and woodlands in dry and semi-dry Lands usually referred to as ASAL and plantation forests.[71]

Kenya has forests variety from coastal where they are mangrove and natural forests, High Mountain, dense and rainforests in west part of the country. They maintain not only a varied range of tree and plant species, but also house several wildlife such as chameleons, elephants, leopards, butterflies, monkey, and birds. A number of Kenya's forests are situated in high elevation areas such as mountains and hills, most of them are important catchment areas specifically, Mt. Kenya, Aberdares, Mau Complex, Cherangani Hills and Mt. Elgon. They form upper catchment and they are sources of most the rivers in country.

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[70]Křeček and Hořická 2004: *Forests, air pollution and water quality*: influencing health in the headwaters of Central Europe "Black Triangle" WHO, 2004

[71] Wimbush 1949*: A classification of the East Africa* trees and shrubs of East Africa S. H. *Wimbush*, Research Officer, Forest Department, *Kenya*

They correspondingly support trans- boundary water bodies, underscoring their regional and international prominence.

The Mau forests composite structure the main forest ecosystem in Kenya which is a closed-canopy. The leading native montage forest in East Africa and it's the most paramount water shed in the Kenya with 22 forest blocks covering an area of 417,000 hectares.[72]Mau forests sources several rivers include Mara Rivers that drain water to Lake Victoria via Tanzania. The river support wildlife in Mara and Serengeti game reserves apart from being relied on by several communities both in Kenya and Tanzania for their livelihood. Tea plantations and agricultural activities together in Kericho and Bomet counties depend on Mau ecosystem. Mount Elgon forests positioned on Lake Victoria North on the margin of Kenya and Uganda. It is outline the higher catchment for two major rivers Nzoia and Turkwel. Nzoia River supplies water to several counties in the western Kenya regions and flow to Lake Victoria. River Turkwel, one of the key rivers that discharge water to Lake Turkana, has Turkwel Gorge dam which get water from Turkwel River offers power to the national grid.[73]

Cherangani hills forest serves as a water catchment most of which is watershed for both Lake Victoria and Lake Turkana. Cherangani ecological unit is a source of numerous tributaries which consist of Nzoia, Moron, Kapolet, Saiwa, Embobut, Siga and Weiwei which some are tributaries of river Nzoia and other is tributaries of Kerio River to the east. In the west of the watershed (hills) discharge water streams into Nzoia river basin, brooks to Lake Victoria, however, the east streams drain water into the Kerio river system, directs its water to Lake Turkana. The mean yearly rainfall in this biome diverges from 1,200 mm in the east to 1,500 mm in the west. The rainfall is prejudiced by moist current winds from Lake Victoria; average annual rainfall differs from 800 mm in the northern and 1,400 mm in the central. The main rainy season falls from April to August

[72]Birdlife International 2013: Deforestation in the Mau Forest, Kenya, is impacting wildlife and people. Downloaded from http://www.birdlife.org on 29/10/2018

[73] Macharia 2016*: Kenya water agency status report*: published on Friday, 29 July 2016 12:13

and dry season occur in December to February.[74] Cherangani is an important socio-economic status for the adjacent communities as well as the entire communities living down the stream. It is indirectly a water catchment for river Nile which both Sudan and Egypt depends for their survival.

Mt. Kenya ecological unit delivers chief financially viable and biological significance to the country due to its importance as a watershed and catchments area; it is the source of two of Kenya's largest rivers, the Tana and Ewaso Nyiro. The mountain discharge about 50 percent of the intact stream to Tana River, the principal and most significant river in Kenya. Almost 50 percent of Kenyans rely on water that comes from the ecosystem and 70 percent of the energy is from hydroelectric power. Ecosystem has indigenous forest in the upper zones and plantation forests in the lower zones. Plantation forests were introduced in the early 1900 to the areas with altitudes between 2200 m and 2400 m above the sea level. Foremost objective to contribute beneficial forest products to the timber industries in the country, the species introduced are exotics such as: Cypress, Pines, and Eucalypts as well as indigenous stands which consists of species like *Vitex keniensis* and *Juniperus procera* plantation which required management.[75] It was prepared by the colonial government without involving the communities who utilize the forest, hence there a need to involve the community in reviewing the plans

Aberdare ranges have divine and spiritual meaning for local communities surrounding to the ecosystem. The socio-economic status of Aberdare ranges are: the area next to the forest reserve which has very high potential for agricultural activities because of soils fertility and consistent rainfall which make farming the leading financial system of the communities next to forest. Most families that are contiguous to forests farms in forests as Shamba system practice; it was reinstated as Plantation Establishment and Livelihood Improvement Scheme (PELIS).Ecosystem provides numerous tree species which are

[74]KEFRI 2016: *Socio-Economic status of households, and utilization of public areas*: baseline survey of Cherangani Hills, ecosystems p 1This programme is funded Kenya Forestry Research Institute by the European Union (EU)

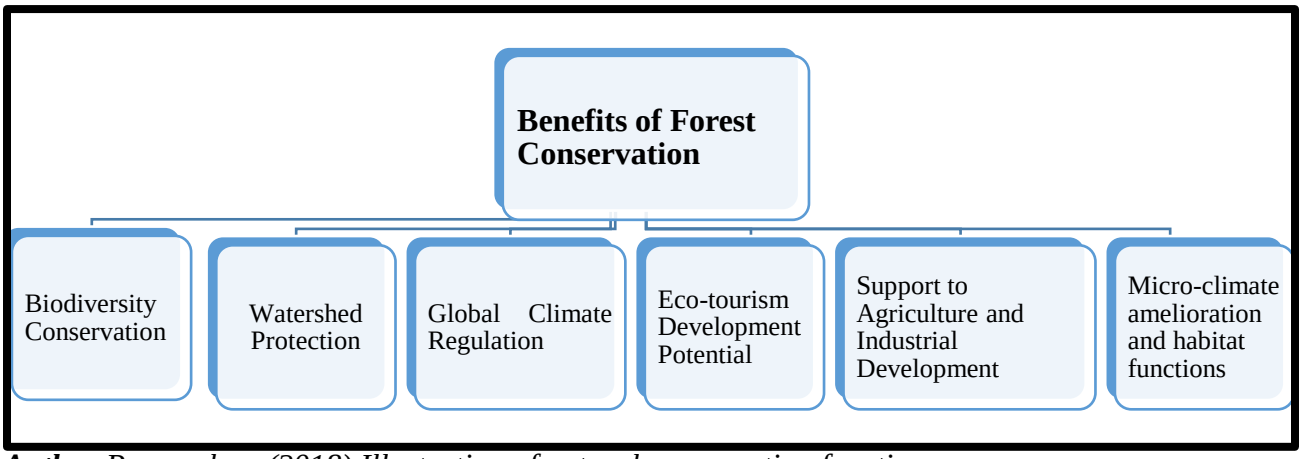
[75]KFS 2010: Mt. Kenya Forest Reserve Management Plan 2010-2019. P 3

considered by locals as Cultural and Historical Importance, including the *Ficus sycamore* (Mukuyu), *Ficus thonningii* (Mugumo), *and Indogo feraerecta* (Muthaara) amid others, are measured sanctified and are used during recital of customary rituals and ceremonies.

Aberdare ecosystem is a tourist attraction site because of gorgeous landscape and immense prospective for sightseeing expansion. The ecology is gifted with exclusive features, cultural and historical sites that great entice tourist, the diversity of wildlife of animals, reptiles and birds, are appealing to visitors, thus support tourism by contribution to the multiplicity of activities like bird watching, trout fishing, walking and wilderness trails. Communities neighbouring forest rely a lot on wood and non-wood forest products.

In Kenya, conservation of natural forests provides the benefits such as: preserve biodiversity protection, watershed Management, climate regulation, eco-tourism expansion potential, support to agriculture and industrial growth, micro-climate amelioration and habitat functions.

Conservation of natural forests benefits



Author *Researcher, (2018) Illustration of natural conservation functions*

2.2.5 Environmental benefits

It's estimated that 1.5 billion home-grown people have obtained constitutional rights to use forest and allied resources through community organization tenure. Paris convention on Climate in 2015, woodland and plants play a decisive role in determining the accumulation of greenhouse gases in the atmosphere, absorbs carbon by absorb a

comparable of nearly 2 billion tons of carbon dioxide per year. Africa accounts more than 30 percent of their wealth from forest and 70 percent of the inhabitant living in sub-Sahara depends on forest and woodland[76]

Kenya is gifted with a variety of woodland biomes extending from montage rainforests, savannah woodlands, dry forests, coastal forests and mangroves. Forests play vibrant environmental, societal, traditional, and commercial roles. Forests food, medicines, honey, and wax, it also provide silk and cocoon that can be trade by the local communities.[77] Insects and trees have mutual symbiotic commensalism that beneficial to human being, therefore planning and management of forest in very crucial for it's a tool that provide the zonation of forests for different usage.

[76] UNEP 2018: *The seven special session of the ministerial Conference on Environment (AMCEN*); held at Nairobi Kenya from 17 to 21 September 2018

[77] Moore, Allard and Malagnoux 2006: *Itching for the woods: forests, allergies and irritants*: FAO Forestry Department, Rome

CHAPTER THREE

Forest planning and management on community in Africa

3.1 Introduction

This chapter examines the Impact of forest planning and management on community in Africa specifically Kenya.

3.2 Forest planning

Forest planning is a process of preparing forest documents that are required to guide different forest activities from seed collection to tree harvesting. The purpose is to address conflicting forest issues that require space, cost and time. Besides these, sustainable forest management require plan like operational plans which is a comprehensive site specific plans for the several forest activities such as seed collection, nursery management, establishment, road construction and harvesting plans. When developing forest plans, consideration is classified into: planning issues such as forest tenure details, maps indicating management units that comprises blocks, compartment and sub compartment as well beat. Site and stand details like species, year of planting, operations to be undertaken and date of implementation. And special features such as biodiversity areas, cultural sites, water points.[78] Reference

Issues to be considered when planning afforestation or reforestation are; site suitability characteristic such as soil fertility and drainage, slope, accessibility, size of the propose area and environmental impact assessment. Other factors are expected volume timber be achieved working circle and Silvicultural system as well as forest protection[79]

Forest planning is an essential element among KFS organization's activities, for it defines and articulating the goals and objectives which forest stakeholders are targeting and stages that should be engaged in order to achieve the intended objectives and goals. It consists of spatial planning which involve the fortifying space of the tree planting

[78] Akishin 2014: *Forest planning is the most important aspect of sustainable forest management*: ERSA conference paper ersal 14p569, European regional science association

[79]Klous Von Gadow, Timopukkala and Margarida Tome: *2000Sutaianable forest yield*. managing forest ecosystem p 4: Kluwer Academic publishers ISBN-13;978-1-44020-07286

activities. Forest areas that has a long-term rotation, thus requires management plan that defined management goals.[80]The long term period is a relative term the rotation of trees normally takes average from 8 to 30 years depending on species and the intention of the owner on end use products. According to the U.N. FAO, intention of forest planning is to develop Forest Management Plan that clearly communicates forest management policies, rule and regulation that govern forest conservation and describe how, why when and by whom forest activities are procedures are implemented.

Planning of forest can be achieved through participatory forest planning where multiple stakeholders are engaged. It has been said that **t**he principle of co-management of forest personified in perceptions of participatory forest.[81] Though the European Union talked of participatory/ co-management of the forest, it's never talked of planning who plan for the management? And also did not specify the type of stakeholders who are included in the management. This study is specifically identifying communities living around the forests as stakeholders and planning and management of forests are included through registered Community Forest Associations. Purpose of this Plan is to draft an orderly method to admissible forest management and ensuring planning is an instrument; to compliance with relevant regulation that forest conservation and management, to illustrate the obligation of communities to ensure continuous improvement in conservation, to endorse engagement with communities and ensure that they understand their roles and responsibilities regarding forest management.

Forest planning for plantations is important to the employees (managers) so that they commit themselves to continuous improvement. The document framework outlined for self-evaluation of performance that may lead to operational change that improve future outcomes. An adaptive management technique ensures flexibility in an ever-changing

[80] FAO 2010: *Global forest resources* assessment 2010 terms and definitions Forestry Department Food and Agriculture Organization of the United Nations ROME, 2010

[81] EU 2001: *tropical forestry paper 2 principles and practice of forest co-management*: evidence from west-central Africa David Brown Overseas Development Institute London European Commission European UNION Commission Brussels 2001

operating environment.[82] The Act parks strategic plan Plantation Management Plan aimed at employed staff only and the improvement of plantation forests targeting performance outcomes, while this study is focusing on planning for both natural and plantation forests targeting the provision of goods and services to the both state and the communities. Forest planning activity produce the following plans: Seed collection, transportation, process and storage plan which is a document which guide the principles and practices of seed harvesting, processing and storage of seed. An Essential aspect of seed collection planning is to have sufficient information on forest planning seed collection, transportation, process and storage, it entails the following: species selection for seed collection (which species to collect seed from?), the amount of seed required to be collected (how much seeds are required?), where can seeds be collected (where is the seed source?), when is the appropriate time to collect seeds collect? And how to can seed be collected?[83]

Tree nursery is a space (land) set aside for the raising of seedling, cuttings and wildings till they are sturdy and ready to be planted in the field. One of Issues to be considered during planning is the location of a nursery which encompasses these factors: Site elevation, should be gently slope, area should be as square as possible, accessibility, to accessible throughout the year, availability of water, there should be permanent clean water and the area should be free from frost. Another issue to consider is the arrangement of the structures such seed beds, seedlings beds, water points potting, offices, gate and toilets.[84]

The forest planning involves Silvicultural prescriptions, environmental, economic and social aspects to form a comprehensive plan that deliberately provide continuing returns

[82] Strategic Plantation Management Plan 2017 – 2022. This is a controlled document held by the Forestry Coordinators within the ACT Parks and Conservation Service. All printed copies are uncontrolled. Version 1 – September 2017 © Australian Capital Territory 2017

[83] Schmidt 2000*: planning preparation for seed collection p 3*guideto handling of tropical and sub-tropical forest seed, Danida forest seed Centre

[84] Kumar and Tiwari 2018: Practical manual of nursery management Published by: Agri-Biovet press publisher 2018ISBN: 978-93-84502-60-7

through sustainable forest management.[85] The statement contain three elements civil-cultural prescriptions and environmental, economic and social factors paramount in forest development for instant civil-cultural practices such as Espacement, tending, pruning and thinning regimes, and total harvesting techniques are vital operations that improve the stand the timing. These operations is very critical, therefore it should be included in the plan. Environment consideration in planning, assist in species matching and zonation of forest according to ecological to users. Social economic factors such scared, water source and cultural sites should be considered during planning to avoid clashing with the locals.

The Scope plan is to prepare a management tool that will be a guideline in the in forest management by all forest stakeholders as it indicated in Conservation and Management Act 2016, the plan emphasis on the following plantation values, including; communities and the activates that are supposed to carry out such planting and surveillance, business plan to show volume to be remove per year on sustainable basis, schedule for planting activities, areas zones for environment. Conservation, grazing and societal values the sacred and cultural areas. The plan normally takes a period of 15 years and it's renewable.

3.3 Seed collection transportation and process management

Seed is defined is a product of pollination inside the embryo sac of an ovule.[86] The quality of seed is important for a successful afforestation and reforestation depends on the quality and quantity of seeds, therefore, it is vital to manage seed handling from collection, transportation and processing in addition to storage. The management include: (i) surveying the forests to define the appropriate seed collection sites: For different tree species, Climatic conditions and maturing phase. (ii) Seed collection procedures: gathering of Seed requires trained workers and special apparatus and ingredients (iii)

[85]Forestry Commission 2014.*Practice Guide Design techniques for forest management planning Forestry* Commission: Edinburgh First published by the Forestry Commission in 1998 as 'Forest design planning: a guide to good practice'. This revised second edition published in 2014. ISBN: 978-0-85538-894-2

[86]Omondi Maua and Gachathi 2004: *Kenya Tree seed hand book of Kenya 2nd Edition*: published by GTZ Forestry seed center Muguga

Selection of mother trees: inventory of seed orchard or seed stand should be carried out in order to determine the following: time of seed maturity, Health of tree (Elite tree), Shape of tree and the Height of tree (Plus-tree).

A tree nursery is a place where seedlings are raised and kept till they are ready for planting in the field, they are propagated in the nursery in order to obtain quality seedlings with well-developed fibrous roots, thus enhance good survival in the field after planting. Nursery management operations are arrangement of nursery structures, potting tubes, watering. Weeding, root pruning and grading of seedlings before being transplanted as well as of nursery records manage.[87]

3.4 Management of plantations

Plantations establishment and management is significant due to high demand for forest which has put pressure on natural forests. The following are necessary management activities for plantations: (i) Site reconnaissance (survey). It entails these elements; Climate which consist of temperature, rainfall (amount and distribution), relative humidity and wind, Soil information on soil composition. Topography determines climate and soil. Vegetation - composition and environmental characteristics of nature (ii) site selection for planting. It should be participation site selection by the forest stakeholders and policy makers. (iii) Species selection: use of experts like foresters and researchers to select species that match the sites and should be desirable to markets (iv) Preparation of the planting site**:** the rationale of site preparation is to: Destroy and remove vegetation that could compete with the seedlings after planting, loosening soil so that the planted seedling roots could penetrate easily and absorb abundant rainfall possibly. Land preparation reduced surface runoff and increases the soilmoisture and minimized danger of fire and pests (v) Time of planting. The season normally corresponds with the rainy season. Planting should be carried out when there is sufficient moisture in the planting site. (vi) Planting of containerized stock. During the land preparation, big hole should be

[87] Jaenicke 1999: *Good Tree Nursery Practices Practical*, p8 Guidelines for Research Nurseries International Centre for Research in Agroforestry, P O Box 30677Nairobi, Kenya ©ICRAF 1999 Printed by: Majestic Printing Works Nairobi, Kenya

dug for water harvesting. Other management activities include spacing, pruning, thinning, firefighting preparation and final harvesting.[88]

3.5 Impact of forest planning and management on community

Forests in Africa continent is declining at accelerating rate particularly in rural zones where community lives, tree cover in some countries are less than 10 percent. For instance, Kenya has a tree cover of 7.2 percent. Insufficient planning and management of forest has led to the rapid reduction of forest as well as upsetting conservation struggles and the survival of marginal communities dwelling around the forest

The disappearance of forests has brought negative impact of the social economic welfare of the communities that depends on forests for their livelihoods due to reduction of forest resources. Lack of forest planning and management has brought negative consequences to the society as follows; more than 1.6 billion people in the global, depend on forests has been affected[89]. These consist of small scale farmers, timber industries merchants and employees, seed venders, transporters in addition to the entire society. Its affect biodiversity Habitations as forests afford territories to variety of animal species. About 80 percent of the global terrestrial biodiversity, which rural people rely on them for survival, Lack of proper planning and management of forests, would deter the creation of jobs for about 13 million people globally who works direct and indirect on forests.

Forests sequester carbon and store it in such a manner that cannot be release to atmosphere if the environment is not disturb**,** thus Captivate detrimental greenhouse gasses that produce climate change and its vulnerability to human beings, animals and plants and the destruction of forests in Kenya has led to decreasing of revenue paid by logging industries to the State.[90]

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[88]FAO 1989 Environmental guidelines for resettlement projects in humid tropics Arid zone forestry: A guide for field technicians

[89]Chao, 2012 : Forest Action and Document Plan FY 10-20 - World Bank

[90] Reboredo 2002.Socio-economic, environmental, and governance impacts of illegal logging Geist and Lambin 2002 Geist HJ, Lambin EF. 2002.

In the past, communities around the forest were not participating in the planning and management of forest activities, though they were depended on forest resources[91]. They were considered as hindrance in forest development and management, this made the communities to believe that forests belong to the states, therefore they did not attach values to them, and hence they carry out illegal activities such as unauthorized logging.

To sustain forest conservation and management as well as in maintaining the welfare of the community bordering the forests, it requires sound planning and management, which involve all stakeholders especially the participation of the community. The indigenous community knowledge on forest management and the role of forest farmer groups need to be taken on board together with technical knowledge from the experts during forest planning and management. Forest Act 2005 N0 7 recognizes the importance of community participation. Community participate in the planning and management through Community Forest Associations (CFAs) adjacent the state forests. This is part of the strategy to increase tree cover in the country

3.2 Benefits of sharing forest product between states and the community

3.2.1 Environmental benefits of forests

Forest products include wood and non-timber forest materials accrued from forestfor both commercial and private use such as structural timber, transmission poles, fencing posts and fuel wood as well as timber for furniture. Non forest products are products such as medicinal herbs, fungi, edible fruits fodder, nuts, and gums among other.

The ecological benefits of forests are production of oxygen that humans and animals inhale and sequestration of absorbing carbon dioxide from the atmosphere through photosynthesis process as shown below

There is international compromise that sharing of benefits from natural resources like forests is a crucial means that should be employed to promote both sustainable management of natural resources and advance incomes of natural resource communities

[91] Ochola 2017: assessment ot the factores affecting farmers involvement in enviromnetal conservation in Gatundu north sub-county

living around the forest.[92]Actual and fair benefits sharing provide incentives (in form tangible goods and services) between the government and local communities enhance sustainable management of the forest resources. The community can convert the benefits to monetary value thus contribute to the well-being of recipients. Benefit-sharing can achieved through participatory planning and management of forest by the stakeholders.

It is appraised that between 1970 and 2008, 29 to 56 percent of all civil conflict globally involved natural resources including forests.[93] Forest has potential to ignite battle amid stakeholders having different determinations for the similar landscape. When some of the group (state) access goods and services from forests, while the others (communities) receive little or no accessing forest resource, because of this inequitable distribution of benefits and in the absence of engagement with the forest urgencies, conflict can easily arise, in regard to this, the rationale of this study was looking at the most justifiable method of benefit sharing method of among forest stakeholders The partnerships should have a clear distinction on the benefit sharing formula so that each party can be sure of what they get. Fair and equity is the focus of sharing of benefits if the community doesn't get fair benefits, influential members can incite the public to destroy the forest, if they are satisfied with sharing method, then they conserve the forest.

Forests has positive effects on human development which includes; Geomorphology that concerns trees holding the soil and thus preventing erosion, landslides as well as thwart wind erosion by reducing its speed, acting like a natural green buffer for World's relief. The effect of forests on soils is outline as forests shades leaves on the ground which later decompose into humus soil which is fit for the growing of plants. Tree roots disintegrate solid rocks into soil which are medium that support the plants and forests/ trees facilitates water percolation to underneath the surface through the roots during the rain, thus reduce

[92] Nabanyumya, Mugyenyi, Naluwairo, and Amumpiire 2017: *benefit sharing in the forestry sector in Uganda, Kenya and Tanzania: status, lessons and recommendations for Uganda* advocates coalition for development and environment. ACODE Policy Briefing Paper Series No. 46, 2017

[93]World Bank 2009: *Rethinking Forest Partnerships and Benefit Sharing*. insights on factors and context that make collaborative arrangements work for communities and landowners report No. 51575-GLB Agriculture and Rural Development Department

the runoff and subsequently prevent both soil erosion and flooding. The water below the ground is stored in aquifer which acts as underground water reservoirs and they are the sources of rivers and spring which are vital for human development Forests improve crops production by influencing climate and soils positively and reducing wind speed, thus proliferate crops. Forests promote health by providing oxygen for human inhaling, reduce carbon dioxide concentration in the atmosphere through carbon sinking, and purify both water and air, besides provision of food, herbal medicine as well as materials for shelter construction. Forest protects and provides beautiful scenery to landscape; they protect fragile land scape through root and canopy formations.[94]

3.2.2 States involvement on forests

Forests provide a widespread diversity of profitable products and services at local, national and international levels. Some of these gains depend on the forest preserved or subject to minimal interference, while others can only be realized by harvesting the forest for wood and other products on sustainable basis. In spite of the forests profitability being paramount, benefit sharing from them, and conservation and management of the same are questionable in most part of African continent and hence this study was to find out the nexus between human development, benefit sharing method of forest between the communities and the states in Africa.

Forest uphold wood and energy industries by creating services to the government and communities and also supply finished products from wood for local consumption such as paper, structural timber, fuel wood and wood packaging materials. For instance, large populations of Kenyans both in rural and urban areas use fuel wood as source of energy. Tea, sugar and tobacco use fuel wood as their sources of energies for the production. Exportation of products from wood material like wood carving, furniture, timber, paper, paperboard, and wood packaging materials that are used to package, boost foreign exchange in the country. Non-wood forest products (NTFPs), also branded as non-wood forest products (NWFPs), are minor forest produce among them are herbal medicine,

[94]UN 2017 *Sustainable Development Goals; Protection of forests 'fundamental to security of humanity's place on this planet,*' UN Forum told 01 May 2017 Forests, desertification and biodiversity, News

barks, gums, mushrooms, apiary, wild fruits, insects rearing and flowers are valuable produces obtained from forests which do not require harvesting (logging) trees. NTFPs are of notable importance for rural societies living in or near forests.[95]Forests as dwelling places have an estimated 1.6 billion people worldwide living in and around forests, and depend on them for their maintenances. They depend on forests for basic human needs include foods, shelter, water, medicine, social cultural aspects and grazing. The forest settle people which otherwise could be problem to states.

Genetic resources and biodiversity: genetic diversity in plants signifies inter and intra hereditary difference populations of plant species, while Biodiversity refers to variation within the living world.[96] Biodiversity provides the foundation for live in the world, variability among tree species. An understanding of genetic diversity and its distribution is essential for its conservation and how to use them on a sustainable basis, state the understanding of genetic and biodiversity to increase tree cover in Kenya. Genetic resources and biodiversity has led to the international convention and treaties such as The Convention on Biological Diversity (CBD) in 1992, the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of 1994 and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGR) negotiated under the auspices of the Food and Agriculture Organization.[97]

World's forests have major functions of ameliorating climate and lower soil temperatures by shielding it from direct sun radiations. Forest offers higher humidity to its environs due to transpiration, evaporation and precipitations by trees, this counterbalance the

[95]Micheletti and Elias 2018: *Sustainably managing non-timber products to improve livelihoods, equity and forest;s* Bioversity International is a CGIAR Research Centre. CGIAR is supported by CGIAR Trust Fund Donors

[96] Rao & Hodgkin, 2002*: T. Plant Cell, Tissue and Organ* Culture (2002) 68: 1. https://doi.org/10.1023/A:1013359015812 Publisher Name Kluwer Academic Publishers Print ISSN0167-6857

[97]Antons 2010: *Biodiverse Conserve* (2010) 19: 1189. https://doi.org/10.1007/s10531-010-9816-yPublisher Name Springer Netherlands Print ISSN0960-3115

excessive heat and then, creates a pleasurable micro environment local level for humans, plants and animals.

Environmental degradation and climate change sometime cause war and conflict within and between states; this can abate the national security of the state in a number of insightful behaviors. Environmental change can damage the economic prosperity which plays a big role in the country's military capability and material power. It contemplates the abilities of personalities, /nations to manage environmental hazards that might bring conflicts due changes climate which lead to limited natural resources. For instance, climate change can be a threat to environmental security state borders.

3.2.3 The Benefits of Community Forest and Trees

Forest resource hold up rural households especially in areas where poverty are high, though some of those who lives adjacent to the forests are poor. However, forests are not only significant for the poorest people only, but also vital for the better income group. Studies revealed that forest contribute to 17 percent in Africa.[98]Community benefits from forests in many ways among them are: Conserving their cultural values, Local employment in rural communities, preserving water supplies, safeguarding traditional medicines, provision of energy to the rural community, provision of shed for both human being and animals, promote aesthetic values. Trees are used as live fence and heighten chances for education and research where Community forests can be as demonstration plots and trying innovative forest practices. Forests manage storm water and reduce the cost storm water systems and its treatment facilities and fortify watersheds, capes, and other values that paramount to communities and to local and regional economic activity.[99]Maintenance of Urban forests biodiversity provides wildlife habitat such as nesting sites for birds, egg-laying sites for insects, protection from predators and the

[98] Miller *et al* 2016: *Trees supplement income for rural farmers in Africa*; January 23, 2017, University of Illinois at Urbana-Champaign https://phys.org/news/2017 -01-trees-supplement-income-rural-farmers.html#jCp

[99] *Bowler, Ali, Healey, Jones, Knight, and Pullin, 2010: The evidence base for community forest management as a mechanism for supplying global environmental benefits and improving local welfare.* Environmental Evidence CEE 08-011www.cebc.bangor.ac.uk

elements, and food sources such as leaves, nuts, and fruits. Trees contribute to keeping our families healthier, peace and security.[100]

In Nepal, the community forestry method has implicit the decentralization of authorities to local communities to collect, retain and redistribute forest revenue from products from community forest. In Africa, native local systems of governance of forest and woodland resources have also been battered for of a lack of clarity about the rights involved under coinciding and poorly submissive systems of national and community land law and regulations.[101] This has contributed to the forests destruction that has led to reduction of forest in the continent because the community cannot take care of the resources that cannot benefit them. In Kenya, the method of benefit sharing from conservation and management should be formulated through participatory means where all stakeholders and guide by the experts

Particular the rural community is very critical; forests are better managed when stakeholders are broad on board

3.3 Chapter Conclusion

Forest planning provide plan which is outline the course needed or the stakeholders to put up sustainable forest conservation and management as provide in constitution 2010 and forest conservation and management Act 2016**.** The inclusion of community in the planning and management of forest activities, enhance proper establishment, conservation and management of forest resources. Participation by all stakeholders

Based the on the findings, there is a need to developed a formal benefits sharing method through stakeholders' participation, mainly participation by the community. This make the communities to have sense of forest ownership thus contribute to conservation of the forest. Sharing of benefits accrue from forest products will alleviate poverty within the community and give openings for research and innovation on new products for market

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100 Khana, Chhetriab, Lunda and Nielse 2008: *Rural development potential of Community Forestry in Nepal Corresponding* author. Email address: bbkc@life.ku.dk (B.B.K. Chhetri)

101 Arnold 2001: *Forests and people 25 years of Community forestry*. Food and Agriculture Organization of the united nations Rome 2001

CHAPTER: FOUR
DATA ANALYSIS

4.1 Introduction

This chapter is concern with the analysis of data from the field as well as comparing secondary and primary data in order to arrive at findings of the study. It about put meaning to the data collected from the field to explain phenomenon's that is under investigation. This was done through qualitative analysis in order to get an in-depth of the study and quantitative analysis which led to make logical conclusion

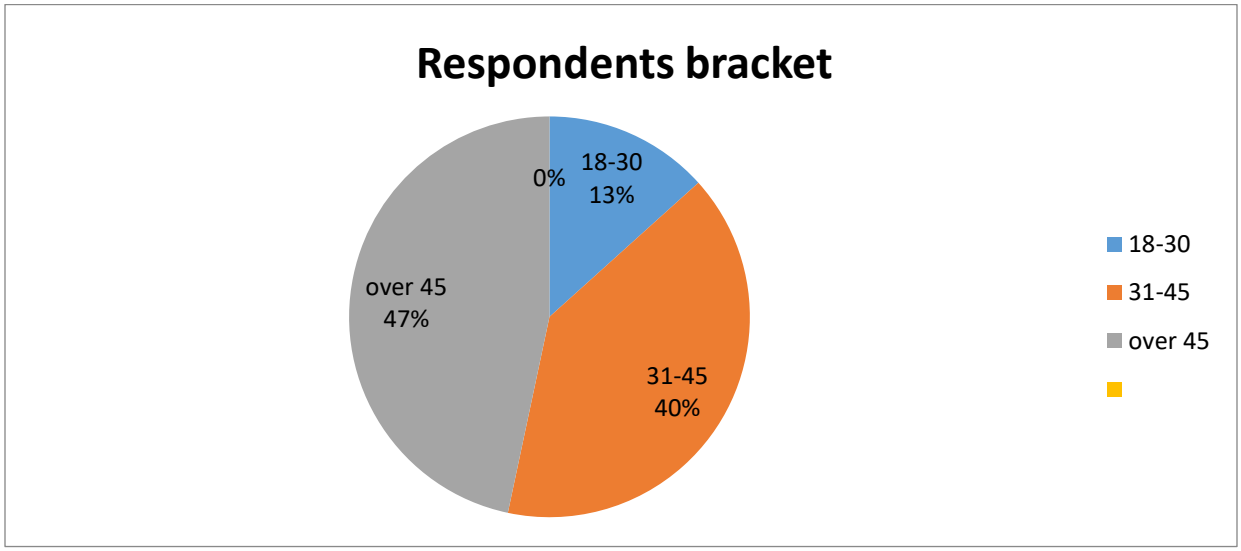
4.2 Method of data analysis

The analysis was carried out using both qualitative and quantitative techniques as per objective. Qualitative analysis detail information from collected for each objective, while data collected using Likert scale for each objective was subjected to different statistical analysis tools as: Role of forest in human development; - Chi square (□2) techniques, community involvement in forests planning and management;-Un-paired t-test and sharing benefit method;-Two-way ANOVA. The questionnaires consist of two sections; the first section is concern with personal data such as age, gender and level of education. The second section deals with questions as per objectives, each question was designed to have two types of questions opened end and closed end that was used in qualitative and quantitative analysis.

4.2.1 Personal data

Most of the respondents who took part were over 45 years. In terms of gender, there equal male and female respondents who took part in the exercises. The graphical representation

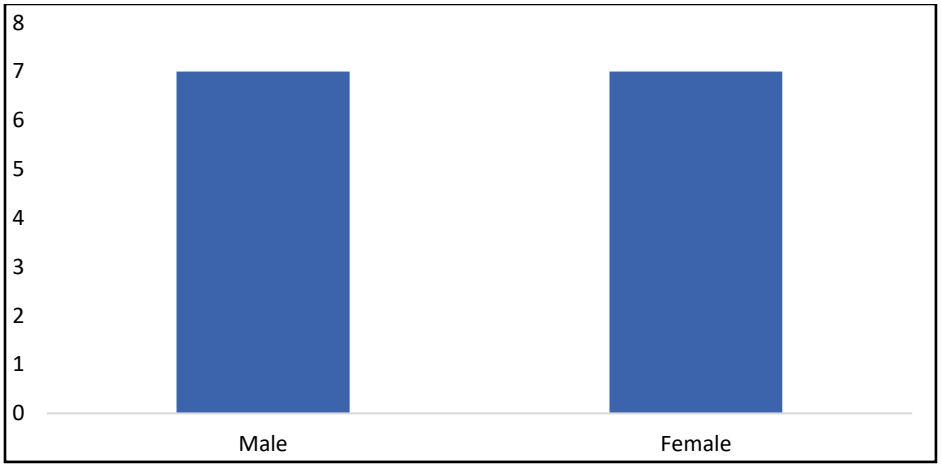
Respondent age



***Source**: Author 2019 Field data collected from ten counties between 25th November 2018 and January 10th 2019, Figure 5.1showing age bracket of the participants*

Summary; The above chart, majority of respondent are mature people over 45 years Age represent 47 percent of the respondents were over 45 years, 40 percent of the respondents were between 31 and 45 percent and 13 percent between 18 and 30 years, meaning that mature people are the one who deals with forest activities, thus understand the significant of forest conservation and management.

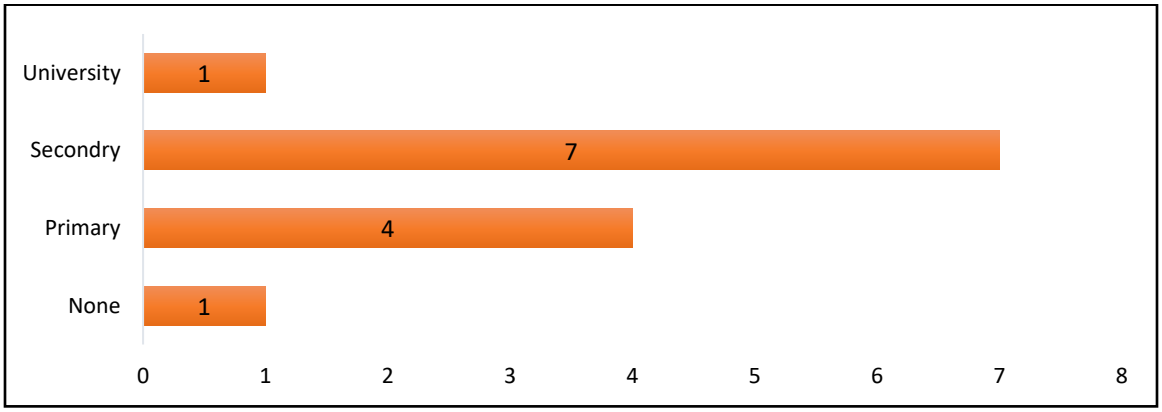
Gender



***Source**: Field data collected from ten counties between 25th November 2018 and January 10th 2019. Figure5.2: Gender representation:*

Summary: There chart show that there was equal representation of both male and female, showing that there is gender parity in sustainable utilization of forest resource and allied resources, its enhances conservation

Education level



***Source**: Field data collected from ten counties between 25th November 2018 and January 10th 2019Figure 5.3: Level of education:*

Summary: The chart indicates that 53.8 percent of the respondents attain secondary level, 30.8 percent attains primary level and both university level and those who never attended education level score the same percentage of 7.7 percent. This explain that forests contribute to creation of employment to the section of society who has only attained formal education without any professional certificate

4.3 Role of forests on human development

4.3.1 Roles of forests provide in terms of goods?

(a) Qualitative analysis**:** Majority of the respondents admitted that forests play an important role in the provision of goods and services the adjacent communities surrounding in the ten counties selected for studies. The respondents 'inputs are summarized as forests provide tangible goods such as timber, herbal medicine and honey. Respondent from Nairobi county forest acknowledged that provide energy in form of for fuel wood class people who resides slums like Kibra and Mathare who cannot afford gas and electricity. Forest farming under Plantation Establishment for Livelihood Scheme (PELIS), which was formerly known as shamba system has benefited the adjacent communities. For instant many the respondents from all the counties stated that they have no problem with food security because they produce enough for consumption and sell the surplus to meet domestic needs besides settling school fees. Forests provide a space for eco-tourism and picnic sites. In Karura forest, community forest association members, collect 1.5 million shillings from gates. In Ngong road forests the CFAs collect Kenya shillings 2000 monthly from bird watching, withies as well as fodder and wild fruits, in addition to wild seedlings.[102] During the discussion, participants from Nairobi and Kiambu Counties declared that they rent open spaces (glades) for wedding events and meeting point. Ngong and, Karura participants collect on averagely 200,000 and 50,000 Kenya shillings respectively from forest products, while Kiambu collects an average of 20,00 from meetings

[102] Questionnaires were administered to community forest associations in the ten counties (Nairobi, Kiambu, Kajado, Narok, Bomet, Kericho, Nandi, Uasin Gishu, West Pokot and Elgeyo Marakwet) between 25th November 2018 and 10th January 2019

Relating to services provision, it came out clearly from the focus group discussion that forests are used for education and research, influence rains, mitigate climate change, protect soil from being eroded by both water and air intercept rain drops and therefore reduce the surface runoff, protect catchment areas, act as wind breaks. They regard forests as sacred and cultural places that require to be protected at all costs.

The discussion confirmed that currently most of the forests are used by both local and international sports like athletics in which practices and exercises are done in most of the forests in Kenya especially in north and south Rift and Central Kenya as well. The respondents have realized that most of the secular and gospel music are video tape in beautiful sceneries that are found in the forests examples are Kinale and Kereita forests in Kiambu County and Kaptagat forest in Elgeyo Marakwet County

Summary: Based on facts given by the respondents about the role of forest on Human Development, it has come out that forests sustain human life in relation to the provision of goods

4.3.2 Rate the role of forests in form of goods benefits in a scale of 1-5 (very weak – very strong)

(b) Quantitative using Chi-square (X^2): Quantitative analysis using *(X^2)* carried out for objective one and the results are given as: Calculated x^2 = 1.3113 while tabulated. The criticalx^2 that is tabulated at95% confidence level of 0.05 with Degree of freedom (d.f.) = (5– 1) (10 – 1) is 21.66. Calculatedx^2 is less than the tabulated critical, therefore the result accept null hypothesis (H_0) and states that human development depends of the forests for the provision of goods.

Summary: Quantitative analysis has further deduced that forests are indispensable to human well fare

4.3.3 Roles of forests provide in terms of services

(a) Qualitative analysis: Respondents stated that forests provide critical services to the local communities. Service provision was summarized into regulatory, supportive, and cultural services. On regulatory service regulation, about 90 percent of the respondents

indicated that forest regulate climate and trees create micro climate which has cooling effects. Forest mitigate climate through a process call carbon sequestration or carbon sinking where by carbon dioxide are captured inform the atmosphere and converted into simple and complex sugar that some are utilized by trees for structural development. Responses from all counties agreed that forest controls pollution. Trees such as Bamboo purify water and intercept rain drops that otherwise has impact on soil. Forests reduce surface runoff which pollute water bodies and observed dust and toxic chemical which could pollute atmospheric air[103]

A nutrient cycling is an arrangement where nutrients are transferred between biotic and abiotic (living organisms and non-living). Nutrients are found in the soil, and these nutrients are then freed back into the atmosphere via death and decomposition. Forest observe nutrient elements such as hydrogen, nitrogen and oxygen from deep soil which has been deposited due to the process of leaching and brought back to the surface. Forests regulate hydrological cycle; it plays a significant part in the water cycle because forests filtering and recycling water as well as controlling moisture levels of our ecosystem and supply.

Forest ecology roles support the provision of bionetwork services to humans, thus institute the direct and indirect contributions of forest ecosystems to human wellbeing. Supportive services include. Habitant for animals, provision of fresh air, provision of herbs, employment, marked boundaries, provision of shade, energy create, primary productivity and nutrient recycling besides biological diversity maintenance. Ecological functions are a part of the structure and the processes that underpin the capacity of an environment to provide goods and services. Protection services; the respondents stated that forests have supportive functions such as: Soil protection and formation: e.g. erosion control, protection of crops, water for irrigation and protect water catchment areas. Forests also prevent soil erosion and check soil pollution. Cultural services, some respondents listed as cultures service provided by forests as: Recreation, Research and education, Heritage, spiritual, beautiful sceneries nature, and sports.

[103] Summarized report from the respondents from ten counties that were sampler between 25th November 2018 and 10th January 2019

Summary: facts from the respondents proved that forest provides intangible services which crucial to human life such as restoration of degrade land and climate mitigation

4.3.4 Rate the role forests in form of services in a scale of 1-5

(b) Quantitative Analysis: (X^2) was done Calculated x^2 = 0.7142 while tabulated. The critical x^2 that is tabulated at95% confidence level with (d.f.) = (*5*– 1) (*10* – 1) is 21.66. Calculatedx^2 is less than the tabulated critical, therefore the result accept null hypothesis (H_0) and states that human development depends of the forests for the provision of goods.

Summary: Quantitative determination inferred that forests are ultimately important for the provision of intangible services that are crucial to Human Development

4.3.5 Estimate the benefits from forest goods per year, In terms of monetary value.

(a) Qualitative analysis: Participants were asked to estimate the cost of tangible goods they in term of monetary values, they gave different answers depending on the locality where they come from. Some expressed inform of percentage, in Likert scale, while other estimated in figure. But whatever the form they responded, all answers indicated that forests provide them with goods that have values which are more than average. Kajado, Nairobi, Kiambu Narok Counties top the list and of that respondent of percentage were 78.6 percent and the average cost goods per year in terms of monetarily values Ksh 300,000 and those who use Likert scale have an average of scale 3, which interpreted as 50percent. Valuating forest production is part of forest valuation which is a process of establishing, by conventional calculation, a single number expressed in currency that is surrogate for the market price expected on sale of the subject asset.[104]

Summary: Community values forest products in terms of money values so that they can estimate the significant of forests to them

4.3.6 Rate the role forests in form of benefits given a scale of 1-5

[104] Balama, Augustino, Mwaiteleke, Lusambo, and Makonda 2016: *Economic Valuation of Non-timber Forest Products under the Changing Climate in Kilombero District, Tanzania*: International Journal of Forestry Research Volume 2016, Article ID 7893143, 13 pages http://dx.doi.org/10.1155/2016/7893143

(b) *Qualitative Analysis:* Result of *(X^2)* statistical analysis indicated that Calculated x^2 = 0.9535 while tabulated. The critical x^2 that is tabulated at the probability level of 0.05 with (d.f.) = (5– 1) (x10 – 1) is 44.90. Calculatedx^2 is less than the tabulated critical, therefore the result accept null hypothesis (H_0) and states that human development depends of the forests for the provision of goods.

Summary: valuation of forests has proved statistically that they provide benefits to the community, thus improve human Development

4.3.7 Challenges hindering the role the forests

(a) Qualitative analysis: The participants were asked about the challenges affecting role of forest to them, they answered according what they are facing in their localities. These challenges were summarized and categorized into: poverty and unemployment oriented challenges and these are what they respondent: charcoal burning, illegal logging, and fuel collection. Illegal logging and charcoal burning is a major problem facing forests conservation in Kenya, it's mostly brought about by poverty and lack of employment for the youths and women who form majority of the population in the country. Human settlement and agricultural activities: Forest excisions for urban settlement, institutions such schools and allocation. The respondent from Narok, Elgeyo Marakwet and Uasin Gishu indicated most the forests in their localities have excised and issued for other development.

One of the main challenges across the counties are political interference from politician and prominent people in the localities, among the challenges are incitement of communities to destroy forests through fuel wood collection grazing, encouraging forest dwellers and carry out cultivation in forest. Overgrazing in forests land has not only degraded forests, but has also destroyed water catchment areas and springs in the forests. Likewise, illegal cultivation has destroyed flora and fauna in the forests and hence degraded the forestland. Infrastructural development such as road and sewerage construction, power line establishment and dam construction are some of the challenges that were mentioned by majority of participants across the counties: Respondents from Elgeyo County were so particular about the proposed construction of three dams in the forests by Kerio valley development authority for the generation of hydro

power.[105] Illiteracy was indicated on the forest challenges which, has led to massive destruction of forest that indicated the following factors; Poaching of both animals and cedar posts, honey hunting, cultural activities, land preparation using fires, arsons. Poachers and hunters normally light in the forests for good roasting wild meant and using to suppress bees respectively, cultural activities like worshiping has had some communities light fires in forest to warm themselves during the prayers at night, but they usual forget to put off when departing leading to forest fires and farmers living adjacent to forests who prepare their farms for planting by using fires during dry seasons cause a lot destruction when the fire strays to the forest.

The respondents attributed that poor management of forests has been a challenge because of; lack of community involvement and other stakeholders, poor planning, inadequate forest rangers, poor relationship between forest official, inadequate funding, poor infrastructures, inadequate forest management tools and equipment besides lack of proper management of invasive species. The participants realized that there is poor communication between forest management and the community as well as other stakeholders in most of the where the exercise took place counties, resulting to lack of stakeholders' participation in the management of forests. The respondents specified that corruption is an issue, forest official collude with licenses to allow the harvest of the forests. Likewise, politician colludes with top forests management such as director, cabinet secretary, permanent secretary and other senior official to exploit forests using their relatives. Corruption includes: Tender procurement, land grabbing, allocating dumping of waste site in the forest, allocation of quarry and mining. Climate change has brought severe drought due change in rain pattern, thus encouraging pests and diseases. The effect of forest challenges can lead to land degradation if they are properly addressed.

Summary: The analysis indicates that forests have many challenges which have led to the their reduction and the effects has led to climate change and scarcity of forest products

4.3.8 Rate the challenges using a scale of 1-5

[105] Response from community forest association participants from Elgeyo Marakwet interviewed on 8th January 2019

Qualitative Analysis: statistical test from Chi-square (X^2) showed that Calculate f-value 3.291 and 3.291 Tabulated f-value at 95 % confidence level = 3.3, therefore null hypothesis (H_0) is accepted and state that that they are challenges that hinders the role played by the forests to community:

Summary: Statistical analysis confirmed that forests are a lot of challenges that has threaten Human Development

4. 4. Community involvement in forest planning and management

4.4.1. Task to carrying out planning and management of forests

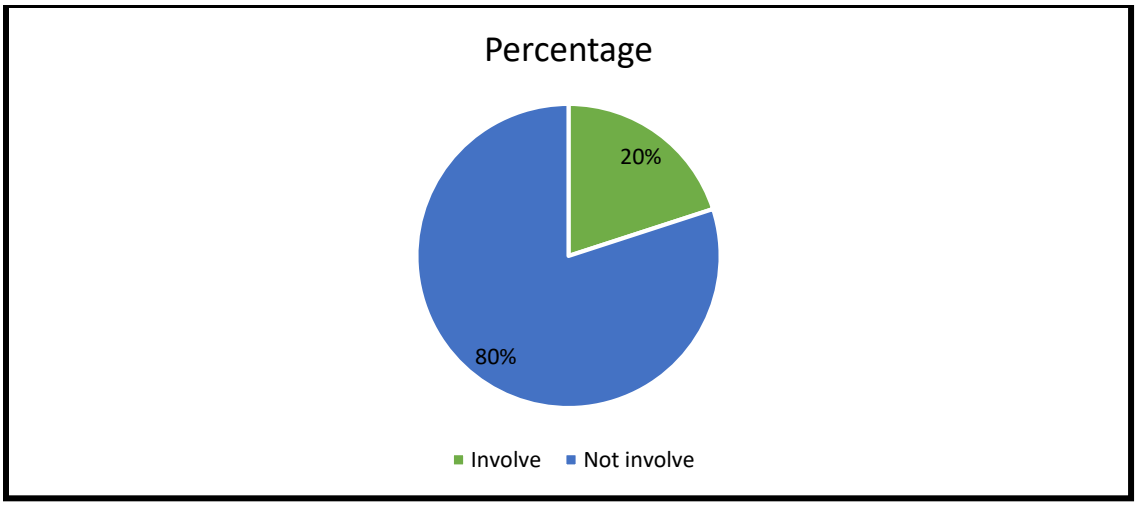
Qualitative analysis: When the respondents were asked to specify who is tasked with planning and executing forest the management in states forests, they indicted that Kenya Forest Service, other line ministries who deal with conservations, NGOS like Forest Action Network media KWS, community Base Organizations. Majority of the participants stated that the government through the mandate department which is Kenya forest service does the planning and the execution of forest management. KFS normally invites line department such as KWS, NEMA and line ministry during the planning stage. Some counties like Nairobi and Kajado indicated that community forest association and other CBOs are usually included in planning.

Summary: The detailed information from participants on the planning and management of forests are sufficient evidence that government and NGOs planned and executes the management of forests without involving community.[106]

4.4.2. Involvement in the forest planning and management?

(a) Qualitative analysis: About 80 percent of the respondents stated that they are not involved in the planning and management of forests, participants from Narok, Bomet and Nandi said that they are not aware about planning and management of forests. 20percentof the respondents mostly from Nairobi, Kiambu, and Uasin Gishu indicated that they are seldom involved in planning.

[106]The forest conservation and management Act, 2016 no. 34 of 2016



***Source**: Field data collected from ten counties between 25th November 2018 and January 10th 2019. Figure 5.4: Level of management involvement in the forest planning and management*

4.4.3 Rate the level of involvements using a scale of 1-5

(b) Quantitative analysis: Statistical determination using unpaired t-test indicated that calculated t-value is lower than the critical tabulated two-tail t-value, therefore support the null hypothesis and state that there is no significant difference between calculated t-value and critical tabulated t-value

Summary: the un-paired t-test statistical computation further confirmed that there is no participatory planning and management of forests activities in Kenya.

4.4.4 Main forest activities that requires for planning and management

(a) *Qualitative analysis:* The respondents provided numerous answers according the localities they come from, these were categorized into zonation, which is the dividing of forest according to different uses such as grazing area, catchment areas, eco-tourism sites, park, and arboreta, plantation establishment for livelihood improvement areas, sport sites, cultural sites, herbal and beekeeping besides mushroom farming as sites among others. Nursery establishment and practices is a pertinent issue that require attention when carrying out forest planning for the success of development in the country depends on the quality and quantity of seedling, the respondent in all counties sampled indicated it.

Rehabilitation is the restoration of the degraded area in the forest especially in the indigenous forest, the respondents categorized it a fundamental issue that must be of high priority during forest planning. Forest development include: land preparation through plantation establishment for livelihood improvement, afforestation and reforestation in addition to enrichment planting in the forestlands through plantation establishment is one of the planning activities was specified the participants. Another important factor stated is civil-cultural practices thinning, pruning and coppice reduction as well as harvesting. It is the operation management of forests stands when they reach certain height after planting.

Respondents considered infrastructures like road construction and maintenance of bridges and culverts, constructions of fire towers, water tanks and houses. Infrastructures facilitate smooth management. Procurement of tools and equipment for forest management such as fire prevention, nursery management and plantation establishment, therefore it is necessary to plant for the procurement as per disposal and procurement Act. Other planning issues that were stated out were cultural and events, issues, forest survey, and education and research. Forest planning is the most imperative condition for supportable, continuous, efficient and effective economically and ecological forest use, it comprises of the combination of Silvicultural practices and business concepts.[107]

Summary: The community prioritized forest issues which are required for participatory planning and managements in order to enhance forest sustainable conservation of forests.

4. 4.5 Rate the sufficiency forests planning activities using a scale of 1-5

(b) Quantitative analysis; Computation was done using unpaired t-test and the result were Calculated t-value = 2.141t-value0.5 percent probability and 45 degree of freedom 1.684 and critical tabulated two- tail t-value. Calculated t-value is lower than the critical tabulated two-tail t-value, therefore null hypothesis is rejected and support the alternative hypothesis that communities are not normally involve in planning and management of forest.

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[107]Bettinger and Grebner 2017: *Management of Forests and Other Natural Resources***:** Forest Management and Planning (Second Edition), 2017

Summary: it has been proved mathematically that forest planning and management is done by the state only and

4.4.6 Challenges involving in forest planning and management

(a) Qualitative analysis: The challenges hindering forest planning were indicated as; Lack of community involvement, insufficient funds, political interference, conflict of interest among stakeholders, corruption, Lack of proper facilities and equipment, Regular changes in forest management, lack of skilled man power, marginalization of during planning unpredicted weather conditions, lack of coordination and change in supply and demand of forest products as well as cultural beliefs[108].Most of the participants stated that communities are excluded during the planning while others said they lack capacity to contribute in planning as they have never been trained to do so. Others admitted that planning is a technical issue that can be left to experts. It appeared there is a problem pertaining to conflict of interest among stake holders who have difference mandates.

Political interference has tampered with forest planning examples are forest excision, allocation of shamba (site for farming) and zone of land for gazing and farming among others. Regular changes of forest management have interfered with forest planning and management by delay in planning in the stations.

Summary: Participants listed the challenges affecting forests, this show that community interests on forest issues has been increasing since the last decades.[109]

5.4.7 Rate the challenges in a scale of 1-5

(b) Quantitative analysis: Objectives two determined using unpaired t-test: Calculated t-value = 0.504 t-value0.5percent probabilities and 45 degree of freedom 1.684 and critically tabulated two- tail t-value. Calculated t-value is lower than the critical tabulated

[108] Summary of participants responded from ten counties where community forest associations were purposely targeted. The interview between 25th 2018 and 10th January 2019

[109] Korjus 2014: *Challenges in Forest Management Planning*, Forest Res 3: e110. doi: 10.4172/2168-9776.1000e110

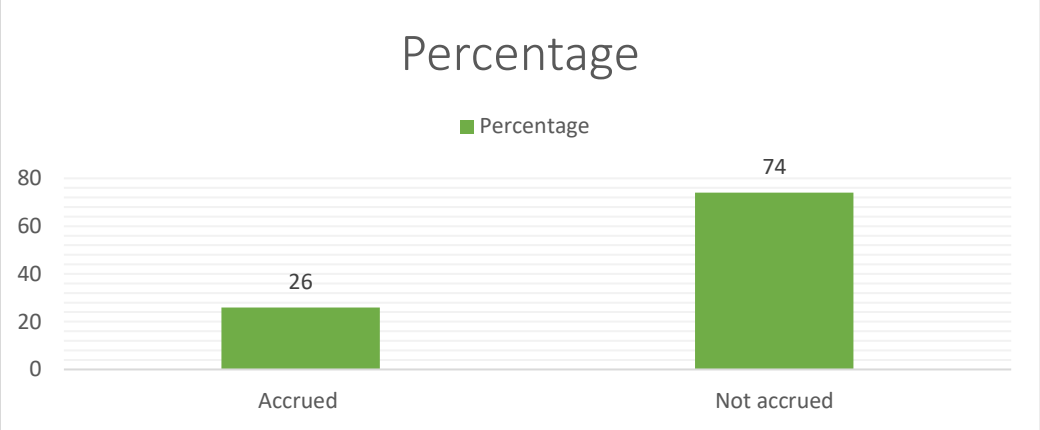
two-tail t-value, therefore null hypothesis is accepted and state that there are challenges that forests have challenges that affects forest

Summary: Forests are facing a lot of challenges that threaten the existent of forests in the country

4.5 Benefits sharing from forest products between the government and communities

4.5.1 Does the government give you part of benefits accrued from forests?

(a) Qualitative analysis.



***Source**: Field data collected from ten counties between 25th November 2018 and January 10th 2019.Figure5.5: Showing the accrue from forests with community*

Summary: Most respondents claimed that the government have been the biggest beneficial of revenue accrued from forest products than the community.

4.5.2 Rate the benefits accrue from forest using a scale of 1-5

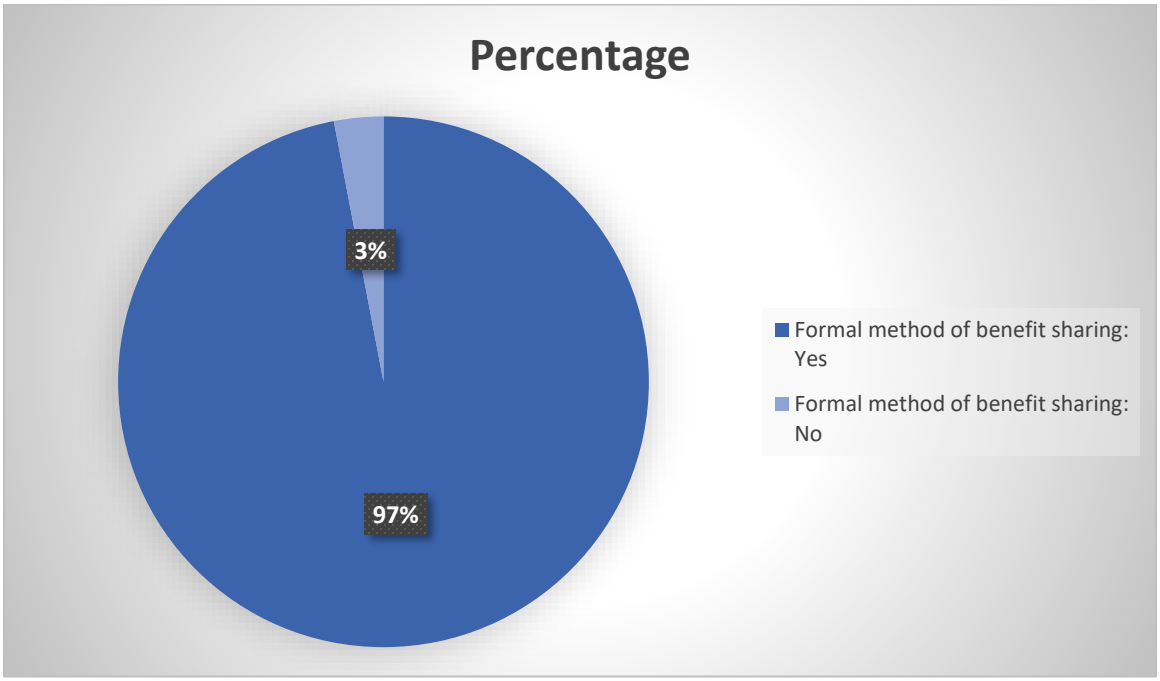
(b) *Quantitative analysis; Two-way analysis variance was used to test statistics and results are as:* Calculate F (4,36) between columns at 5% confidence level 251 and F tabulated for critical value at f-distribution table = 2.63 and Calculate F (9,36) between rows F-tabulated for critical value. The calculated f-value is greater than the critical tabulate f-value, between the columns, therefore null hypothesis (H_0) is rejected and

supports the alternative (H_1) that government does not share benefits from forest product with the adjacent communities.

Summary: The calculated f-value small than the critical tabulate f-value, between the rows, therefore null hypothesis (H_0) is accepted and state that government share benefits from forest product with the adjacent communities.

4.4.3 Formal method of benefits sharing?

(b) Qualitative analysis



***Source**: Field data collected from ten counties between 25th November 2018 and January 10th 2019*

Summary: The quantitative analysis has indicated that the government is getting bigger than the community and no formal method of benefit sharing. Benefiting sharing or sharing of revenue instrument is the agreements between the government and

stakeholders such as local communities, private sectors and non-governmental organization.[110]

4.4.4 Rate the formal method benefits sharing efficiency in a scale of 1-5.

(b) Qualitative Analysis: ANOVA Calculate F (4, 36) between columns at 5percent confidence level 251 and F tabulated for critical value at f-distribution table = 2.63 and Calculate F (9, 36) between rows F-tabulated for critical value. The calculated f-value is greater than the critical tabulate f-value, between the columns, therefore null hypothesis (H_0) is rejected and supports the alternative (H_1) that government does not share benefits from forest product with the adjacent communities.

Summary: The calculated f-value small than the critical tabulate f-value, between the rows, therefore null hypothesis (H_0) is accepted and state that government have big share benefits from forest product than the adjacent communities

4.4.5 How much shares to you get from goods?

(a) Qualitative analysis: The 3percent respondents who stated that they get less than 10 percent of the benefits accrued from forests inform of contracts for planting, fire breaks cleaning, creeper cutting, pruning and scouting as well as fire fighting

4.5.6 Rate amount shares that go to community using scale of 1-5

(b) Quantitative analysis: the analysis was carried out using Two-way ANOVA and the findings given as; Calculate F (4, 36) between sample columns at 0.05% probability level =3.029 and F tabulated for critical value at f-distribution table = 2.63 and Calculate F (4.36) between rowsF tabulated for critical value. Calculate F (9, 36) between sample rows at 0.0percent probability level 0.197 and F tabulated for critical value at f-distribution table = 2.15 and Calculate F (9.36).

The calculated f-value is greater than the critical tabulate f-value, between the columns, therefore null hypothesis (H_0) is rejected in test between sample columns and sample between rows and supports the alternative (H_1) that government does not share benefits from forest product with the adjacent communities.

[110] Aronsen, Bråten and Gleinsvik 2010 *Experiences with benefit sharing:* issues and options for REDD-plus international union for conservation of nature (IUCN)

Summary: The calculated f-value small than the critical tabulate f-value, between the rows, therefore null hypothesis (H_0) is accepted and state that government share benefits from forest product than the adjacent communities.

4.4.7 Main challenges involving benefits sharing between government and community

(a) Qualitative analysis: Respondents claimed that; Lack of community participation in revenue collection, lack of proper accounting, absence of revenue collection structures, most of the Community Forest Association members lack revenue collection skills, conflict of interest among the players, inadequate income generating activities, over reliance on wood products, unclear formula for benefit sharing, weak governance and corruption, political interference and lack of capacity

Summary: Community lack of clarity on the amount of revenue collected, the means of collecting and also there is no clear formula for sharing the benefits

4.5.8 Rates the challenges, in a scale of 1-5

(a) *Quantitative analysis:* Two-way ANOVA was applied to test statistic and outcomes were; calculate F (4,36) between sample columns at 0.05percentprobability level 12.09 and F tabulated for critical value at f-distribution table(4,36) = 2.63 and Calculate F (9,36) between rows F= 4.96. Tab1.37ulated for critical value. Calculate F (4, 36) between sample rows at 0.05percentprobability level 4.067 and F tabulated for critical value at f-distribution table = 2.15 and Calculate F (9, 36).

Summary: All the three F-ratios are not significant of 5 percent probability level which means that the calculated f-value is greater than the critical tabulate f-value, between the columns, therefore null hypothesis (H_0) is rejected in test between sample columns and sample between rows and support the alternative (H_1) that government does not share benefits accrued from forest product with the adjacent communities. The calculated f-value small than the critical tabulate f-value, between the rows, therefore null hypothesis (H_0) is accepted and state that government share benefits from forest product with the adjacent communities

4.6 Chapter Conclusion

Analysis was carried out for each objective using both qualitative and quantitative techniques as:

Personal data: Indicates that mature people concerned with forest activities, thus understand the important of conservation and management, both male and female are equally represented, thus there is gender parity from the community in forest conservation.

Objective one, the Role of forests on human development: based on Qualitative analysis, facts given by the respondents about the role of forest on Human development, it has come out that forests sustain human life in relation to the provision of tangible goods. Quantitative analysis further deduced that forests are indispensable to human well-fare. Respondents proved that major roles of forests are provision of intangible services which crucial to human life such as restoration of degrade land and climate mitigation. Quantitative determination inferred that the major roles forests are ultimately importance for the provision of intangible services that are crucial to human development.

In terms of monetary value, respondent estimated the benefits from forest goods per year using different methods, shown that attaching values to forest products by community makes them understand the significant of forest conservation. The analysis showed that forests are facing a lot of challenges which have led to the its reduction and the effects has led to climate change and scarcity of forest products along with qualitative Analysis confirmed statistically that are a lot of forests challenges m that has threaten Human Development

Objective two Communities involvement in planning and management of forest in Kenya: Participants gave detailed information on the planning and management of forests which are sufficient evidences that KFS planned and executes the management of forests as their mandate with minimum community involvement. The level of involvement in forest planning and participatory is skewed towards the government side, thus, hinders effort to conserve forests by community for lack of ownership. Quantitative analysis also

confirmed that there is little participatory planning and management of forests activities in Kenya as it is planned and implemented by the state through KFS

The community prioritized main forest issues that are required for participatory planning and managements in order to enhance forest sustainable conservation of forests. Quantitative determination proved that forest planning and management is done by the state only. Participants listed the challenges affecting forests, this show that community's interests on forest issues has been increasing since the last decades and Quantitative determination concluded that Forests are facing a lot of challenges that threaten the existent of forests in the country.

Objective three Benefits sharing from forest products between the government and communities: Most respondents stated that government is biggest benefits from forests than the community; hence jeopardize conservation effort by the community. Quantitative analysis accepted null hypothesis (H_0) that government share benefits from forest product with the adjacent communities. On the formal method of benefits sharing, it is clearly stated no formal method of benefit sharing between government and community.

Benefiting sharing or revenue sharing instrument is the agreements between the government and stakeholders such as local communities, private sectors and non-governmental organization. Statistical test accepted null hypothesis (H_0) that government have big share benefits from forest product than the adjacent communities. The main challenges facing benefits sharing between the government and the communities is lack of clarity on the amount of revenue collected by the government, the means of collecting and also there is no clear formula for sharing

CHAPTER: FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapters provides the summary and conclusion from the findings analysis which was carried out relating to chapter four and five

5.2 Summary

The research finding expose that forests play the utmost significant roles to human development in the provision of tangible goods and services. The qualitative analysis of the roles play by forests in the country to both adjacent and the entire communities in terms of provision of goods and quantitative analysis for both the provision of goods and provisions of services shows that Calculated x^2 is less than the tabulated critical, therefore the result accept null hypothesis (H_0) and states that human development depends of the forests for the provision of goods and services

The importance of forests can be quantified using different factors. The services provided by forests are summarized into regulatory, supportive, and cultural services. Regulatory service: Forest mitigates adverse climate change, purify water, prevent soil erosion from both water and wind agents and prevent water and noise pollution. In terms of nutrients cycling, forests observe nutrient elements that importance for plant growth and regulate hydrological cycle. Forests are an important place for hosting events such as weddings and sports besides cultural.

Valuating forest production is part of forest valuation is significant to the stakeholders such as community so as to attached values it; hence enhance the spirit of conservation and management. It is also equally important to educate community on simple methods of forest valuation like conventional calculation, a single number expressed in currency that is surrogate for the market price expected on sale of the forest materials. Qualitative analysis accepted null hypothesis (H_0) and state that that they are challenges that hinders the role played by the forests to community. The challenges were summarized and categorized into: Poverty and unemployment oriented, Human settlement and agricultural

activities, political interference, Infrastructural development, Illiteracy, poaching and cultural activities, as well as poor management of forests besides corruption.

Majority of the participants stated that the government through the mandated departments; Kenya forest service, KWS, NEMA and other line ministries are tasked with planning and managing forests. However, some counties like Nairobi and Kajado accepted that they are involved in planning process

do not have clear method of sharing benefits accrued from forests.80 percent of the participants who took part in the interview said that they have not be involve in the planning and management of forest in their respective areas, though they agreed that that are a lot of activities that requires to be planned by all stake holders. The challenges hindering forest planning were indicated as: Lack of community involvement, insufficient funds, political interference, conflict of interest among stakeholders, corruption, Lack of proper facilities and equipment, regular changes in forest management, lack of skilled man power, marginalization of communities during planning, unpredicted weather conditions, lack of coordination and change in supply and demand for forest products as well as cultural beliefs. It was realized that 26 percent of the adjacent communities accrued forest benefits given by the government while 74 percent do not accrue benefit from forests, 97 percent of the stated government.

5.3 Conclusion

The study linked the objectives with hypotheses and relates with results obtained through data analysis. The first objective to investigate the role of forests in human development in African especially Kenya and the null hypothesis (H0): there is positive correlation between forest and human development in Africa specifically Kenya. Both qualitative and quantitative analysis confirmed that forests plays essential roles to human development in the country by providing basic requirements such as foods, shelter and health services. It also creates employment and alleviates poverty as well as bringing foreign exchange in form eco-tourism. The provision of intangible values (services) is indispensable to human survival and development. Services such as carbon sequestration and provision of oxygen for breathing are vital to human survival, whereas nutrient

cycling and soil prevention are important for human development. Cultural events and weddings are vital social issues form the basic unity in the community.

Forest valuation is important for it gives an estimate of forest values, using budgeting and planning of forests by stakeholders in addition to attracting intensive conservation. Qualitative analysis indicated that there are several challenges that are hinder forest planning and management, and quantitative analysis accepted the null hypothesis that there are challenges hindering forest planning and management. It is essential to understand the challenges facing forests planning and management by all stakeholders, so as to find amicable solution to them. Knowing the factors that hinder the role of forests to human development assists in finding solution of solving them.

The second objective; to explain how communities can be involve planning and management of forest in Africa especially Kenya and the null hypothesis (H_0) Forest planning and management has positive impact on the community in Africa especially Kenya, the qualitative and statistical analyses proved that the level of involvement in forest planning and participatory is skewed towards the government side, hinders effort to conserve forests by stakeholders because they do not own. Planning and management of forests activities in Kenya as it is planned and implemented by the state through KFS, thus denied the community sense of owning forests and consequently led to forest

The third objective; to recommendation through which benefits from forest products can be shared between government and community members and the null hypothesis (H_0): that there is a clear benefit sharing of forest products between the government and the communities. Both qualitative and quantitative analyses established that benefits sharing asymmetrically towards the government side and there is no formal method of sharing the benefit. It was also found that the main challenges facing benefits sharing between the government and the communities is lack of clarity on the amount of revenue collected by the government, the means of collecting and also there is no clear formula for sharing. This one of the factors that has contributed to forest destruction, benefit sharing from forests products by the stakeholders especially the community is vital for it makes the community have sense of forest ownership thus provide efficient and effective

conservation and management of forests in the country. The unclear method of forest benefits provides implication on benefits sharing to stakeholders thus jeopardizes forest conservation.

5.4 Recommendations

5.4.1 Policy makers

The study revealed that Forest plays an important role to human development, therefore it prudent for policy makers that to provide policies and regulations that support the participation of forest development by all stakeholders in the country and by extension to the entire continent. The findings revealed that planning and forest management of forests is a necessity for quality conservation and management, hence, it is recommended that there all the stakeholders should be involve. This can be achieved by amending forest conservation and management Act and other conservation policies to accommodate the all stakeholders.

The study has shown that about 97 % of the community cannot share benefit from forests with the government, and there is no clear method of benefit sharing accrued from forests between the government and the adjacent community for the 3% who stated that they accrue benefit. To prevent, this sensitive issue, the stakeholders with the guidance of the experts should developed a sharing formula which is accepted by all parties

5.4.2 Recommendations for further research

The study was undertaken in this thesis where some topics have been emphasized which requires further research. There areas which where literatures are insufficient particularly in the areas of planning and benefit sharing method, thus, there is need for further research in such areas. The study was specifically target the Community Forest Association as the stakeholders, though there are other forests stakeholders, therefore it necessary to carry out further investigate to determine how they collaborate in forest planning management

There are other areas for further research that have been highlighted by the studies undertaken for this thesis. These include the further exploration on the hypothesis, questionnaire designs, and theoretical application as well as analysis method

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LIST OF TABLES

1(b) Quantitative on role of forests inform of provision of goods benefits

Role of forests inform of provision of goods of benefits

COUNTY	Scale 1 - 5					TOTAL	Mean
	1	2	3	4	5		
Nairobi	0	1	4	5	5	15	3
Kajado	0	1	6	6	8	21	4
Kiambu	2	3	5	6	9	25	5
Narok	5	5	5	5	5	25	5
Bomet	3	3	3	4	3	17	3
Kericho	2	0	3	5	10	20	4
Uasin Gishu	0	1	1	5	11	17	3
Nandi	0	4	6	5	10	20	4
West Pokot	2	1	4	3	5	17	3
Elgeyo Marakwet	5	5	5	5	5	25	5
TOTAL							38

Table 1: Roles of forests in form of benefits to community

2 (b) Quantitative on role of forests inform provision of services benefits

Role of forests inform provision of services benefits

COUNTY		Scale 1 - 5					TOTAL	Mean
		1	2	3	4	5		
1	Nairobi	0	1	4	3	2	26	3
2	Kajado	0	0	6	4	0	34	3
3	Kiambu	0	0	1	4	5	44	4
4	Narok	0	2	4	2	5	32	3
5	Bomet	0	0	5	4	1	32	3
6	Kericho	0	0	1	8	1	40	4
7	Uasin Gishu	0	0	3	4	3	44	4
8	Nandi	0	0	8	2	0	32	3
9	West Pokot	0	0	7	3	0	30	3
10	Elgeyo Marakwet	0	0	0	7	3	43	4
	TOTAL							

Table2: Roles of forests in form of services to community

Estimation of benefits from forest goods

No	COUNTY	1	2	3	4	5	TOTAL	MEAN
1	Nairobi	5	5	5	5	4	24	5
2	Kajado	5	4	5	5	5	24	5
3	Kiambu	4	5	5	5	5	24	5
4	Narok	4	4	5	5	5	24	5
5	Bomet	3	4	4	5	5	21	4
6	Kericho	4	4	4	4	4	20	4
7	Nandi	5	3	3	5	4	20	4
8	Uasin Gishu	4	5	4	5	4	22	4
9	West Pokot	3	3	3	3	5	17	3
10	Elgeyo Marakwet	4	4	4	5	5	22	4
	TOTAL							

Table 3: Estimation of benefits from forest goods

Challenges hindering the role played by the forests to MEAN communities

No	COUNTY	Scale 1-5						
		1	2	3	4	5	TOTAL	
1	Nairobi	0	3	6	6	5	25	5
2	Kajado	5	5	7	3	1	21	4
3	Kiambu	0	0	5	7	7	22	3
4	Narok	0	2	3	4	6	15	3
5	Bomet	1	0	5	5	6	17	3
6	Kericho	0	1	12	10	2	25	5
7	Nandi	0	3	6	12	1	20	4
8	Uasin Gishu	0	5	5	9	4	23	4
9	West Pokot	1	1	1	8	2	13	2
10	Elgeyo Marakwet	2	3	5	7	3	25	5
	TOTAL							34

Table 4: Challenges hindering the role played by the forests to communities

COUNTRY	1	2	3	4	5	TOTAL	MEAN
Nairobi	10		0	0	0	10	1
Kajado	0	0	0	0	0	0	0
Kiambu	9	1		0	0	11	1
Narok	10	0	0	0	0	10	1
Bomet	6	4	0	0	0	14	1
Kericho	8	1	1	0	0	13	1
Nandi	7	2	1	0	0	14	1
Uasin Gishu	6	1	1	1	0	15	1
West Pokot	0	6	3	0	0	21	2
Elgeyo Marakwet	2	2	2	2	0	20	2

Table5: Communities involvement in planning and management of forest in Kenya

Computations for Two-way ANOVA (in a design without repeated value)

Do Government gives you part of benefits accrue from forests to the community

		Scale 1 -5					
No	COUNTY	1	2	3	4	5	TOTAL
1	Nairobi	5	5	6	1	1	18
2	Kajado	5	5	5	7	3	25
3	Kiambu	4	5	7	5	2	23
4	Narok	4	4	4	4	4	20
5	Bomet	6	6	3	4	2	21
6	Kericho	7	6	7	5	0	25
7	Nandi	7	6	4	4	3	24
8	Uasin Gishu	7	5	5	2	1	20
9	West Pokot	7	7	4	3	2	25
10	Elgeyo Marakwet	7	6	5	5	2	25
	TOTAL	60	55	51	40	20	$\sum = 226$

Scale 1 -5

No	COUNTY	1	2	3	4	5	TOTAL
1	Nairobi	7	6	7	0	5	25
2	Kajado	5	5	5	7	3	25
3	Kiambu	4	4	4	4	4	20
4	Narok	4	5	7	5	2	23
5	Bomet	6	6	5	4	3	24
6	Kericho	7	5	4	3	1	20
7	Nandi	4	7	6	4	3	24
8	Uasin Gishu	5	7	5	2	1	20
9	West Pokot	7	4	3	7	2	25
10	Elgeyo Marakwet	7	6	5	5	2	25
	TOTAL	**56**	**55**	**51**	**41**	**26**	**$\sum$ = 229**

Computations for Two-way ANOVA (in a design without repeated value)

Main forest activities that requires for planning and management

NO	COUNTY	Scale 1-5					
		1	**2**	**3**	**4**	**5**	**TOTAL**
1	Nairobi	0	0	4	9	7	20
2	Kajado	1	2	5	5	4	17
3	Kiambu	0	0	9	6	10	25
4	Narok	1	3	5	7	6	22
5	Bomet	0	1	4	5	5	15
6	Kericho	0	2	3	4	7	16
7	Nandi	2	0	6	7	4	19
8	Uasin Gishu	0	0	4	3	5	12
9	West Pokot	2	2	3	4	3	14
10	Elgeyo Marakwet	0	4	7	9	5	25
	TOTAL	**6**	**14**	**50**	**59**	**56**	**∑ =185**

Table 7: Main forest activities that requires for planning and management

Computations for Two-way ANOVA (in a design without repeated value)

Method benefits sharing, rate (very weak – very strong) the efficiency

No	COUNTY	1	2	3	4	5	TOTAL
1	Nairobi	0	3	5	10	7	25
2	Kajado	2	3	7	5	6	23
3	Kiambu	0	4	4	10	5	23
4	Narok	1	3	1	10	10	25
5	Bomet	3	4	5	3	7	22
6	Kericho	2	2	4	7	9	24
7	Nandi	2	0	9	8	5	24
8	Uasin Gishu	3	4	5	9	4	25
9	West Pokot	0	0	12	5	6	23
10	Elgeyo Marakwet	0	3	6	7	7	23
	TOTAL	13	26	58	74	66	∑= 237

Table7: Main forest activities that requires for planning and management

Computations for Two-way ANOVA (in a design without repeated value)

main challenges pertaining to benefits sharing between the government

NO	COUNTY	1	2	3	4	5	TOTAL
1	Nairobi	0	4	6	5	10	25
2	Kajado	2	3	3	5	10	23
3	Kiambu	2	4	5	7	5	23
4	Narok	3	5	7	6	4	25
5	Bomet	2	7	2	5	6	22
6	Kericho	0	0	9	3	12	24
7	Nandi	2	0	12	5	5	24
8	Uasin Gishu	0	3	6	7	9	25
9	West Pokot	4	4	5	6	4	23
10	Elgeyo Marakwet	0	3	4	7	7	21
	TOTAL	15	33	59	56	72	∑=235

Questionnaire for forest planning and management for human development

This questionnaire is purely for academic purpose only. Its use for collecting data on forest planning and management for human development, Likert scale is use in rating to a sign value where 5 is the highest and 1 is the lowest information is required for data analysis and the findings will be used for conclusion and recommendation in the study

1.0: section a Personal data

1.1. Name----------

1.2. Age 18-30 ☐ 31- 45 ☐ over 45 ☐

1.3. Gender ☐ Male ☐ Female

1.4. (I) County----------

(ii) Forest station----------

1.5. Level of education

☐ Primary ☐ Secondary ☐ University ☐ None ☐

1.6. Are you a member of forest conservation committee?

2.0: SECTION B: Role of forests on human development.

2.1. (I) what are the major role that forests provide in terms of goods?

(a)

(b)

(c)

(e)

(d)

(f)

(ii) From a scale of 1-5 can you rate the role of forests inform of benefits-------

2.2. (I) what are the major role that forests provide in terms of services?

(a)

(b)

(c)

(e)

(d)

(f)

(ii) In a scale of 1-5 can you rate the role forests in form of benefits in terms of services -------?

2.3. (I) in term of monitory value, can you estimate the benefits from forest goods per year------

(ii) Given a scale of 1-5 can you rate the role forests in form of benefits from services -------?

2.4 (i) what are the challenges hindering the role played by the forests to you?

a)

(b)

(c)

(e)

(d)

(f)

(ii) Using a scale of 1-5 rate the challenges-------

3.0: SECTION C: Communities involvement in planning and management of forest in Kenya

3.1. Who carry out planning and management of forests?

a)

(b)

(c)

(e)

(d)

(f)

3.2. (I). Are you involving in the forest planning and management? ----------

(ii). in a scale of 1-5, rate the level of involvements------

3.3. (I). What are the main forest activities that require planning and management?

a)

(b)

(c)

(e)

(d)

(f)

(ii) Given a scale of 1-5, rate if the forests planning activities are sufficiency-------

4.4. (I). What are the challenges involving in forest planning and management?

a)

(b)

(c)

(e)

(d)

(f)

(ii) Rate the challenges in a scale of 1-5-------

4.0: SECTION D: Benefits sharing from forest products between the government and communities

4.1. (I). Do governments the government give you part of benefits accrue from forests? ----

(ii). in a scale of 1-5, rate the sufficiency of benefits accrue from forests--------

4.2. (I). Is there formal method of benefits sharing? ----------

(Ii). if there a formal method, rate the efficiency in a scale of 1-5----------

4.3. (I). How much shares to you get from goods? ----------

(ii). Rate the shares in a scale of 1-5--------

4.4. (I). How much shares to you get from services? --------

(ii). Rate the shares in a scale of 1-5----------

4.5 (i) what are the main challenges pertaining to benefits sharing between the government and the communities?

a)

(b)

(c)

(e)

(d)

(f)

(ii). in a scale of 1-5, rate the challenges----------

THIS IS TO CERTIFY THAT:
MR. ANDREW CHERUIYOT SOI
of NATIONAL DEFENCE COLLEGE,
24381-502 NAIROBI,has been permitted
to conduct research in *All Counties*

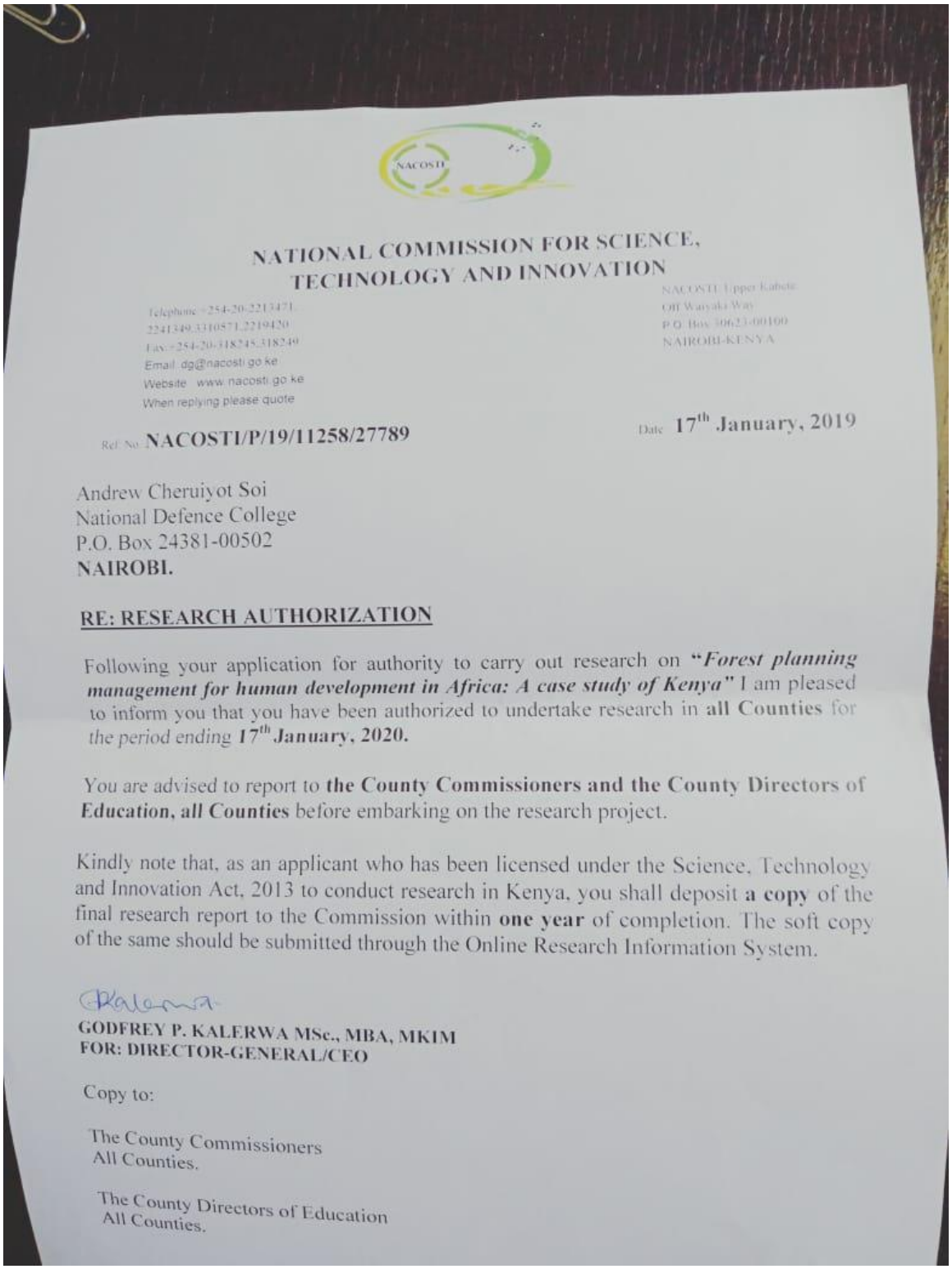
Permit No : NACOSTI/P/19/11258/27789
Date Of Issue : 17th January,2019
Fee Recieved :Ksh 1000

on the topic: *FOREST PLANNING MANAGEMENT FOR HUMAN DEVELOPMENT IN AFRICA: A CASE STUDY OF KENYA*

for the period ending:
17th January,2020

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation



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NAIROBI-KENYA

Ref. No. **NACOSTI/P/19/11258/27789**

Date **17th January, 2019**

Andrew Cheruiyot Soi
National Defence College
P.O. Box 24381-00502
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Forest planning management for human development in Africa: A case study of Kenya"*** I am pleased to inform you that you have been authorized to undertake research in **all Counties** for *the period ending* ***17th January, 2020.***

You are advised to report to **the County Commissioners and the County Directors of *Education, all Counties*** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioners
All Counties.

The County Directors of Education
All Counties.