CONTRIBUTION OF PUBLIC PARTICIPATION TO ENVIRONMENTAL CONSERVATION IN KAKAMEGA COUNTY, KENYA

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A thesis submitted in partial fulfillment of the requirements for the award of Master of Science Degree in Disaster Management and Sustainable Development of Masinde Muliro University of Science and Technology

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DECLARATION

This thesis is my original work and has not been presented for a degree or any other award in any other University.

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CERTIFICATION

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DEDICATION

To the four pillars of my life: God, my wife, and my parents. Without you, my life would fall apart, might not know where the life's road will take me, but walking with You, God, through this journey has given me strength. Janeth, you are everything for me, without your love and understanding I would not be able to make it. Mom, you have given me so much, thanks for your faith in me, and for teaching me that I should never surrender. Daddy, though you went to be with the Lord, you always told me to "reach for the stars." I think I have gotten another one in my life.

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ABSTRACT

Environmental degradation and loss of resources that requires conservation is a pressing developmental issue. The scope of study Public participation is emphasized as a factor by Public participation bill 2018 and remains a critical determinant in environmental conservation in Kakamega County to safeguard the environment against further degradation The overall objective of the study was to evaluate the contribution of public participation in environmental conservation .The specific objectives of the study were (i) to Determine the individual household's participation in environmental conservation in Kakamega County; (ii) to Examine the influence of governmental and non-governmental actors on public participation in environmental conservation in the County and (iii) to Evaluate strategies in public participation, influence in environmental Conservation. Corresponding research questions were developed to guide the study. The literature reviewed revealed key gaps in that little had been done by way of evaluating public participation in conservation. Key theories and models reviewed, Hardins 'Tragedy of commons", "Primary Environmental Care" and the "Ladder of Citizen Participation" selected to underpin the research. The study design was descriptive and evaluation survey; with inferential aspects to evaluate how independent and dependent variables affected public participation in conservation. Three sub counties were selected as study area. Data were collected using random, probabilistic sampling techniques, quantitative and qualitative tools, namely questionnaire, KII Interview Guides, FGD Guide and Direct Observation Guide. The sample size was 384 households responded, the sampling strategy was clustered/multistage, employing both purposive and non-purposive techniques. Ethical issues were observed, by the lead researcher and research assistants. Descriptive statistics were generated using SPSS v20, and a 3-point public participation ranking score to measure the level of participation, based on the model provided in literature. The first objective found that livelihood factors of individual households result in a low level (30%) of the public participation, which points out to a 10% degree of contribution; the second objective pointed out that governmental actors influence public participation at a 20% level; and that non-governmental actors influence the public to participate at a 10% level, translating to a 30% contribution.. The third objective's findings were that a strong political will at all levels and a congenial economic environment is necessary to effect measures to mitigate environmental degradation. The correlation between the level of education and knowledge of any environmental committees in the community was significant at (R=0.147; P=0.5) indicating a high correlation of level of education and environmental committees and initiatives. the Pearson moments correlation between personal initiatives to protect rivers and forests and perception on importance of environmental committees in Kakamega county was high at (R= 0.101; P=0.5). The findings reveal that the process of interaction between service providers or project implementers and the community with the aim of improving decision making during the planning, design, implementation and evaluation phases of the project is key to environmental conservation. The study recommends that constant monitoring and regular evaluation of all stakeholder participation be legislated, adopted and implemented.

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LIST OF ABBREVIATION AND ACRONYMS

ASAL	Arid and Semi-Arid Land
CBOs	Community Based Organizations
CIDP	County Integrated Development Plan
DECs	District Environmental Committees
DWEDs	Divisional Environmental Committees
DRR	Disasater Risk Reduction
ECOSOC	Economic and Social Council
EMCA	Environmental Management and Coordination Act
FA	Forestry Administration
FAO	Food and Agriculture Organization of the United Nations
FGD	Focused Groups Discussion
GHGs	Green House Gases
GWP	Global Water Partnership
ICWE	International Conference on Water and the Environment
IEM	Integrated Environmental Management
INECE	International Network for Environmental Compliance and Enforcement
IO	International Organizations
IRC	International Water and Sanitation Centre

IUCN	The World Conservation Union
IWMI	International Water Management Institute
IWRM	Integrated Water Resources Management
KII	Key informant interview
KIFCON	Kenya Indigenous Forests Conservation Project
KFS	Kenya Forest Service
KWS	Kenya Wildlife Services
LEC	Locational Environmental Committees
MMUST	Masinde Muliro University of Science and Technology
NEDA	Netherlands Development Assistance
NEMA	National Environment Management Authority
NGO	Non-Governmental Organization
NSDP	National Strategic Development Plan
PA	Participatory Appraisal
PECs	Provincial Environmental Committees
RVF	Viral Hemorrhagic Fever
SDG	Sustainable Development Goals
SLEC	Sub Locational Environmental Committees
SSP	Statistical Package for Social Sciences
SCMP	Sub-catchment Management Plan

UN	United Nations
UNDP	United Nations Development Programme
UNCED	United Nations Conference on Environment and Development
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNDP	United Nations Development Programme
UNRISD	United Nations Research Institute for Social Development
USAID	United Agency for International Development
WB	World Bank
WBGU	German Advisory Council on Global Change
WCED	World Commission on Environment and Sustainable development
WRM	Water and Forest Management
WWF	World Water Fund

OPERATIONALIZATION OF CONCEPTS

Climate change Directional change in climatic variables over a long-term period.

Community: A group of households that interact frequently and have common interests, needs, and shared sense of identity

them, that together support life onearth.

Conservation: The protection, care, management and maintenance of ecosystems, habitats, wildlife species and populations, within or outside of their natural environments, in order to safeguard the natural conditions for their long-term permanence.

Contribution: In this study it is taken to be in direct proportion to the level of participation. Hence, a high contribution is as a result of high-level participation

Environment: Environment refers to the living (biodiversity) and non-living components of the natural world, and to the interactions between them.

Environmental resources: Includes the resources of the air, land, flora, fauna and water together with their aesthetic qualities. For this study, the resources refer mainly to forest and water

Household: A person or group of persons who live together, share the same living arrangements, and consider them a single unit. In this research, household residents need not be related by blood or marriage, but simply cohabitate.

Livelihood factors: in this study, these are taken to mean the human, social and economic capital possessed by individual households, that determine an individual's ability to participate in conservation activities

Public particiption this is measured in relation to the level of engagement of the citizen in development activities**.** In this study it will be taken to mean the level at which the general public participates in efforts to conserve

their immediate environment, specifically soil, forest and water resources

Sustainable Development: According to the classical definition given by the United Nations World Commission on Environment and Development in 1987, development is sustainable if it "meets the needs of the present without compromising the ability of future generations to meet their own needs."

Weather : Weather refers to the daily changes in the atmosphere and the study of weather is called meteorology which includes rainfall, solar and terrestrial radiation, temperature, visibility, evaporation and atmospheric pressure

CHAPTER ONE: INTRODUCTION

1.1 Background

Conservation is defined as the management and use of the biosphere, so that it may yield the greatest sustainable benefits to present generations while maintaining its potential to meet the needs and aspirations of future generations (UNEP-, 2001). This is an effort directed to reverse degradation of the thin layer of soil that covers most of the earth's land surface that is key to human well-being and survival (Lal 2005, 2014; von Braun 2013; Lal *et al*. 2014; Amundson *et al*. 2015).

Globally, about 40% of the earth's land surface and more than one billion people are affected by land degradation and it is noteworthy that degraded lands are home to the poorest segments of the rural population, (IFAD ,2001). Thus, conservation is positive embracing of, maintenance, sustainable utilization, restoration, and enhancement of the natural environment.

According to le *et al*, (2014) land degradation determinants can be classified into two categories namely proximate and underlying drivers. 'The proximate drivers include unsustainable land management practices and biophysical factors, such as precipitation, length of crop growing periods, agro-ecological zones. Underlying drivers on the other hand consist of socio-economic and institutional factors such as poverty, land tenure security, access to credit and extension. The proximate and underlying drivers of land degradation interact with each other to result in different levels of land degradation. Le *et al*, (2014) further asserts that causal mechanisms of proximate drivers affecting land

degradation include, cultivating along riverine areas and slopes (steep) without soil conservation measures

Resource conservation is specifically concerned with plants, animals and microorganisms, and with those non-living elements of the environment on which they depend. Living resources have two important properties, the combination of which distinguishes them from non-living resources: they are renewable if conserved; and they are destructible if not conserved (UNEP, 2001).

Public involvement in environmental conservation enforcement is a very important aspect for every citizen. Each citizen has a right to live in a healthy environment and the obligation to protect it (GOK, 2010). Further Parliament (Senate) has initiated a bill to be known as Public Participation Act, 2018.to provide a general framework for public participation; to give effect to the constitutional principles of democracy and participation of the people under Articles 1(2), 10(2), 35, 69(1)(d), 118, 174(c) and (d), 184(1)(c), 196,201(a) and 232(1)(d) of the Constitution (GoK 2018); Following the lead set by the Rio Earth Summit 1 in 1992, every environmental sustainability meeting closes with a unanimous commitment to improved citizen participation in environmental decision making (UNCED 2012)

Despite significant improvements in environmental protection over the past several decades, over 1.3 billion individuals worldwide live in unsafe and unhealthy physical environments (UNRISD 2015; Bullard, 2001). Hazardous waste generation and international movement of hazardous waste and toxic products pose some important health, environmental, legal, political, and ethical dilemmas.

The role of citizens in environmental compliance and enforcement is fairly a new phenomenon in most countries (INECE, 1998). Historically, the public was not conscious about participating in environmental enforcement as it was the work of government agencies. In fact, in many instances, government agencies did not include clear mechanisms for citizen involvement in programs and actions to achieve compliance with and enforce environmental laws. Perhaps the most well-known mechanism is citizens going to court to enforce environmental laws (Wu, 2008).

At the global level, China's massive rate of industrialization has caused a pollution crisis more severe than anywhere else in the world, leading to serious health and environmental concerns such as air pollution and contaminated drinking water supplies. According to Wu, (2008). This has happened against a backdrop of Chinese undeveloped legal system and members of the public were unconscious about environmental laws.

The situation was exacerbated by poor enforcement of these laws at all levels of jurisdiction due to what has been said to be lack of funding for government agencies. Over time the role of public participation to augment enforcement has gained momentum due to development of China's anti-pollution regulations due to enhanced public participation (Wu, 2008).

Environmental conservation challenges are many, complicated by and often include climate change, low public participation and inappropriate land use practices. Conservation requires management of forests, woodlands, wildlife and water catchment areas. Stakeholders' participation in forest and water management in Kenya has increasingly shifted towards rhetoric in the past several years (GoK 2018).

Population increase is exerting pressure on the natural resource base on which the economy of Kenya relies. This is characterised by climate change manifested through land degradation, water pollution, encroachment on fragile ecosystems and loss of biodiversity. It is therefore imperative that strategies are developed to address these issues which are being experienced globally.

The County and sub-county environment committees are a primary mechanism for NEMA to undertake these functions. The committees are responsible for the proper management of the environment within the province (region) or Counties in which they are appointed. In Kenya, citizens must contend with both polluted air and drinking water as well as poorly located noxious facilities such as municipal dumps for biomedical wastes, e-wastes, municipal wastes, wastes incineration, hazardous waste treatment among liquid and solid wastes (Bullard, 2001).

However, there are many other opportunities for citizens to supplement governmental efforts. For instance, where a public complaint process exists, citizens are an important source of information concerning potential violations. Citizens have much to add to the negotiation and settlement process of environmental compliance assurance or enforcement actions. The research therefore in part endeavoured to find out why there are existing gaps in the involvement of the citizens in environmental conservation.

1.2 Statement of the Problem

Land degradation requiring urgent conservation has become a global problem occurring in both low income and highly industrialized agro-ecologies, Lal *et al*, (2012).The UN notes and acknowledges through the 17 Sustainable Development Goals, SDGs that target

to “protect, restore and promote sustainable use of terrestrial ecosystems, manage forests, combat desertification, halt and reverse land degradation including biodiversity loss” (UNDP , 2015).The high level of degraded croplands is due to intensive fertilizer and livestock grazing which has led to reducing grasslands, shrub lands, , and increasing areas with sparse vegetation (Le *et al* ,2014).Whereas human activities hugely contribute to land degradation the contribution of community and public participation on environmental conservation is rarely addressed Kenya which has seen a shrinkage in forest cover alone from a high of 31% in the 1960s to a low coverage in the new millennium below 10%, loss of soil cover alone in Kenya is estimated at 1 % annually , it is for these reasons that the study seeks to identify the stakeholders of environmental conservation and the public participation challenges ,threats and opportunities in reversing land degradation and enhancing government and non-governmental (private) interest to involve the public in a quality partnership to reverse and adopt sustainable land and natural resource use practices (UNDP 2015).

There is evidence that biodiversity loss is directly linked to the erosion of community-land based tenure (Lynch & Alcorn 1994) and there has been clamour for wider public participation in natural resource conservation (GoK ,2018).

This demand for public participation is in response to the belief that neither industry nor elected representatives are making or effecting enough good decisions in the interest of the public good, (Seaba (2006). Despite its importance, public participation is still deficient, and its contribution is not felt in resource conservation.

The demographic, economic and social characteristics of individuals in the community play a part in determining their willingness and ability to engage in conservation activities.

There is however an information gap regarding the extent to which these livelihood factors influence public participation in conservation (Le *et al* ,2014). Similarly, information on the impact of the Government and NGO agencies in conservation initiatives such as funding, training and provision of technical support to the community is relatively unknown. The very manner in which the state and non-state actors engage with the community in the name of partnership may be the very problem hindering the effectiveness of public participation in conservation resources.

The study therefore endeavoured to examine how the Government and NGO actors can form a working partnership through public participation in conservation.

1.3 Research Objectives

The overall objective of the study was to evaluate the contribution of public participation in environmental conservation Kakamega County, Kenya.

The specific objectives of the study were:

i. To determine the level of households' participation in environmental conservation in Kakamega County
ii. To examine the influence of governmental and non-governmental actors to public participation in environmental conservation in Kakamega County
iii. To evaluate strategies for public participation for environmental Conservation in Kakamega County.

1.4 Research Questions

The research questions that guided the study are as follows:

i. How do individual household's livelihood factors influence participation in environmental conservation Kakamega County?
ii. What is the influence of governmental and non-governmental actors on public participation in environmental conservation Kakamega County?
iii. What are the strategies for public participation in environmental conservation Kakamega County?

1.5 Justification of the Study

1.5.1 Policy Justification

This study is significant because, by endeavouring to evaluate the contribution of public participation in environmental conservation, it highlights areas that may require strengthening, thereby informing policy. The study findings inform the government, NEMA and other stakeholders to understand more on the factors affecting the loss of soil cover, biomass and other natural resources leading to climate change, for policy formulation.

The information from the study also serves to equip the public with knowledge on the benefits that accrue from taking care of their environment. Further the study enlightens public on the role they play to ensure that there is a balanced ecosystem.

1.5.2 Academic Justification

The study was justified academically because, although many studies exist which have been documented on stakeholders' involvement in land environmental degradation (including water pollution and water catchment depletion and climate change), further

investigations needed to be done to better understand and provide detailed information on stakeholders' participation in the management of these resources at the grassroots level.

Other researchers stand to benefit through using the recommendations made from the study as a point of reference in their studies as this will add more knowledge to the existing literature on public participation in environmental conservation.

1.6 Scope

1.6.1 Geographic Scope

Although the study was carried out in Kakamega County, it focused on three sub-counties namely: Navakholo, Kakamega North, Kakamega East. The two sub-counties, host Kakamega forest and act as both the water catchment areas for Rivers Isiukhu and Yala respectively whereas Navakholo is drained by River Lusumu. The study focused on the levels of natural resource conservation found in the county being biomass cover (forest) and water.

1.6.2 Academic Scope

Academically, the study focused on how the variable of public participation interacts with its determinants, namely individual, state and non-state actors. The public participation focus was on 8 elements ((1) Manipulation (2) Therapy. (3) Informing (4) Consultation (5) Placation (6) citizen power (7) Delegated Power and (8) Citizen Control, as provided by a model in literature. The elements were used to rank the level of participation which, itself was assumed to be synonymous with the contribution of the public. The study provides suggestions for more research on environment committees and other stakeholders' participation because there is little empirical data or experience from which

to learn collaborative environmental conservation and management in Kenya and their consequences for participatory management.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents review of relevant literature in the context of the study problem formulated and the objectives articulated. It covers the following areas: the concepts of environmental conservation, public participation, and the influence of governmental and non-governmental actors on public participation in environmental conservation. Key theories and models are also reviewed, from which a conceptual framework and model was developed to guide the study. The model diagrammatically presents the relationship between the independent and dependent variables of the study.

2.2 The Concept of Environmental Conservation

The planet's capacity to support people is being irreversibly reduced in both developing and developed countries: thousands of millions of tonnes of soil are lost every year as a result of deforestation and poor land management; at least 3,000 km^2 of prime farmland disappear every year under buildings and roads in developed countries alone; likewise hundreds of millions of rural people in developing countries, including 500 million malnourished and 800 million destitute, are compelled to destroy the resources necessary to free them from starvation and poverty in widening swaths around their villages.

The rural poor strip the land of trees and shrubs for fuel so that now many communities do not have enough wood to cook food or keep warm; the rural poor are also obliged to burn every year 400 million tonnes of dung and crop residues are badly needed to regenerate soils (UNEP, 2001).

The energy, financial and other costs of providing goods and services are growing throughout the world, but especially in developing countries, siltation cuts the lifetimes of reservoirs supplying water and hydroelectricity, often by as much as half. Floods devastate settlements and crops (in India the annual cost of floods ranges from $140 to $750 million), the resource base of major industries is shrinking: tropical forests are contracting so rapidly that by the end of this century the remaining area of unlogged productive forest will have been halved. The coastal support systems of many fisheries are being destroyed or polluted (in the USA the annual cost of the resulting losses is estimated at $86 million) (UNEP, 2001).

The environment doesn't exist in isolation; it both affects and is affected by many aspects of our lives. Environmental resources and ecosystem services are direct inputs into the economy. Establishing a sustainable pattern of development is a key challenge and improving resource efficiency is a top priority to achieve this goal. Embracing resource efficiency offers a path to job creation and economic growth. Resource efficiency is also one of the key environmental priorities at EU level and is one of the seven flagship initiatives within the Europe 2020 Strategy.

The challenge is to utilise resources in a sustainable manner throughout their life-cycle, avoiding over-exploitation and reducing the environmental and social impacts of their use. Changing the consumption patterns of private and public purchasers will help drive resource efficiency and reduce waste with the potential to generate direct net cost savings. Sustainable management of our water and biodiversity resources is another aspect of resource efficiency. Policies supporting energy efficiency, sustainable transport and

sustainable agriculture can bring benefits to both the environment and the economy. (Ireland's Environment, 2012).

This much-talked concept of environment has evolved since it started to become global issue in the early 1970s. At first was a kind of global recognition that the earth's ecosystems are in fact fragile and that human beings have been contributing much to its degeneration. When countries started to join efforts to strike a balance between improving the quality of human life and protecting the environment for the sake of future generations, new awareness materialized. The social and economic welfare of human beings is closely linked to their environment (GWS, 2012).

A critical aim of conservation is to maintain essential ecological processes and life-support systems (such as soil regeneration and protection, the recycling of nutrients and the cleansing of waters), on which human survival and development depend. It also preserves genetic diversity (the range of genetic material found in the world's organisms), on which depend the functioning of many of the above processes and life-support systems.

It is preservation of breeding programmes that are necessary for the protection and improvement of cultivated plants, domesticated animals and microorganisms, as well as much scientific and medical advance. Further the technical innovation, and the security of the many industries that use living resources to ensure the sustainable utilization of species and ecosystems (notably fish and other wildlife, forests and grazing lands), which support millions of rural communities as well as major industries are also major aims of resource conservation, (UNEP,2001).

Resource conservation is maintained by social management mechanisms that form the basis of wider structures of social organization. Notably, not all societies have been successful in developing sustainable resource management practices, but those that have not can suffer heavy social costs, up to and including the extinction of their society.

The decline or disappearance of many civilizations, from those of pre-Columbian Central America to that of ancient Greece, has been hypothesized to have resulted at least in part from environmental decline due to mismanagement. The capacity and flexibility of traditional resource management systems have often been stretched to their limits, and they have become unable to handle successfully the environmental challenges with which they are now faced (UNRISD, Geneva, 1993).

The Kenyan new constitution is respectful of the environment, and ascribes to it *as a heritage, that should be sustained for the benefit of future generations*, (GoK ,2010). Vision 2030 development blueprint, in the same spirit re-affirmed the important role accorded to the environment in national development. (Wright, 2012). The Forest Conservation And Management Act No. 34 Of 2016 legislates for a sustainable environment demands, conservation of water, soil, biodiversity; river line, shoreline protection for cultural use, heritage; recreation, tourism, sustainable production of wood and non-wood products; carbon sequestration and other environmental Services, education and research purposes, habitat for wildlife in terrestrial forests and fisheries in mangrove forests (GoK ,2016).

Land degradation continues to be a threat to the global environmental commons through desertification, deforestation, loss of biodiversity, adverse effects on climate, sedimentation and pollution of waters (GEF Council 2005). Biodiversity and ecosystems provide the habitats for all living organisms.

Interference with ecosystem functions inevitably diminishes the diversity of above- and below-ground biodiversity, as well as affecting aquatic life. The ethic underlying the conservation of biological diversity is that it is for the global good and the needs and rights of future generations. Yet, in practice, conservation has had to make itself pay by promoting non-damaging forms of use (Stocking, 2006).

2.2.1 Challenges of Environmental Conservation

Conservation faces challenges such as climate change, high population growth, and inappropriate land use practices (Kipngetich; GWS, 2012). Conservation requires management of indigenous forests, woodlands and water catchment areas, to ensure protection and minimize social impact of use and interference with environment as development of infrastructure takes place and energy needs are met. Natural resources are to be utilized through elaborate identification of concession areas for public use. The conservation management plan should include inventories, reforestation or replanting programmes, annual operation plans and community user rights and benefits; which shall be undertaken in consultation with all stakeholders (Forest Conservation and Management act) (GoK ,2015).

According to Garlauskas (1975) there are four fundamental functions that must be effectively accomplished for environmental management to be effective and systematic.

These include visualizing all processes (both natural and artificial) in total perspective, recognizing and understanding any processes or problems in the structure and its component interrelationships, manipulating or otherwise dealing with the interdependencies characterising the process or operation of the whole Integrated Environmental Management (IEM) design, build, and operate the management system, which would serve as a means to manage the entire system (Garlauskas, 1975).

2.3 The Concept of Public Participation

Mathabatha and Naidoo (2004) define public participation as "the ongoing process of interaction between service providers or project implementers and the community with the aim of improving decision making during the planning, design, implementation and evaluation phases of the project" Mathabatha and Naidoo, (2004). These authors see participation as a means of defending one's claims as well as an opportunity to challenge other people's claims. The process can also be utilised to ask for further clarification to arrive at socially acceptable decisions (Webler *et al*, 2000).

There are a number of ways in which the public participates, either by individual initiatives, or, more often, in collaboration with governmental and non-governmental organizations. Arnestein, (1969) in her ground-breaking concept of 'ladder of citizen participation' identifies eight types corresponding to eight rungs of a ladder, describing successive levels of engagement.

2.3.1 Manipulative Type of Partnership

According to Arnstein (1969) the bottom (lowest) rung of the Ladder of Citizen Participation is an engagement process where, in the name of citizen participation, people are placed on rubberstamp advisory committees or advisory boards for the express purpose of "educating" them or engineering their support. Instead of genuine citizen participation, the bottom rung of the ladder signifies the distortion of participation into a public relations vehicle by power holders. In Arnsteins view of a non-participatory manipulative partnership, 'it is officials who educate, persuade, and advise the citizens, not the reverse. Sometimes the community are required to append their signatures to policy documents whose decisions they did not participate in' Further according to Baker *et al*., (2005) most development conservation initiatives are often times one-way communication and target based and are not oriented towards problem-solving in the immediate environment of concern.

2.3.2 Therapy Type of Partnership

This type of partnership is described as one where group therapy is 'masked as citizen participation'. It is where administrators - mental health experts from social workers to psychiatrists - assume that powerlessness is synonymous with mental illness and proceed to subject the citizens to clinical group therapy. Citizens are engaged in extensive activity, but the focus of it is on curing them of their "pathology" rather than changing the racism and victimization that create their "pathologies" (Arnstein, 1969)

2.3.3 Informing Type of Partnership

There is a type of partnership where citizens are informed of their rights, responsibilities, and options, but where the emphasis is placed on a one-way flow of information - from officials to citizens - with no channel provided for feedback and no power for negotiation.

This type is often manifested in meetings where superficial information is provided, and questions discouraged, or irrelevant answers given (Arnstein, 1969).

A study by Kathi and Cooper, (2005) posits that 'the main goals of public participation are to inform, engage, consult, collaborate and empower the citizenry through different ways such as, elections, or civil society activities where public input is sought at all stages of policy making. However, the culture in public bureaucracy is not supportive of public engagement, but relies on standard information exchange channels like public hearings.

2.3.4. Consultative Type of Partnership

In the consultative type of partnership According to Arnstein (1969) the fourth rung of the ladder, officials usually ask the community to give their opinion, even though there is no guarantee their input will be used. The most frequent methods used for consulting people are attitude surveys, neighbourhood meetings, and public hearings. Arnstein (1969), further asserts that when power holders restrict the input of citizens' ideas solely to this level, participation remains just a window-dressing ritual. People are primarily perceived as statistical abstractions and participation is measured by how many come to the meetings, take brochures home, or answer a questionnaire. What citizens achieve in all this activity is that they have "participated in participation." And what power holders achieve is the evidence that they have gone through the required motions of involving "those people." To ensure that citizens feel they have an opportunity to contribute to the decision-making process, research by Gastil, (2008) calls for deliberative two-way communication that gives every participant an equal opportunity to speak and listen to the

views of other participants. In order to arrive at a decision or judgment based on not only facts and data but also values, emotions, and any other less technical considerations ‘aimed at problem-solving.

Arstein, (1969) argues that it is at this level that citizens begin to have some degree of influence though tokenism is still apparent. An example of placation strategy is to place a few hand-picked "worthy" poor on boards of Community Action Agencies or on public bodies. Citizens have the opportunity to give endless advice, but don’t have any real decision-making power. The degree to which citizens are actually placated depends largely on the quality of technical assistance they have in articulating their priorities, and the extent to which the community has been organized to press for those priorities (Arnstein, 1969).

2.3.6 Meaningful Partnership

In meaningful partnership power is redistributed through negotiation between citizens and power holders. They agree to share planning and decision-making responsibilities through such structures as joint policy boards, planning committees and mechanisms for resolving impasses. There is no room for unilateral change (Arnstein, 1969).

2.3.7 Delegated Power Type of Partnership

Negotiations between citizens and public officials lead to citizens achieving dominant decision-making authority over a particular plan or program. At this level, the ladder has been scaled to the point where citizens hold the significant cards to assure accountability of the program to them. (Arnstein, 1969).

2.3.8 Citizen Control Type of Partnership

At this level of partnership, the process is community controlled in terms of decision-making power. This means that participants can govern a program, be in full charge of

policy and managerial aspects, and be able to negotiate the conditions under which "outsiders" may change them. (Arnstein, 1969).

Findings in a research by Hagelskamp et al. (2013), suggest that elected and appointed officials see the public as being ‘uninformed, disengaged and distrustful’, and thus see no need to engage them., whereas Black,(2012) argues that Well-structured deliberative public participation has been shown to produce high-quality engagements, especially in a diverse environment, thereby reducing problems of marginalization, exclusion and inequality (Sui and Stanisevski, 2012).

The foregoing literature provided variables which made it possible to measure and rank the level of public participation in environmental conservation. It also reveals a gap insofar as there being little information on the type of participation or partnership that the community, government and non-governmental organizations are engaged in with regards to environmental conservation of water and forest resources in Kakamega.

2.3.9 Rationale for Public Participation

There are numerous rationales for public participation in programmes, plans, projects and other actions that affect people and their immediate environments. These reasons can be categorized as depicted in the Table 2.1

These rationales of public participation in decision-making processes may take the form of tokenism (procedural, information eliciting) or the form that is directed towards empowerment.

2.4 Individual Livelihoods and Public Participation

According to Pretty, (1991) livelihoods are complex and adapt rapidly in response to unpredictable environmental and economic change. Pretty also observes that knowledge of these complex pressures and interlinkages have not been extensively researched and mapped .and these variable gaps are often not taken into consideration in development practice that has been dominated both by the philosophy of positivism and the science of reductionism. Pretty, (1991) further argues that if development is to be sustainable, it must begin with the participants who know most about their own livelihood systems they value and develop.

Table: 2.1. Participation as a means (passive) and participation as an end (active)

Participation as a means (passive)	**Participation as an end (active)**
Implies the use of participation to achieve some predetermined goal or objective	Attempts to empower people to participate in their own development more meaningfully
Attempts to utilize existing resources in order to achieve the objectives of programmes/projects	Attempts to ensure the increased role of people in development initiatives
Emphasizes achieving the objective rather than the act of participation itself	Focuses on improving the ability of the people to participate rather than just achieve the predetermined objectives of the project
More common in government programmes, where the main concern is to mobilize the community and involve them in improving the efficiency of the delivery system	Finds relatively less favour with Government agencies. NGOs agree with this viewpoint in principle
Participation is generally short-term	Participation is a long-term process
Participation as a means appears to be a passive form of participation	Participation as an end is relatively more active and dynamic than participation as a means

Source: Davids *et al,* (2005:) customized by Researcher (2017)

2.4.1 Human Capital (Age, Gender, Marital Status, Morbidity, Knowledge)

Although women comprise 50.3 percent of Kenya's population (GoK, 2009), they must continually negotiate highly oppressive cultures with the effect that many of them face exclusion from the public and economic spheres. They also carry an inordinate work

burden and because their role as providers of family food, fuel and water brings them into close contact with the environment, they are disproportionately affected by eco-crises**.**

Approaches to forest management the world over have undergone profound changes: from central state control prior to the 70s through the community-based approaches of the 80s and the devolution of the recent 90s. Women's involvement in decision making has hardly kept pace with the earlier changes and they don't seem to fare any better under devolution programs (Jumbe and Angelsen, 2007). Youths play important roles in the water and forests management.

They are involved in problem identification, attempt to solve them and recommend solutions. Youths are involved in conflict resolutions, acting as trainers, activists and pressure groups. Youths also consult with communities and network with other organizations for sustainable development and best practices. A much more realistic interpretation of community participation is given by Paul (1986) as "an active process by which beneficiaries influence the direction and execution of a development project with a view to enhancing their well-being in terms of income, personal growth, self-reliance or other values they cherish". This therefore brings us to the question of participation, as either induced, or spontaneous.

However, caution should be given to the frequently abused term `participation` because the bottom-up approach in itself has got several limitations. While many development programs have been promoted by rhetoric about decentralization and participation, in practice, they have generally been either tightly controlled by the state or outside

development institutions. Most states still fear that grassroots organizations (especially the youth) will generate popular empowerment beyond state control.

This study joins the GWP/TAC in supporting the Dublin principles´ claim that women and youths play a key role in the collection and safeguarding of water for domestic and agricultural uses though they have less influential role than men in management. GWP/TAC continues with the claim that although gender issues have been reflected in many agreements since the Rio conference, the Dublin principle strives to ensure that the water sector is gender aware and that rhetoric is replaced by operational mechanisms and actions to ensure an equitable participation of women in resource management.

Ironically, the Dublin Principle like many others by stigmatizing the role of women failed to fully recognize that youth just like women exercise a similar role. By their sheer numbers amounting to about 30% of the world population (UNCED, 1992) and through their dynamism, skills and energy and their ability to mobilize resources, youth can play a vitally non-negligible role in environmental sustainability. According to Sherbinin and Dompka (1997), women, especially indigenous women, are only marginally involved in the process though they are the ones that are most affected by environmental changes. In Kenya, traditional gender roles have inhibited the participation of women and youth in forestry development.

The role of women and youth in forest and tree resource utilization and management has not been fully recognized, although initiatives by women and youths have convincingly demonstrated the necessary and potential value of their participation in forestry development, especially at the community level. The Government, in recognition of the

important roles played by women in communities adjacent to forests, made provision for their involvement in the current Forest Policy.

2.4.2. Social Capital and Environmental Conservation

Socio-economic conditions tend to have impact on the existence of natural resources Mitchell, (2000) argues that, prevailing local circumstances can either foster cooperation or otherwise. Environmental problems, such as water scarcity, prolonged drought, pollution of water sources and others that are trans-boundary in nature can only be addressed collectively and should compel cooperation among stakeholders. On the other hand, it is difficult to cooperate in addressing environmental problems under conditions where poverty abounds (Mitchell, 2000).

The decline in the responsibility of local level institutions is linked to changes taking place at the global level. The power of traditional and local authority structures in general has been eroded as larger, external structures become more important to local people. This crisis of local institutions occurs as part of the same dynamic which led to the decline of traditional resource management mechanisms (Munasinghe, 1993). It is precisely institutional adaptability that is crucial in the context of rapid social and environmental change, and upon which the implementation of Primary Environmental Care (PEC) depends. Thus, the potential contribution of PEC to environmental rehabilitation or the prevention of environmental decline is still relatively circumscribed.

India in the pre-British colonial period had social institutions that were partially communal in nature that acted as forest management structures and impacted natural resource management a utilisation Quota systems and social stratification led to considerable

diversity in the use of resources and also served to protect against the mismanagement and depletion of resources (Gadgil and Guha 1992).

According to Gadgil and Guha, (1992) the most serious consequence of colonial rule was the loss of traditional resource protection and management systems. British colonial rule recognized the importance of forests when it came to power in India in the early 1800s. War-related requirements for raw materials, the significant external demand for these resources and the expansion of the Indian railway made control over the forests strategically important. Land use became characterized by the transformation of resources into commodities and success became measured by money.

In 1864 the Forest Department was established and later the Indian Forest Act of 1865 was passed, which was eventually revised to the Indian Forest Act of 1878. The Act was intended to assert state control by demarcating forests into three categories: Reserved Forests, Demarcated Protected Forests (both state's controlled) and undemarcated Protected Forests (village forests). The primary goal of the state was to secure the forests to extract timber for its own benefit (Gadgil and Guha 1992). This observation concurs with Utting who states that 'All too often, contradictory policies are implemented. Governments simultaneously promote conservation and environmental degradation, and the result is one step forward and two steps back' (Utting, 1994).

African communities had conservation structures prior to colonialism and many of these are attributed to indigenous practices including good social networking and sharing of new ideas, community participation, use of low cost locally available materials in crop production and storage facilities, crop diversification and biodiversity conservation, caring abilities and high level of risk awareness Ngenwi, *et al*. (2010)

Conservationists have recently recognized that the establishment of most national parks and protected areas has had negative effects on their prior inhabitants. So powerful has been the notion that conservation is about preserving wilderness that conservationists have been intensely reluctant to admit that indigenous peoples and other residents have any rights in protected areas a realisation brought about due to the continued land degradation and deforestation despite conservation efforts (Ghai, *et 'al*, 1992).

However, most protected areas are inhabited, and forced relocations are not a thing of the past. In Uganda, for example, mass expulsions of forest dwellers and peasant settlers were recently carried out to create a wildlife corridor. Some 30,000-indigenous people living in the area were expelled without warning, leading to serious human rights violations, mass impoverishment, burning, looting, killing of livestock, and deaths of indigenous people (Ghai, *et 'al*, 1992).

Materially, most evictees are substantially worse off following removal from their original areas. The fact that compensation is usually inadequate, it is compounded by the fact that cash compensation is often squandered improvidently: indigenous people, unaccustomed to dealing with land as a saleable commodity, frequently fall prey to the unscrupulousness. (Ghai *et al*, 1992).

It is far from clear whether the social, political and environmental problems caused by 'transplanting' people out of protected areas are justified even in strictly environmental terms. Not only do relocations create a difficult political environment for the protected area to function within, but they also disrupt the neighbouring environments into which the people have been displaced (Ghai, *et 'al*, 1992).

People are confined to small and inappropriate land areas; traditional social institutions and patterns of land management and tenure, which previously regulated access to resources, are undermined. The net result is environmental degradation. The establishment of protected areas without considering the needs, aspirations and rights of local people may create ultimately insoluble social problems, thus threatening the long-term viability of the parks as much as the perceived threats which caused them to be established in the first place (Ghai, *et al*, 1992).

Nevertheless, the desire by the public to become more involved in the decision-making process of government has gathered pace over the past fifteen years or so. Historically, the responsibility for decision making in public life has been vested in elected representatives (politicians) and government agencies. The shift towards public involvement in the decision-making process is essentially a change in emphasis from substance what should government do to process how should choices be made (Ghai *et 'al*, 1992).

2.4.3. Financial and Economic Capital

According to Pretty, (1991) there have been decades of positive development effort yet the number of people subject to extreme poverty is increasing. Many are now faced with accelerating environmental degradation coupled with a growing immediate need to utilize natural resources to survive. Pretty observes that livelihoods are complex and must adapt rapidly in response to unpredictable environmental and economic change. It is averred that knowledge of these complex pressures and interlinkages is extremely limited. Yet people behave as if it was near perfect.

This observation can be explained by a development practice that has long been dominated both by the philosophy of positivism and the science of reductionism. Pretty (1991) argues that development assistance has always pursued the goals of a sustainable development. It is noted that if development is to be sustainable, it must begin with the participants who know most about their own livelihood systems they value and develop, (Pretty.*et al* ,1991).

Environmental degradation has variously been blamed on 'the ignorance and wastefulness of the poor'. Conventional wisdom has turned to the explanation that the poor are forced to over exploit the environment by factors outside of their control. The linkage between poverty and environmental degradation are of two main processes. First, environmental degradation is said to cause poverty because degradation involves the erosion of the resource base upon which the poor often depend for their livelihood, while the adverse impacts of environmental decline on people's health further limits their productive potential. Secondly, poverty is said to cause environmental degradation because the poor are forced into marginal resource areas: they are driven out of the best agricultural lands, for instance, and into fragile and unproductive ecosystems (Tham, 1992).

According to UNDP, (2010), there is ample proof of the inter-linkages between socio-economic status and the environment in Kenya. Kenyans who occupy the bottom rank of the socio-economic hierarchy heavily rely on the natural environment for their subsistence needs such as food and wood fuel and are more likely to exert extraordinary pressure on it. Further, hazardous landfills and incinerators are predominantly located in deprived neighbourhoods with the corollary that the residents are disproportionately affected by the resultant adverse health and environmental impacts.

Conversely, those who enjoy a privileged socio-economic status are more likely to display insatiable consumption patterns which inevitably put a strain on the country's environmental resources and generate a lot of waste, which is then dumped in the poor neighbourhoods. As such, even though elite Kenyans are the chief contributors of environmental degradation, their high-end locales are ironically generally lush, immaculate and pollution-free. The poverty environment nexus is a complex, mutually reinforcing one and is particularly relevant to Kenya which is characterized by rising income inequality, with a significant 46.6 percent of the population currently living below the national poverty line (UNDP, 2010).

Poverty exacerbates environmental degradation in Kenya in that one, it forces poor people to overexploit open-access natural resources which have little or no effective state or private regulation. Secondly, it compels the poor to inhabit or cultivate ecologically fragile landscapes such as forests, wetlands, lakeshores, hillsides and animal migration corridors, with disastrous consequences for biodiversity and ecosystems. Thirdly, it constrains the government and deprived communities to privilege short-term economic growth over environmental concerns (UNDP, 2010).

On the flipside, environmental degradation compounds poverty as disadvantaged sections of society are forced to occupy marginal rural lands or hazardous urban neighbourhoods and are consequently exposed to diseases with environmentally-mediated triggers such as asthma while those who live near landfills such as Dandora in Nairobi and Mwakirunge in Mombasa are predisposed to unfavourable conception outcomes such as miscarriages, stillbirths, congenital anomalies, low birth weight as well as organ cancers and leukaemia. Further, it disproportionately impacts the poor and aggravates their vulnerability to natural

disasters as they already live in squalor and only possess a limited repertoire of coping capacity. As such, deterioration of the environment further enmeshes the indigent in the poverty trap (UNDP, 2010).

2.5 Government Initiatives and Public Participation

Nature conservation may take the form of regulations limiting or prohibiting the exploitation of certain animal or plant species, mandating environmental protection measures to be carried out in conjunction with productive activities (for instance, requiring small farmers to undertake soil conservation activities) or prohibiting various activities that contribute to pollution (Utting, 1994).

The importance of forest to Kenya was realized by the colonial government in the 1900s. when in 1902 the first forest Department was set up and the first forest legislation was written to provide protection for the mangroves and a strip of land along the line of the railway. After the appointment of the first Conservator of Forests, the East Africa Forestry Regulations (1902) were published, supported by Forest Rules. The first reserved forests in Kenya were established in 1908. Trust forests were declared in those areas where it was considered that the local people were in effective occupation and were making regular use of the area. Areas with sparse population and only spasmodic land use were gazetted as Forest Reserves.

The first saw mill operating in government forest started in 1903 and the number of sawmills increased as the demand for construction timber increased in line with settlement. Initially, much of the timber came from natural forest areas that had been

granted to private settlers, but in 1910 the first systematic felling began in government forests with blocks of 250 acres (100 ha) felled on a 20-year cycle.

The Second World War created a major demand for timber, both locally and for shipment to the Middle East. There were supplies from the montane conifer forests. The more accessible areas were heavily logged and were later converted to forest plantations. Periodic revision of forest legislation took place. The Forest Ordinance was revised in 1941, and created nature reserves for protection within forest reserves. The first formal forest policy was published in 1957. Afforestation and conservation of forests in 'African areas' were encouraged, as management of privately-owned forests (Wass, 1995).

In Tanzania, the questions of politics and power are essential, because all nature conservation and environmental management efforts are inevitably projects in politics as well (Zerner, 2000; Wilshusen ,2003). The goal is to explore why the ideals on forest conservation, and especially the participatory approach, do not seem to work in practice as well as in theory, especially in areas considered as having high conservation status. In recent conservation discourse, there are also arguments against the applicability of participatory and development-oriented approaches to conservation areas (Wilshusen *et al*. 2002).

Proponents of community-based forest management and conservation stress that participatory approaches have too often seen local people just as “beneficiaries” and not as actual decision makers over forest use (Woodcock ,2002; Wily, 2002). Yet, shifting the responsibility and powers over conservation to the local level is often not a cheap and simple solution either, and is likely to contradict with the conservation objectives in many locations.

The promotion of participation usually requires both ample time and resources (Platteau & Abraham ,2002), and a careful consideration of the right way(s) to involve people. It seems that the problem of reconciling the conservation of forests and the needs of local people has not been solved, especially in areas with high conservation focus.

In Kenya, the government, through its institutions performs the dual role of planning and decision-making. It is charged with policy formulation. The policy formulation process on the other hand requires involvement of all those affected by such policy. In practice, this does not happen. In Mt. Elgon forest, the main resource users are the forest adjacent communities as is illustrated by the diversity of forest resources they exploit. The "People in Planning" model emphasizes the need for involvement of local communities affected by the plan.

The model stipulates that the experience and determination of local people in dealing with their environment is often neglected yet it is an important resource; that people will grasp development opportunities they themselves have helped to plan more readily than any that are imposed on them. The People in Planning approach would avoid the tragedy of the commons which would lead to what Hardin, (1968) refers to as the 'tragedy of the Commons'.

2.5.1 Policy Approaches to public participation in Environmental Degradation

The extent to which environmental degradation can be avoided in the process of development is itself a matter of contention. The governments of many developing countries assert that stringent environmental regulations would impede economic growth and thus slow poverty alleviation, and many economists agree. Social and economic

structures that encourage land concentration and capital accumulation, private land ownership and unrestricted land markets can be very damaging to the environment. This process is particularly obvious in parts of Latin America, where land accumulation and economic policies can create incentives for speculation and throw away patterns of resource exploitation, in which resources are mined for short-term profit.

Policies that decrease security of tenure for small farmers have also been implicated in environmental damage. Increasingly large numbers of people alienated from their land often migrate to areas which may be forested or more ecologically fragile (UNRISD, Geneva, 1994). Environmental problems develop because of the combined impact of many socio-economic, political, demographic and ecological processes. Except in a few villages studied in Pakistan and Uganda where rising population density has had an exacerbating influence, demographic dynamics have not generally been determinant in environmental change. In Costa Rica case studies have indicated that rapid environmental degradation such as deforestation and soil erosion can occur without having a high population density as a cause of land use and occupation (Ghimire, 1993).

An argument by Utting (1994) opines that there are three primary variants of the policy approaches commonly taken to address environmental degradation, although these often overlap. The first is conservationism, an environment-centred approach that is based largely on the assumption that human activities are detrimental to nature, and that thus seeks to control those activities. Second, a more people-centred approach, emphasizing the human costs of environmental degradation, has been advanced in recent years.

This approach, often called primary environmental care (PEC), assumes that human activity is not necessarily or inherently detrimental to nature, and that, given the

opportunity, people will often manage their environment sustainably because it is in their best interests to do so (Utting, 1994).

2.5.2 Government Action and Public Participation in Environmental Conservation

Public participation is a mechanism that involves the public in environmental decision-making. These include traditional participatory mechanisms such as public hearings, notice and comment procedures, and advisory committees as well as those considered more innovative such as regulatory negotiations, mediations, and citizen juries. Decision making is based on social goals, that are defined as those goals which are valued outcomes of a participatory process, but which transcend the immediate interests of any party in that process. The goals are: educating the public, incorporating public values and knowledge into decision-making, building trust, reducing conflict, and assuring cost-effective decision-making (Beierle ,1998).

The compelling reasons for inclusion of public participation in environmental conservation are advanced by Gelhorn who avers that public participation is viewed as fair conduct in a democratic system for the public to be involved in issues that affect them (Gelhorn, 1971; Fox, 1979; Shepherd & Bowler, 1997), Gelhorn asserts that it allows people to feel that their views and values are heard and are then incorporated into a programme or project (Brown, 1972; Buchy & Race, 2001), the public is less hostile and more actively involved in the project (Knaap, *et. al* 1998); and the local community is better able to understand its environment and intervene in environmental problems by applying past experiences (Lane & McDonald, 2005)

The public's interest in natural resources include collection of medicinal herbs; harvesting of honey; harvesting of fuel wood; grass harvesting and grazing; collection of forest produce for community based industries; ecotourism and recreational activities; scientific and education activities; plantation establishment through the plantation, establishment and livelihood improvement scheme; contracts to assist in carrying out specified silvicultural operations; development of community wood and non-wood forest based industries (GOK, 2016).

One of the reasons given for the lack of public participation is that experts, such as engineers, are reluctant to allow lay people to provide input and or to generate alternative solutions to problems (Enserink *et'al*, 2003). 'It is easier, quicker and more cost-effective to exclude the public from environmental impact assessments' (Shepherd & Bowler, 1997). Resource and time constraints inhibit public participation.

Project proponents are generally in a hurry to implement their projects and many hold the belief that public participation will alter their schedules or force them to revise project modalities O'Riordan & Stoll-Kleemann, (2002). Given that public participation has become an institutionalised process, it is imperative that public input should constitute a critical part of the project process. It would be erroneous to see it as a mere privilege, but rather, as means to an end Enserink & Monnikhof, (2003). According to Joekes, (1994) women in Kenya are particularly exposed to the negative consequences of environmental decline, but property and effective land use rights limit women's ability to take corrective action. Property restrictions on holdings managed by women militate against the optimal planting of trees (Joekes, *et'al*, 1994).

2.6 Nature of engagement with the Community

Land and forests are habitats occupied often by human populations which are growing every day. Most conservation efforts are found deficient when citizens' powers are not taken into consideration and Tokenism is prevalent. Conservation in Kenya is managed within a legal and policy framework that embraces state and non-state actors due to the diverse interests. Partnerships are therefore critical and enables negotiation and trade-offs with traditional power holders to promote full managerial options.

2.6.1 Involvement of Local Community in the Water and Forest Management

Community participation is now globally recognized as an effective strategy in the management of forest and water resources (UNEP, 2001). However, in developing countries and particularly Africa, forest and water management policies have in the past, largely failed to recognize the important role that Forest Adjacent Communities (FAC) can play in the management of the resources.

In Kenya, efforts to incorporate local communities in this resource management have not adequately recognized the variable nature of the water and forest adjacent communities. This has resulted in conflicts over the use and management of these resources (Odhiambo, 1998). Management of forests world-over have for a long time adopted the Yellowstone model of protected area approach (UNEP,2001).

This approach was used by most colonial governments in Africa and other parts of the world to establish national parks, forest reserves and other categories of resource conservation areas to ward-off human interference. Experience with this model has shown

that forest management policies, centred on legal regimes, increasingly exclude the interests of rural people.

Consequently, resources which were once utilized and regulated through traditional practices were removed from communal control and instead central control was instituted through enacting elusive laws, insensitive policies, and centralized institutions like the Kenya Wildlife Service and Kenya Forestry Department (now Kenya forest service), (Waas, 1995).

In this new arrangement, traditionally held tenure rights of use and indigenous knowledge and management techniques of local people have been ignored. Because of this approach, forest resources in most parts of the world are threatened by many problems including deforestation to create new land for agriculture, commercial ranching, settlement schemes, transport network and other major development projects. Forest fires, encroachment of forest reserves, live-stock grazing, timber and firewood collection by the local people have also contributed significantly to deforestation.

The Lack of involvement of the forest-adjacent community (FAC) through consultations in the policy formulation processes exacerbates these threats, as the community does not feel as part of the management team. At the same time, the local communities have often perceived government's forest management policies negatively, as being against their interests, and have therefore been indifferent to government-led conservation initiatives Castro, (1995). This has given clear indication that without local support, implementation of these state-based forest conservation initiatives, regulations and policies, is deemed to fail (Waas, 1995 :).

In Kenya, legislation concerning forests is comprehensive. It is spread over various Acts (e.g. Forest Act Cap 384 amended 2015, Wildlife Conservation and Management Act Cap 376, Plant Protection Act 324) but administered without central co-ordination, by a wide range of public bodies and individuals (Baraza, 1999; Bragdon, 1990; Odhiambo, 1998; Waas, 1994;). The government, through its institutions (Kenya Wildlife Service and Kenya Forest service) has not been able to adequately enforce law related to the protection of forests.

In Mt. Elgon and Kakamega forest, this is evinced by the illegal activities that still take place in the forest such as collection of firewood and logging of indigenous trees without permit. While consumptive activities are not allowed by the KWS in the National Park, firewood and poles are harvested in large amounts. Timber and wildlife poaching are common as huge parts of the forest are not patrolled. Ongugo & Njuguna, (1999) recognized the problem of overgrazing in the forest. They noted that over 300 heads of cattle and a similar number of goats and sheep grazed daily in the forest and caused damage to vegetation and ground cover.

The result has been conflicts between the community on one hand and the forest management bodies - KFS and KWS on the other. Penalties for infringing forest related Acts are usually very mild in comparison to the potential gains from illegal forest activities. At the same time, traditional rights of local communities to use forest resources are inadequately addressed in the legislation. The presidential decrees, which have been intended to stop fragrant breaches of the forest policy, are often not backed up by legislation, and are thus, in practice, difficult to enforce (Baraza, 1999).

The need to share the responsibility of forest management with local communities has however, gained momentum in the recent past. Only by sharing power with local communities can over-burdened national forest departments ensure the health and equitable development of national forest resources. As Wass, (1994) noted, there is fear on the side of the government that it might lose control over forests. This would mean loss of the revenue they generate and the more rapid loss of water catchment potential that accompanies deforestation.

Although community-based control system operated successfully in many forests in Kenya before colonial times, revival of the concept has not yet been officially explored and piloted as an alternative to the exclusive government management of indigenous trees without permit. The government of Kenya published the first National Environment Action Plan in 1994 which recommended the need for a policy, legal and institutional framework for management of the environment in Kenya. The Sessional Paper No. 6 of 1999 on Environment and Development drew attention to the myriad environmental challenges facing the country and the need for harmonization of approaches to address them.

In addition, EMCA (1999) (Amendment act 2015) was formulated and enacted, providing an avenue for the harmonization of about 77 environmentally related sectoral statutes. The Act entitles every person to a clean and healthy environment, while requiring each person to safeguard and enhance the environment. To assist in the implementation of environmental management policies at the grassroots level, Provincial and District Environment Committees (PEC and DEC) now County environment committees and

DECs now sub-county environment committees respectively, are established by section 29 of the EMCA and members are appointed by the Minister through a gazette notice.

The committees are responsible for the proper management of the environment within the Province or District in which they are appointed. The PEC and DEC are chaired by the Provincial Commissioner/Regional Commissioner and the District Commissioner/Deputy County Commissioner respectively. Since 2003 NEMA has initiated gazettement of 3 sets of PECs Now County environment committees and DECs now sub-county environment committees in the country, Environmental Management and Co-ordination (Amendment) Act, 2015(GoK 2015).

2.7 Civil Society Initiatives and Financial Support for Public Participation in Environmental Conservation

Few conservation agencies continue to believe that the establishment of protected areas will, by itself, assure the preservation of biological diversity: while protected areas attempt to isolate threatened areas from the forces destroying surrounding zones; they do not address the root causes of this destruction. Nevertheless, the creation and extension of protected areas absorb most of the funds of non-governmental conservation bodies. Protected areas also remain a priority for many international funding agencies as the most practical way of conserving the greatest amount of biodiversity (Ghai, *et al*, 1992).

Technical and other Support for public participation in Environmental Conservation is a lacking fundamental feature of Africa's water problems and is linked to poverty. Ndiaye (1993) observes that poverty has a tremendous impact. For many sub-Saharan countries,

since the oil crisis of the mid-1970s, economic performance has been poor and worsening, affecting mainly the agricultural sector (Mkandawire and Soludo, 1999).

Moreover, the World Water Forum, (2000) stressed that water and socio-economic development are mutually dependent. This study therefore contends that water is a valuable but vulnerable natural asset. When properly managed, it can be an instrument for poverty alleviation, economic recovery and economic growth, but when poorly managed water can be a limiting factor in poverty alleviation, resulting in poor health, low productivity, food insecurity, and constrained economic development.

Faced with this need for reform, the International Conference on Water and the Environment (ICWE) held in Dublin in January (1992) and the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, June (1992), recommended the Integrated Water Resource management (IWRM). These Dublin-Rio statements express a holistic, comprehensive, multi-disciplinary approach to water and forest resource worldwide problem solving and taking us from a sub-sectoral to cross-sectoral approach to water and catchment areas management. IWRM brings together a variety of disciplines and approaches and according to Sherbinin and Dompka, (1997) this represents a critical first step towards finding lasting solutions in water issues.

2.8 Conceptual Framework for the Study

The conceptual framework for the study was informed by a number of theories and models.

2.8.1 Arnstein's Ladder of Citizen Participation

Arnstein (1969) developed a typology of eight levels of participation, arranged in a ladder pattern with each rung corresponding to the extent of citizens' power in determining the end product. (Figure 2.1)

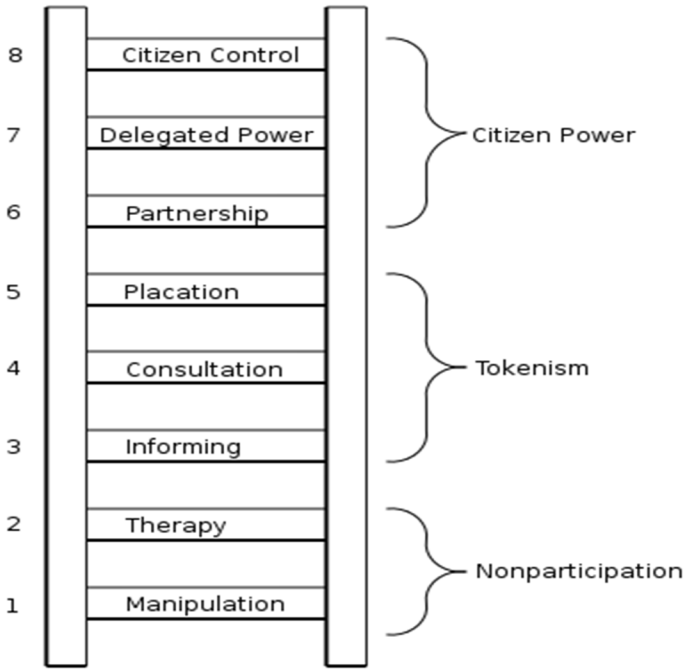

Figure: 2.1 Adopted from Ladder of Citizen Participation

Source: Arnstein's, (1969)

The bottom rungs of the ladder are (1) Manipulation and (2) Therapy. These two rungs describe levels of "non-participation" that have been contrived by some to substitute for genuine participation. Their real objective is not to enable people to participate in planning or conducting programs, but to enable power holders to "educate" or "cure" the participants. Rungs 3 and 4 progress to levels of "tokenism" that allow the have-nots to hear and to have a voice: (3) Informing and (4) Consultation. When they are proffered by power holders as the total extent of participation, citizens may indeed hear and be heard. But under these conditions they lack the power to ensure that their views will be heeded

by the powerful. When participation is restricted to these levels, there is no follow-through, no "muscle," hence no assurance of changing the status quo. Rung (5) Placation is simply a higher-level tokenism because the ground rules allow have-nots to advise, but retain for the power holders the continued right to decide.

Further up the ladder are levels of citizen power with increasing degrees of decision-making clout. (6) Citizens can enter into a Partnership that enables them to negotiate and engage in trade-offs with traditional power holders. At the topmost rungs, (7) Delegated Power and (8) Citizen Control, have-not citizens obtain the majority of decision-making seats, or full managerial power. This model was found appropriate for adoption to aid the study in identifying the level of participation in environmental conservation by individuals, state and non-state actors.

2.8.2 Theory of Tragedy of the Commons

Garret Hardin's challenging article in Science (1968), 'The Tragedy of the Commons' has been used to symbolize degradation of the environment to be expected whenever many individuals use a scarce resource in common. To illustrate the logical structure of his model, Hardin asks the reader to envision a pasture "open to all". He then examines the structure of this situation from the perspective of a rational herder. Each herder receives a direct benefit from his own animals and suffers delayed costs from the deterioration of the commons when his and others' cattle overgraze (UNEP, 2001).

Each herder is motivated to add more and more animals because he receives the direct benefit of his own animals and bears only a share of the costs resulting from overgrazing. Hardin concludes: "therein is the tragedy. Each man is locked into a system that compels

him to increase his herd without limit – in a world that is limited. Ruin is the destination towards which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons" (Hardin, 1968).

The forest resources in this case are regarded as “public goods” and hence can be seen as commons because they are meant for all, but not for anyone. This means that they can be used by all people neighbouring the forest and even those from far off the forest. The local community (the people who are the users) would want to maximize benefits from the forest resources such as timber, firewood, poles, grass etc. but would not want to invest in these resources as is illustrated by evasion of permit payments for resource extraction (UNEP, 2001).

2.8.3 Theory of Primary Environmental Care (PEC)

Primary Environmental Care is a process by which local groups or communities organize themselves with varying degrees of outside support so as to apply their skills and knowledge to the care of natural resources and environment while satisfying livelihood needs, Pretty *et al,* (1991), Supporting Primary Environmental Care, report operationalizing sustainable development at community level primary environmental care.

The approach to environmental degradation that has emerged from such renewed attention to the poor, and that calls for investing in local level resource management, is referred to as primary environmental care, PEC. This approach rests on the assumption that it is essential to focus on the grassroots or community level when making sustainable development operational (Holmberg *et’al*, 1992). There is no claim, however, that PEC alone is the answer to today’s environmental dilemmas. Primary environmental care is as

little able to solve all environmental and poverty problems as primary health care can solve all health-related problems.

However, like primary health care, primary environmental care is supposed to address the roots of the problem, and thus be more efficient than a curative or disaster relief approach to environmental problems (Holmberg *et'al*, 1992). This concept informed the study by further undergirding the concept of individual and community efforts to conserve the environment.

2.9. Conceptual Model for the Study

A conceptual model was developed illustrating the likely relationship between the variables of the study, namely the dependent and independent variables. The independent variables are essentially the factors that determine the level of public participation, namely individual livelihood factors (Human, Social and financial Capital Factors); Government agency and NGO factors.

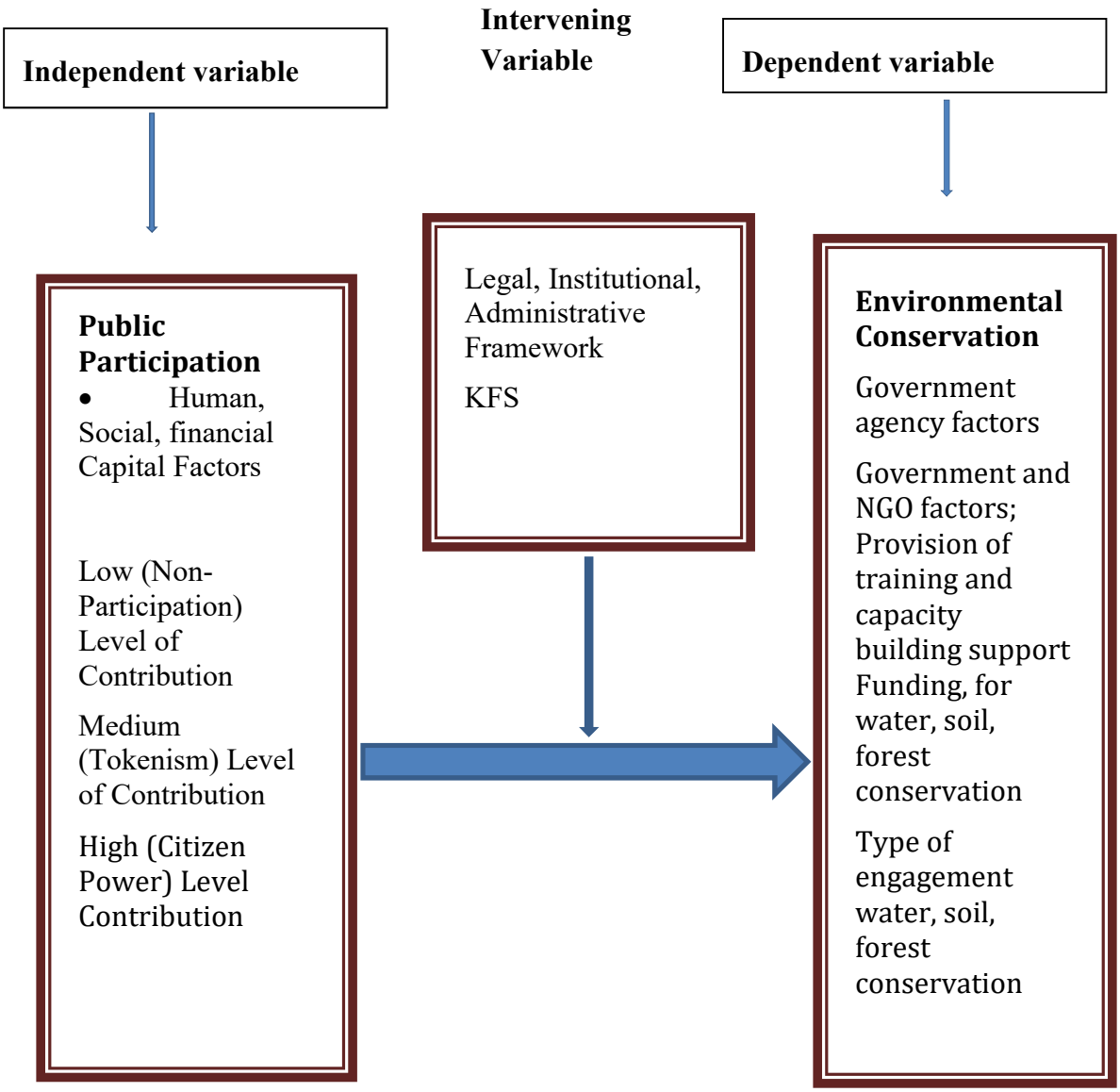

Figure 1.2. Conceptual Framework model

Source: Author, 2018

The governmental and non-governmental actor factors are essentially their provision of funding support, training and capacity building support, and of technical support. it also includes the type of partnership they engage in with the community. The independent variable for the study is public participation, which, in this study, is synonymous with the contribution of public participation to the conservation effort. The dependent variable is measured by the level of partnership participation of government and NGO influence on environmental conservation. The intervening variables in this case are the government policy framework and the administrative structures that can govern the degree to which the actors engage in conservation activities, thereby influencing the ability of the public to contribute.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology used in this study. Section 3.2 highlights on the area where the study was done. Section 3.3 looks at the design applied during the study while Section 3.4 described the population that was studied. In Section 3.5, a description of the sampling procedures that were employed to arrive at an appropriate sample size is given. Similarly, Section 3.6 discussed the data collection procedure and Section 3.7 highlighted the various methods of data collection that were used in the study, finally a method of data analysis that was employed in this study and ethical consideration is also discussed.

3.2 Study Area

The study was carried out in three Sub-Counties (Kakamega North, Kakamega East Navakholo) of Kakamega County in Western Kenya that lies about 30 km north of the Equator. The County headquarters is Kakamega town which is 52 km north of Kisumu. The study site focused mainly on Kakamega North, Navakholo, and Kakamega East which lies between Latitude of 00º 10’ N and 00º 21’ N and longitudes of 34º 47’ E at about 1600m above sea level. Kakamega North and Kakamega East are majorly covered by the Kakamega Forest and are drained by two rivers: Isiukhu to the north and Yala rivers to the South. The forest is the only remaining rain forest in Kenya and is the furthest east remnant of the Guinea-Congolean rain forest. The study also included Navakholo. Most of the population in this area depends on the forest products and water from River Lusumu. The study area is as indicated in the Figure 3.1 below.

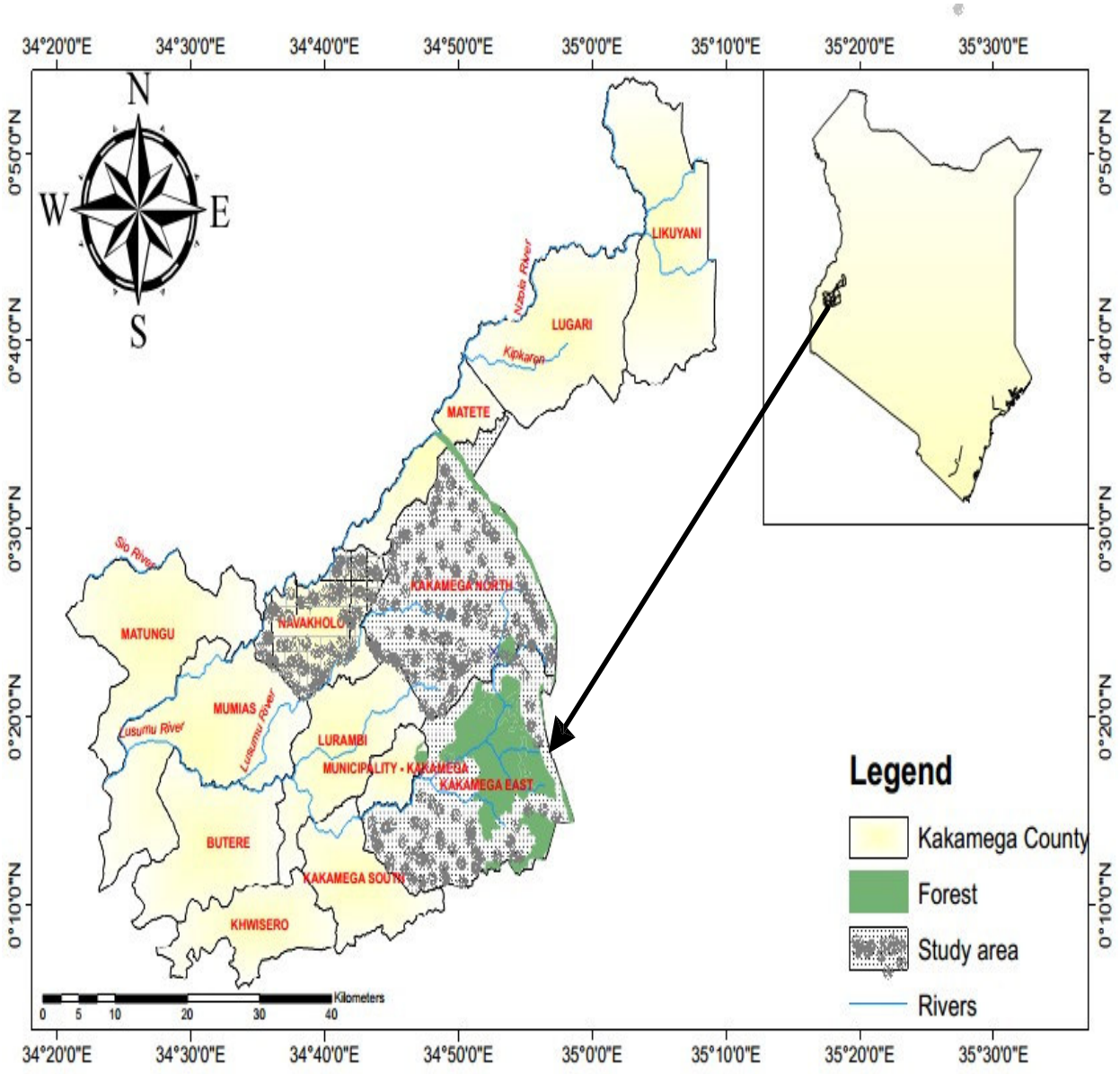

Figure: 2.1: The map of the Study Area

Source: GoK Kakamega County Integrated 2013

3.3 Research Design

The research designs adopted in the study were the evaluation and descriptive surveys. Structured questionnaire was used to collect data on the sampled population involved in environmental conservation as per the attached questionnaire. Qualitative information was collected through focus group discussions, through key informant interviews with selected government representatives and representatives of Non-governmental organisations, and through a direct observation guide. The survey described the factors that contribute to public participation in environmental conservation management in Kakamega County.

3.4 Study Population

The target population of the study comprised forest adjacent dwellers' household heads in Kakamega County. The study population also included agents of government departments (KFS, KWS, CEC) and representatives of non-governmental organisations (WRUAs, CFAs) involved in environmental conservation.

3.5 Sampling strategy and Sample size

Oso and Onen, (2009) defined a sample as part of the target population that has been procedurally selected to represent it. Kakamega county is spatially clustered by administrative boundaries and Stratified by population types including age, gender, occupation (beneficiary /service provider) and with probability samples of respondents (randomly and unbiasedly by apportioning an equal number of quantitative (questionnaires) and qualitative (KII and FGDs data collection tools) among the selected clustered sub-counties and Locations and villages inhabitant respondents), who provided

detailed information (Kothari, 2004). A multistage cluster sampling was used to arrive at a statically representative population. The sample size was determined by a probabilistic formula proposed by Fisher *et al, (1995)*. which yielded a sample size of 384. Using non-proportional cluster sampling, in each sub county, a randomising technique was applied in each location that was purposively selected for its proximity to the environmental resources of interest to the study.

Table:3.1 Specific Objectives and their Data Collection Instruments

Specific Objective	Measurable variable Indicators	Research Design
i. Determine the level of households' participation in environmental conservation in Kakamega	• Skills, Knowledge, Information and competence in Environmental Conservation • Number and type of Individual initiative in conserve environment • Adherence to environmental regulations and laws • Affiliation and level of participation in Government initiated environmental conservation activities • Affiliation to and level of participation in NGO initiated environmental conservation activities • Agricultural practices water conservation structures. • No of villages, sub-locations, locations, sub-county initiative environmental protection groups • No of WRUAs, CFAs • No of environmental protection and awareness meetings held • no. of Community and institutional structures.	Evaluation correlation
ii. Examine the influence of governmental and non-state actors' and community participation in environmental conservation in Kakamega County	Low (Non-Participation) Level of Contribution (1) Manipulation (2) Therapy Medium (Tokenism) Level of Contribution (3) Informing (4) Consultation (5) Placation High (Citizen Power) Level Contribution (6) Partnership (7) Delegated Power (8) Citizen Control	Evaluation /correlation

Specific Objective	Measurable variable Indicators	Research Design
iii. To evaluate strategies for public participation in environmental Conservation in Kakamega County	• Finance provided for water and forest conservation initiatives • Training and Capacity building availed to the community for water and forest conservation • Technical support provided to the community for carrying out water and forest conservation activities • Nature of partnership engagement with the community	Evaluation

Source: Researcher, 2018

3.5.1 Sample size Determination

The sample size was established using Fisher's *et al* (1995) which is probabilistic and applicable where the population (N) is more than 10,000. The study area had a population of 501,806 (GoK, 2009), hence the sample size was determined using the formula as given:

$$\mathbf{n} = \frac{\mathbf{z^2 pq}}{d^2} \qquad \textbf{Equation 1 (3.1)}$$

Where

n = desired minimum sample size

z = Standard normal deviation at 95% level of confidence set at 1.96

p= proportion of target population estimated to have the characteristics under investigation at 50% or 0.5

q= proportion of target population without the characteristics (q =1-p = 50%

or 0.5)

d= level of precision corresponding to statistical significance level set at .05

or 5%

Calculation for sample size

$$n = \frac{z^2 pq}{d^2}$$

1.96^2 (0.5* 0.5)/ $(.05)^2$ = 3.8416(0.25)/.0025 = 384.16, hence 384 households. To take care of non- response and spoilt questionnaires, respondents were targeted for the households.

Table: 3.2: Summary of research sample size.

Study Population Unit	**Sampling Method**	**Sample Size**	**Data Collection Instruments**	**Appendix**
Households	Multi-stage sampling, probabilistic	384	Household questionnaires	Appendix 1
Government agency representatives National, County Government, KWS, KFS	Purposive,	6	Key Informant Interview Guide	Appendix 2
Non-governmental Organization representatives CBO, Individual, private	Purposive	3	Key Informant interview Guide	Appendix 2 Appendix 3
Representative of Forest conservation association	Purposive	3	Key Informant interview Guide	Appendix 2
CBOs, FBOs, Other Ngo Reps	Purposive	3	Key Informant interview Guide	Appendix 2
FGD	Purposive	12 members	Focus Group Discussion Guide	Appendix 4
Observation	Purposive	10	Observation Checklist	Appendix 5

Source: Researcher 2017

3.6 Data Collection Instruments

The study used both primary and secondary data. The data collection employed both quantitative and qualitative tools which included a household structured questionnaire, key Informant Interview Guides, A Focus Group Discussion guide and an Observation guide.

Apart from the primary data sources, the study also made use of extensive secondary data. Secondary data were collected by reviewing reports from government reports, books, periodicals, journals, newspapers and magazines on water sector and water reforms in Kenya and other countries.

Secondary data helped to furnish a background fabric and context to the primary data and serve as a precursor to the primary data collection exercise. In addition, secondary data was useful in cross checking and confirming the primary data. Information obtained from secondary data was used to strengthen findings and draw conclusions. A household structured questionnaire with both (closed and open-ended queries) was the main tool for data collection.

3.7 Validation of the Research Instrument

Validity refers to sampling adequacy and representativeness of the instrument(s). Each statement on the constructed instrument was reviewed by experts in the field to determine the extent to which it was appropriate (Nachmias and Nachmias, 2002). Construct validity relates a measuring instrument to general theoretical/Conceptual framework in order to

determine whether the instrument is tied to concepts and theoretical assumptions they are employing (Nachmias and Nachmias, 2002, Babbie, E. and Mouton, (2010).

The instruments were pre-tested and comparisons with real field data, through correlations, made." Validity indicates the degree to which it measures what it is supposed to measure (Kothari, 2007). In this research, during the questionnaire's construction, quality control and validity was ensured through: Face validity, where the instrument is subjected to the Master Degree Supervisors to check whether it would measure what it is intended to measure, who also checked the content validity, as the instrument was designed according to the study variables and their respective indicators of measurement , Construct validity, was maintained through restricting the questions to the conceptualizations of the variables and ensuring that the indicators of a particular variable fall within the same construct.

3.7.1 Reliability of the Research Instruments

According to Nachmias and Nachmias, (2005), reliability is defined as the extent to which a measuring instrument contains errors that appear inconsistent from observation to observation during any one measurement attempt or that vary each time a given unit is measured by the same instrument. A measuring instrument is reliable if it provides consistent results (Kothari, 2007).

Reliability was checked through test/retest method where the researcher carries out two different tests using the same tool. The same tests were subjected to the same group of people but after a difference of two weeks (Mugenda and Mugenda, 2003). The survey

instruments, through piloting and use of SPSS (version 20) on the data, were subjected to overall reliability analysis and yielded a statistic of 0.7 from the Cochran's Alpha test for reliability. which confirmed the co-efficient of correlation results yielded a value of zero, or below 0.7%, it indicated that there was no relation. In Cochran's Alpha test a value of 1.0 indicates a perfect match, and any value above 0.7% demonstrates that there is a positive correlation and therefore that the tool is reliable.

A pilot study was carried out to facilitate testing the reliability of the data collection instrument. It was carried out in Mumias East sub county, which is adjacent to one of the study clusters, and bears similar characteristics with regard to environmental issues;

The pilot sample size was 10% of the main study sample (38) which the researcher rounded off to the nearest 10. Hence the sample size was 40 respondents. The pilot demonstrated that the tool was reliable in collecting the desired information according to the constructs of the study and regarding influencers of community participation in environmental conservation. It was also found that the data as envisioned in the conceptual framework, and as captured by the qualitative tools, was available and could readily be accessed from within the community.

3.8 Data Analysis and Presentation Techniques

Descriptive and Inferential statistics (correlation analysis) was used to analyse the data collected. Closed questions were analysed through the help of the Statistical Package for Social Science (SPSS) version 20 computer software by assigning numbers to responses. This is approved by Gliner and Morgan, (2000) as they find it efficient and it gives straight formal analysis on practically all possible results. Open ended questions were analysed

through percentages, frequencies and the results were presented in Tables, pie charts and bar charts.

The study used both the Probit model and variability analysis of data through Means and standard deviation to establish relationships among determinants of environmental conservation and public participation in the County, from qualitative data collected from residents and, key stakeholders.

A probit model is a type of regression analysis where the dependent variable can only take two values, coming from probability unit. Pearson's correlation coefficient is a statistical measure of the strength of a linear relationship between paired data. It is denoted by r and is by design constrained as follows

$$-1 \leq r \leq 1$$ **Equation :3.2**

Furthermore:

- Positive values denote positive linear correlation;
- Negative values denote negative linear correlation;
- A value of 0 denotes no linear correlation;
- The closer the value is to 1 or –1, the stronger the linear correlation.

The Spearman's rank-order correlation is the nonparametric version of the Pearson product-moment correlation. Spearman's correlation coefficient, (ρ, also signified by r_s) measures the strength and direction of association between two ranked variables.

Where Pr denotes probability, and Φ is the Cumulative Distribution Function (CDF) of the standard normal distribution. The parameters β are typically estimated by maximum likelihood.

The Means procedure calculates subgroup means and related univariate statistics for dependent variables within categories of one or more independent variables. Optionally, you can obtain a one-way analysis of variance, etc, and tests for linearity.

3.9 Ethical Considerations

This research is a contribution to better management of public affairs and it bears information impacting on operations of all people interviewed. All necessary ethical considerations were observed. The researcher and the research assistants, throughout the course of the study, adhered to laid down rules and regulations of data collection, processing, and confidentiality of information. Participants in the study were treated with due respect, and none were included without their express consent. Participation of individuals in the research was on a voluntary basis; every participant involved in the study was informed of the objectives, methods and benefits of the research and his or her right to refuse participation in the research or to terminate participation at any time. University authorization to conduct the study was obtained, and a research permit obtained from the National Council of Science, Technology and Innovation (NACOSTI). Data collection commenced after approval of the proposal by Directorate of Graduate Studies (DGS) and NACOSTI. Neither pressure nor inducement of any kind was applied to the respondents. Interviews were conducted in confidence.

3.10 Assumptions of the study

The study made the following assumptions:

i. There were environmental conservation efforts made by individual community members, and the level of participation is dependent on the livelihood structure of the individual households.

ii. Government agencies and non-governmental organisations engaged in environmental conservation initiatives engaged with the community in various ways which constituted varying levels of public participation

iii. Respondents would be available and willingly provide truthful responses, and that all the selected civil society organization representatives would be available for interview

3.11 Limitations of the study

The limitations to the study and proposed ways to overcome them are as follows.

i. Access to all the respondents was a limitation since it was not known when they would be available and there was also need to use local enumerators who had to be trained in data collection methodologies. Further bureaucracy was a challenge to get interviews from the Sub-county and county environmental committees. These were eased by the authorisation letters obtained alongside the NACOSTI permit.

ii. The government officers and representatives of Civil Society Organizations that participate in environmental conservation were reluctant to divulge information that they may felt is of a sensitive nature. The limitation was overcome by reassuring them of anonymity.

iii the community members who participate in environmental degradation were reluctant to confess their malpractices, or lack of involvement in conservation efforts. This limitation was overcome by reassuring the participants that the information was for academic purposes, and that their identity would be anonymous.

3.12 Summary of Research Design and Data Analyses

Table:3.3: Summary of Research Design and Data Analyses

Specific objective	Variables/Measurable Indicators	Research Design	Data Analysis Method(s)
i. Determine the level of households' participation in environmental conservation in Kakamega	• Skills, Knowledge, Information and competence in Environmental Conservation • Number and type of Individual initiative in conservation environment • Affiliation and level of participation in Government initiated environmental conservation activities • Affiliation to and level of participation in NGO's initiated environmental conservation activities • Agricultural practices and water conservation structures. • No of local initiative environmental protection groups • No of WRUAs, CFAs • No of environmental protection and awareness meetings held	Descriptive survey	Descriptive& inferential statistical analysis

Specific objective	Variables/Measurable Indicators	Research Design	Data Analysis Method(s)
	no. of Community and institutional structures.		
ii. Examine the influence of governmental and non-state actors' and community participation in environmental conservation Kakamega County	Low (Non-Participation) Level of Contribution (1) Manipulation (2) Therapy Medium (Tokenism) Level of Contribution (3) Informing (4) Consultation (5) Placation High (Citizen Power) Level Contribution (6) Partnership (7) Delegated Power (8) Citizen Control,	Descriptive survey	Descriptive& inferential statistical analysis
iii. To evaluate strategies for public participation in environmental Conservation Kakamega County	• Finance provided for water and forest conservation initiatives • Training ad Capacity building availed to the community for water and forest conservation • Technical support provided to the community for carrying out water and forest conservation activities • Nature of partnership engagement with the community • Traditional Agricultural practices and water conservation structures information knowledge, practices adopted mitigation strategies	Evaluation	Document analysis/ Descriptive& inferential statistical analysis i.e. spearmen's statistics

Source: Researcher, 2017

CHAPTER FOUR: THE LEVEL OF HOUSEHOLDS' PARTICIPATION IN ENVIRONMENTAL CONSERVATION IN KAKAMEGA COUNT

4.1 Introduction

Chapter 4 presents a detailed individual livelihood factors that affect the contribution of public participation in environmental conservation. The findings serve to fulfill the first objective of the study which entails examining the human capital, social as well as economic capital of individual community members living around key environmental resources in Kakamega County.

4.2 Demographic information of Participating community in Kakamega county

Demographic and socio-economic information provided data regarding the research participants' gender, age, income, employment status was used to determine whether the individuals in this study were a representative sample of the target population and that findings could be generalized for Kakamega county's geographical population as an aggregate picture of the population.

4.2.1 Age of Respondent

The findings indicate that the youth interact more with the environment. Van Liere *et al* (1980) and Fransson *et al,* (1999) state that younger people tend to show more concern about environmental quality than elders. Most studies reported that age is negatively correlated with different environmental concern measures applied, which could be suggested that age influence environmental conservation initiatives. Figure 4.1 shows the study findings on age distribution of forest adjacent dwellers in Kakamega county.

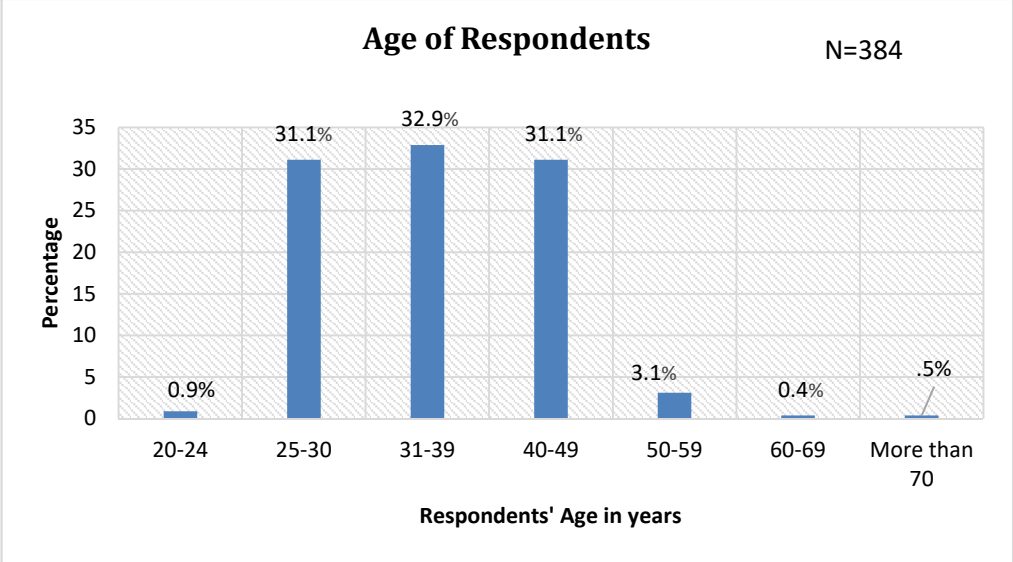

Figure: 3.1 Age of Respondents in Kakamega county
Source; Researcher (2017)

The age of the respondents from the findings showed that 32.9% were in the 31-39 age bracket, 31.1% were in age bracket 25-30. Equally, another 31.1% were in the age bracket 40-49, 3.1% in the age bracket 50-59, 0.4% in the age bracket 60-69 whilst only 0.9% in the age bracket 20-24, 0.5% were in age bracket of more than 70 years.

A significant finding of the study indicates that gender and age differences plays a role in rights and access to natural resources, including land, trees, water, and animals. According to Rocheleau, (1996) women have fewer natural resource ownership rights than men and amongst the males, age plays a significant role in the ownership of natural resource based on land rights,

Males who are 35 and above enjoy more land resource use rights upon marriage than males below 35 years of age. The study findings concur with Rocheleau, (1996) who also found that age-sets relationships with the male household heads often mediates access to land based natural resource.

The study findings Table 4.1 shows that the mean and standard deviation among higher age brackets has a negative relationship to concern for environment.

Table: 4.1 Mean and standard deviation of demographic characteristics of the study area

Characteristics	Mean	Std. Deviation	N
Respondents Gender	1.41	.493	384
Age of respondents	2.07	.943	384
Main source of income	2.68	1.036	384
level of education	3.21	1.154	384

(Source; Researcher, 2017)

In addition, evidence indicated that income and education level significantly affect the degree of individual's environmental participation. The observation checklist showed a huge turnout of youth for conservation related activities. Plate 4.1 shows Youth playing a very active part in environmental conservation and contributing greatly in reforestation efforts to reverse land degradation and deforestation.

A key informant during FGD stated that

> "on our land it is only our father who can plant trees, women and children are not allowed to plant trees as it is the man who plans and allocates land for various uses such as cultivation, planting and cutting down trees"

The study further found that youths are mostly exposed to environmental conservation during national tree planting exercises when school going youth are actively involved in reforestation as shown in Plate 4.1

Plate: 4.1 youths and the researcher during Tree planting exercise in Kakamega county
Source Researcher (2017)

4.2.2 Gender

The study findings on House head gender parity of the forest adjacent dwellers in the Kakamega county are shown in Figure 4.2.

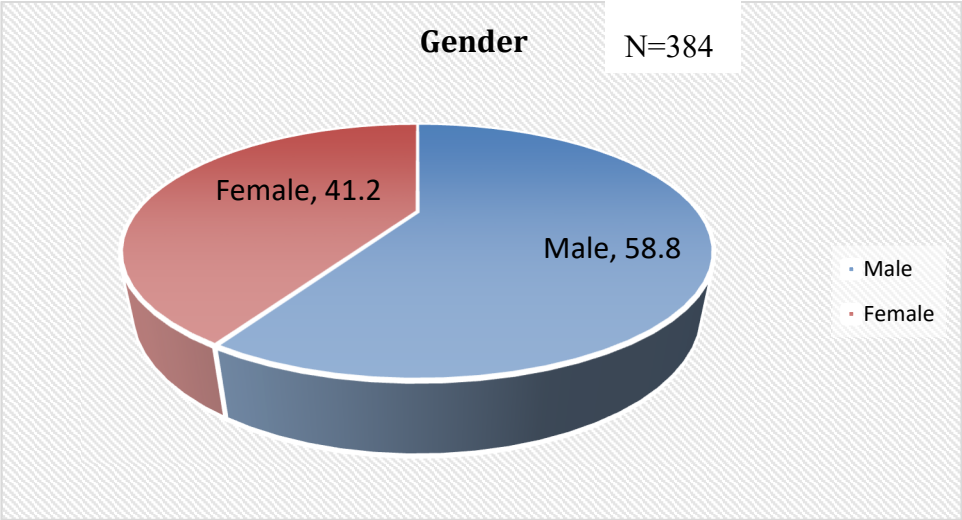

Figure: 4.2 Gender composition of study area
Source; Researcher, (2017)

A majority of the household heads interviewed were male with 58.8% representation whilst 41.2% of the households were headed by females. Study findings show a parity in gender distribution of household heads indicating that close to half of all households amongst forest adjacent dwellers are of either male or female gender, this finding that the two genders have equal access to environmental conservation concerns.

The study found that house hold heads gender parity amongst the forest adjacent dweller respondents was not equal, in some instances females represented the male house hold heads who were absent from the homestead in formal or business engagement and in some cases widowed or divorced (Figure 4.3) but according to Sachs ,(2007) land tenure systems play a large role on the level of environmental conservation , “insecure tenure reduces incentives to make the improvements in farming practices necessary to cope with

environmental degradation". "Women household heads remain at a particular disadvantage in terms of access to land, water, and other natural resources" (Agarwal 2003; Enarson and Meyreles, 2004; Sachs, 2007).

4.2.3 Marital Status and Parity (household size)

The study findings Figure 4.3 shows the household head marital status amongst forest adjacent dwellers.

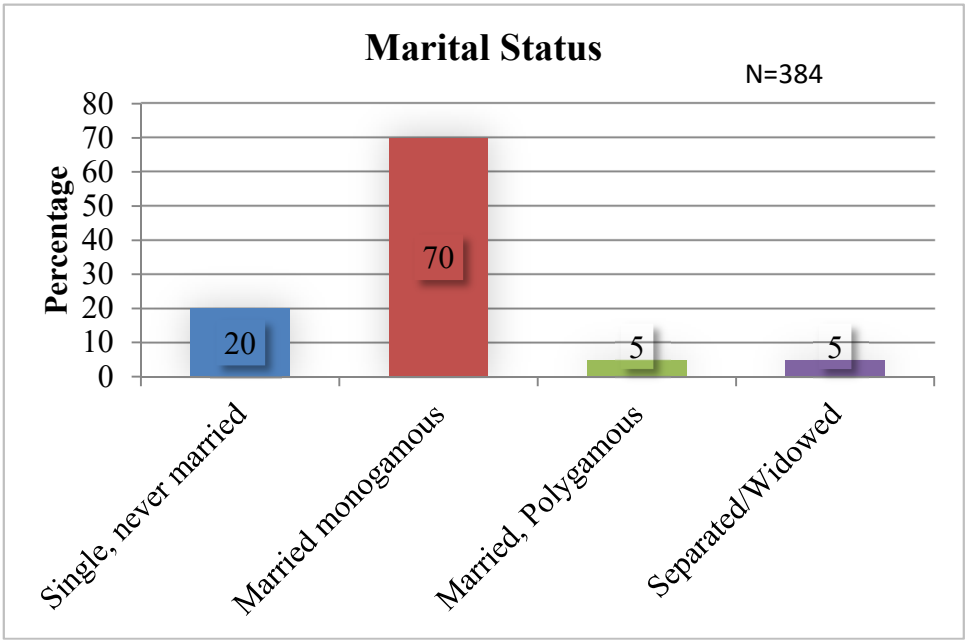

Figure: 4.3 Marital status of respondents in study area
Source; Researcher, (2017)

Majority of the respondents interviewed 70% had a monogamous marriage relationship and 20% of were single, 5% reported married polygamous whilst 5% reported to be separated, divorced or widowed/widower.

The study findings concurred with Agarwal *et al*, (2003) that Women land-use rights were de facto and were mediated by their relationships with men. Thus, when women are widowed or divorced, they may lose these rights. Land rights use by women consisted of

harvesting fuelwood (branches and limbs from trees), fodder for few livestock, and land tillage for food for the well-being of their households whereas men had men's de jure ownership rights and can harvest trees, sell and lease land depending on the land tenure the study found that adjudication of lands (private land ownership and the depletion of common property resources poses a severe threat to the livelihoods and food security of poor rural women and men.

4.2.4 Composition of household

The study evaluated the household size to establish composition and population estimates as shown in Figure 4.4

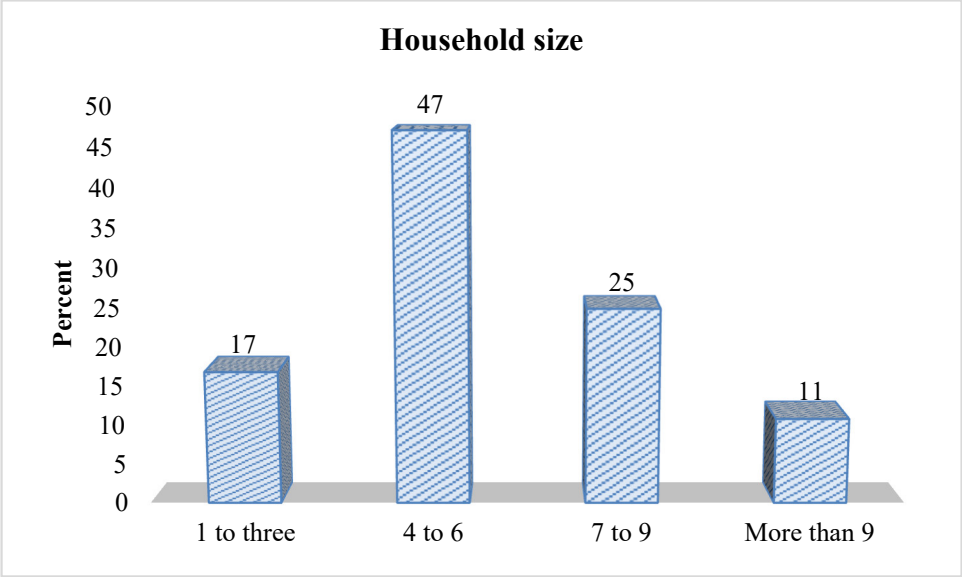

Figure :4.4 Composition of household sizes in forest adjacent dwellings Kakamega *county.*

Source; Researcher, (2017)

Majority of households' heads interviewed revealed that 47% had a membership of between four to six members, 25% of the respondents reported a household membership

of between seven to nine members, 17% reported a membership of between one to three members whilst 11% reported having more than nine members in the house.

4.2.5 Human Capital and Individual Participation in Community Participation

Human capital, the first element that comprises a livelihood, not only depends on skills, education, knowledge levels, but also on the health of a person. These factors influence the ability of an individual to participate in environmental conservation (Chambers and Conway, 1992).

4.2.6 Education and knowledge

The UN declared 2005 to 2014 the Decade of Education for Sustainable Development; the overall goal was to utilize education as a means of integrating the principles of sustainable development with human values and perspectives to create a sustainable society (UNESCO, 2005).

4.2.7 Knowledge of environmental conservation in Kakamega county

"Systematic training and instruction are designed to impart knowledge and develop skill" (OED, 1990), both the acquisition of knowledge and the ability to evaluate that knowledge. Through knowledge, changes in behavior at a personal, societal and global level will occur (UNEP, 2001). An awareness or sensitivity to the environment knowledge and experience of the problems surrounding the environment, to acquire a set of values and positive attitudes, to obtain the skills required to identify and solve environmental problems and, the motivation and ability to participate (Jacobson *et al*., 2006).

Figure 4.5 shows study findings indicating environmental conservation competences of forest adjacent dwellers in Kakamega County, Kenya.

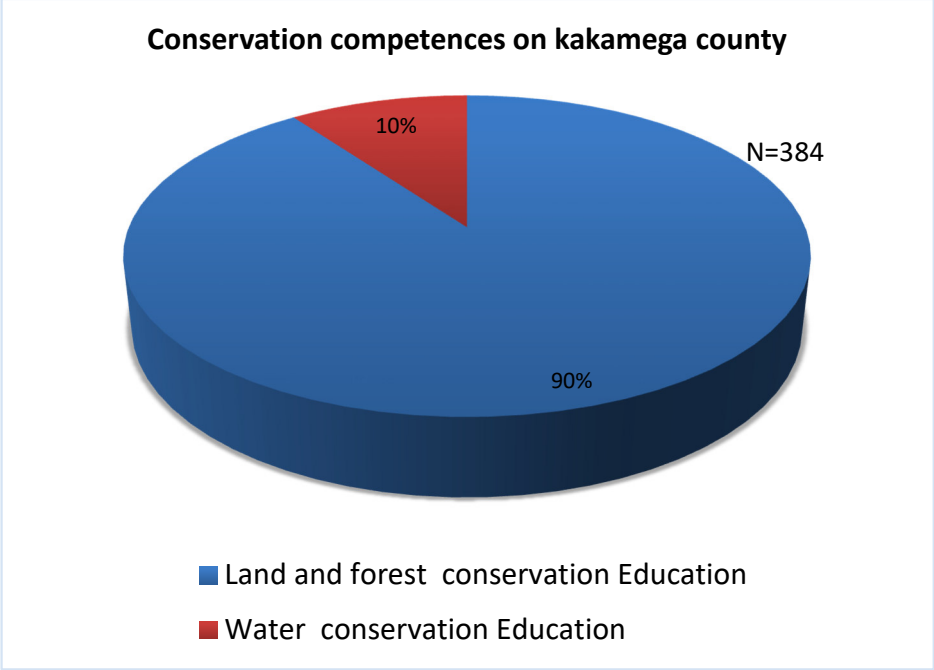

Figure: 4.5 Community competences in environmental conservation Kakamega county

Source; Researcher, (2017)

The study found that 90% of forest adjacent dwellers respondents have land and forest conservation education whilst 10% had water conservation education. These findings show a concentration of and emphasis on land and forest conservation education, and a lower concentration on water conservation education among government agencies and NGO stakeholders in Kakamega county.

According to UNDP, (2010), "The starting point for reducing disaster risk lies in the knowledge of the hazards and the physical, social, economic and environmental vulnerabilities"– Hyogo Framework for Action 2005-2015.

The study findings concur with FAO,(2005) and revealed that the Traditional indigenous knowledge of local people held tenure rights of use and management techniques of forest

resources in most parts of the world and was evident in Kakamega county Figure 4.5 ,which showed that neglect of this knowledge led to land degradation problems that included deforestation to create new land for agriculture, settlement schemes, transport network and other major development projects. The study noted that other factors that deviated from indigenous traditional knowledge practices such as setting aside of huge forested land and Forest fires, encroachment of forest reserves, live-stock grazing, timber and firewood collection by the local people (Figure 4.20) had also contributed significantly to deforestation (FAO,2005).

4.2.8 Vulnerability and risk assessment in Kakamega county

The study findings in Table 4.2 reveal level of environmental vulnerability and risk assessment by government agencies, NGOs and other stakeholders in Kakamega county.

Table: 4.2 Frequency of vulnerability and risk assessment in Kakamega county

N=12	**f**	**%**
Rarely (once or twice in the past three months	3	25
Sometimes (three to ten times in the past one year)	5	40
Often (more than ten times in the past one year)	4	35

Source; Researcher (2017)

A Key Informant interview during FGD established that vulnerability and risk assessments of land degradation are rarely carried out according to 25% participants and 40% participants observed that sometimes (three to ten times in the past One year), whilst 35% participants said that vulnerability and risk assessments of land degradation are carried out Often (more than ten times in the past one year).

4.2.9 Attitude of Community Regarding animals and plants in Kakamega County

The study sought to establish the attitude of the public regarding environmental conservation, particularly with regard to plants and animals which are important aspects of biodiversity. The findings are displayed in Figure 4.6

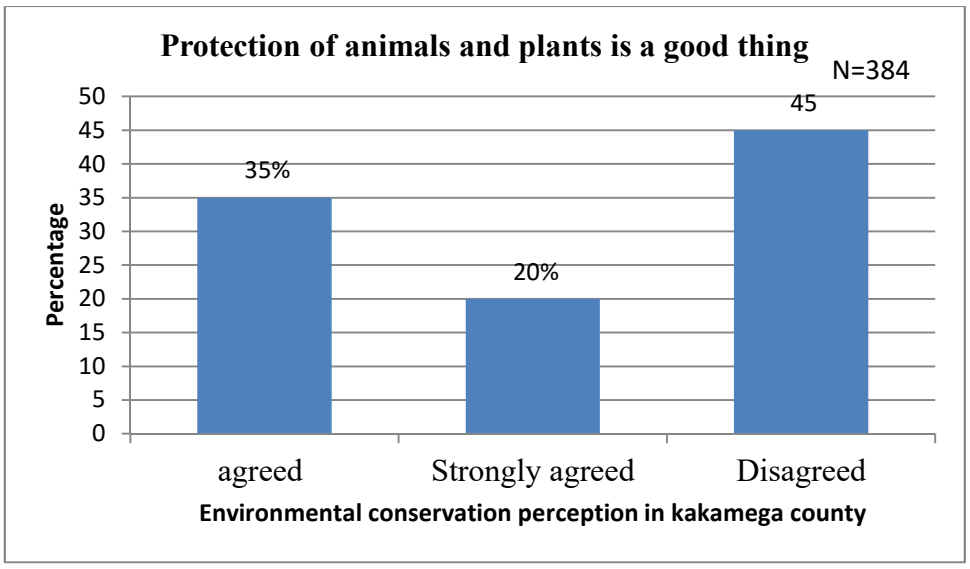

Figure :4.6 Attitude of public regarding the protection of animals and plants in Kakamega county
Source; Researcher, (2017)

The study found that the majority 35% agreed that the protection of animals and plants were a good thing, 35% indicated that they agreed and 20% strongly agreed, whilst some 45% disagreed, this finding indicated a positive perception by the community on environmental conservation.

The study findings Table 4.3 shows the availability of Training manual and materials on Environmental Conservation to Central Government Administrators, KFS and KWS Key informants in Kakamega county

Table: 4.3 Training manual and materials on Environmental Conservation

Training manual and materials on Environmental Conservation		
N=12	**F**	**%**
Yes	10	90
No	2	10

Source; Researcher, (2017)

The study findings on the technical tools available to government agents and NGOs revealed during Key informants' interview, that 90% Key informants have Training manual and materials on Environmental Conservation and 10% do not have any training manual or material.

4.2.10 Correlation of Age and knowledge

The study findings Figure 4.7 shows the age groups between the age group 40-49 are involved more in conservation activities; 45% also scored highly on the advocacy role of environmental committees versus a lower score for the 20-39 age group; 25% of these findings are corroborated by the findings of Van Liere *et al* (1980) which found that the youth interact more with the environment and Fransson *et al* (1999) who states that younger people tend to show more concern about environmental quality than elders. Most studies reported that age is negatively correlated with different environmental concern measures applied, which could be suggested that age influence environmental conservation initiatives.

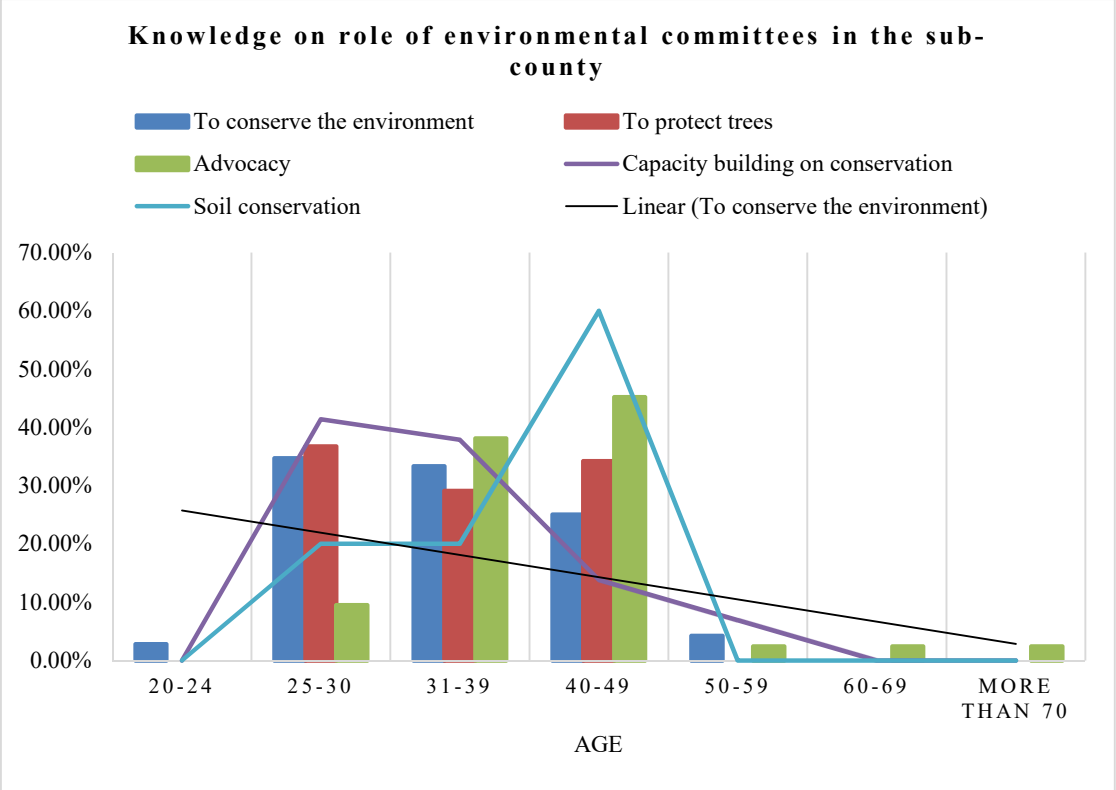

Figure :4.7 Age and knowledge of environmental committees in the study area

Source; Researcher, (2017)

The forest adjacent dweller respondents aged between 40-49; 60% are most knowledgeable about environmental committees and their roles in soil conservation whilst most respondents aged 20 to 39; 20% were more concerned that environmental committees should engage in capacity building on environmental conservation,

4.2.11 Competences in environmental conservation

The study findings Table 4.4 shows frequency of Trainings and seminars on Environmental Conservation for Key informants in Kakamega county

Table: 4.4 frequency of Trainings and seminars on environmental conservation in Kakamega county

		Frequency of Trainings and seminars
N=12	**f**	**%**
Rarely (once or twice in the past three months	2	15%
Sometimes (three to ten times in the past One year)	8	55%
Often (more than ten times in the past one year)	4	30%

Source; Researcher, (2017)

The study findings reveal that capacity building, trainings and seminars were held for KWS, KFS, National and county administration officers and NGO/CFA (8) 55% Sometimes (three to ten times in the past One year) (F-4) 30%, Often (more than ten times in the past one year) (f-2)15% Rarely (once or twice in the past three months)

Studies by UNEP show that capacity building trainings and seminars brings changes in behavior at a personal, societal and global level through knowledge, (UNEP, 2001).this is further averred by Jacobson *et al*., 2006) who observes that awareness or sensitivity to the environment and experience of the problems surrounding the environment, help to acquire a set of values and positive attitudes, enables the acquisition of skills motivation and ability required to participate in identifying and solving environmental degradation problems.

4.3 Public participation factors in Kakamega County

Community-based conservation is a conservation movement that emerged in the 1980s through escalating protests and subsequent dialogue with local communities affected by international attempts to protect the biodiversity of the earth. The objective of community-

based conservation is to incorporate improvement to the lives of local people while conserving areas through the creation of national parks or wildlife refuges. Community-based conservation has often been ineffective because of inadequate resources, uneven implementation, and over-wishful planning.

4.3.1 Morbidity and Ability to Work in Environmental Conservation Initiatives

The study findings Figure 4.8 shows morbidity and health status of forest adjacent dwellers to enable them participate Environmental conservation in Kakamega county

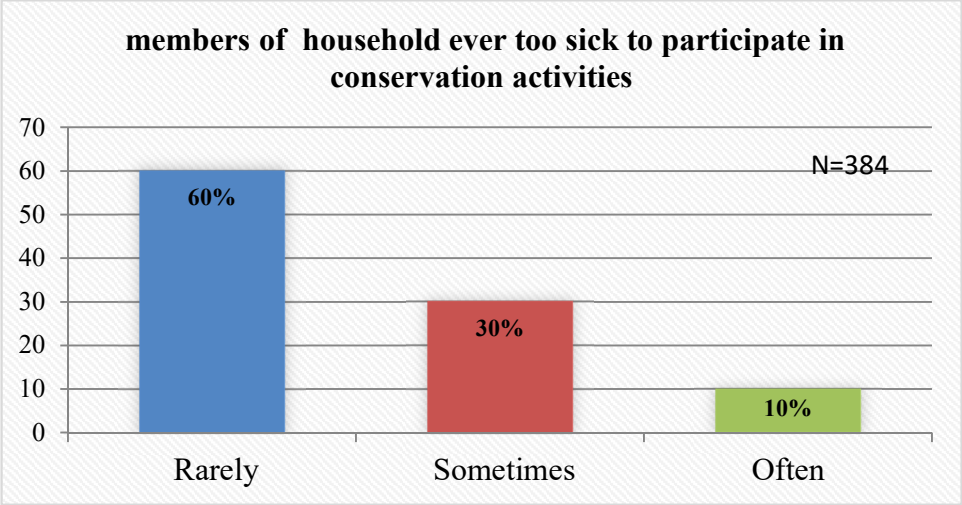

Figure:4.8 Members of household ever too sick to participate in conservation activities in Kakamega county

Source; Researcher, (2017)

The research established that of the 30% Members of households were sick sometimes whilst 10% were sick often, and were ever unable to participate in conservation activities due to illness whereas 60% of the respondents were rarely sick.

The study findings show that the morbidity and ability to work in environmental conservation initiatives and in particular according to Jumbe and Angelsen, (2007) the women's inordinate work burden and role as providers of family food, fuel and water

bring them into close contact with the environment, are disproportionately affected by eco-crises. This study finding further reveals the limited role and involvement of women in decision making on land use resource that leads to land degradation and restricted role in environmental conservation efforts thus far in Kakamega county (Jumbe and Angelsen, 2007).

The study findings plate 4.2 shows the Researcher with women and men members of the public during tree planting for reforestation.

Plate: 4.2 Members of public with researcher during tree planting exercise in Kakamega County.
Source Researcher (2017)

The study found that the public are willing to participate in conservation efforts when sensitized and called upon to plant trees to cover areas that have been deforested as seen in plate 4.2.

The study findings Table 4.5 shows frequency of Trainings and seminars on Environmental Conservation for Key informants in Kakamega county

Table :4.5 Sensitize the community on Environmental Conservation in Kakamega

Frequency of Sensitization on Environmental Conservation

N=12	F	%
Yes	10	90
No	2	10

Source; Researcher, (2017)

Study findings from KI interview established that participants 90% key informants acknowledged that they Sensitize the community on Environmental Conservation whilst 10% did not do any sensitization in the community.

4.3.2 Social Capital and Individual Participation in Environmental Conservation

Social capital, the second element in livelihoods, refers to the individual's belonging or benefitting from social structures such as schools, religious organisations and community groups. The social capital with regard to environmental conservation can manifest by way of funding for conservation activities or through training to build capacity. Such organisations need to make themselves widely known and available to the community they portend to help.

4.4 Knowledge of existence of environmental committee in Kakamega county

The study findings on awareness of environmental committees in their area, Figure 4.9. reveal that 59% of the respondents had knowledge of environmental committee member and 37% did not know of any environmental committee member 4% had no response.

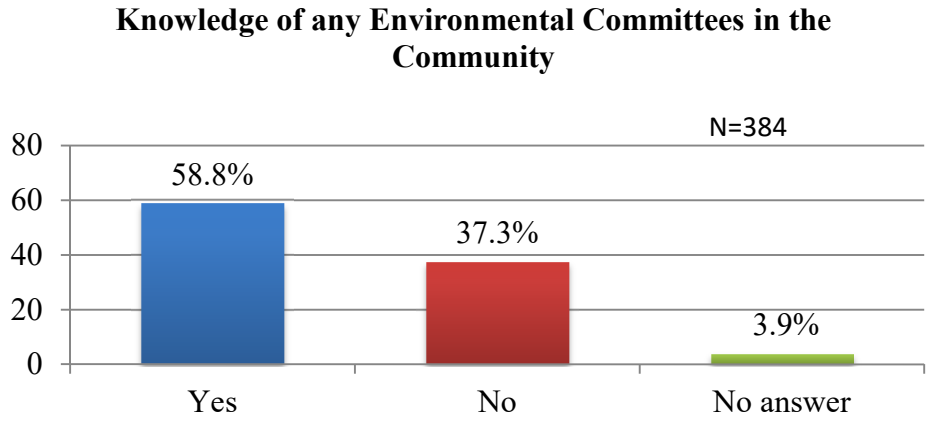

Figure: 4.9 Environmental Committees in the Community
Source; Researcher, (2017)

The research established that the community of forest adjacent dwellers are aware of the existence of environmental management committees, a finding that concurs with study by Mamo (2013) concurring that the creation of ECCs were essential at the grassroots' levels for awareness and sound environmental conservation / management.

The study also inferred the correlation of knowledge of any environmental committees in the community and Opinion on importance of environmental committees in the sub-county significant probability value of .044 below the 0.5 threshold of 95% confidence of probability.

4.4.1 Budgetary allocation for environmental conservation in Kakamega County

Budgetary allocations are integral components to an annual financial plan, or budget, of all organizations. They indicate the level of resources an organization is committing to a department or program. Without allocation limits, expenditures can exceed revenues and result in financial shortfalls. The research sought to establish sources of funding

And budgetary allocations by various stakeholders, the question was put to respondents as in Figure 4.10

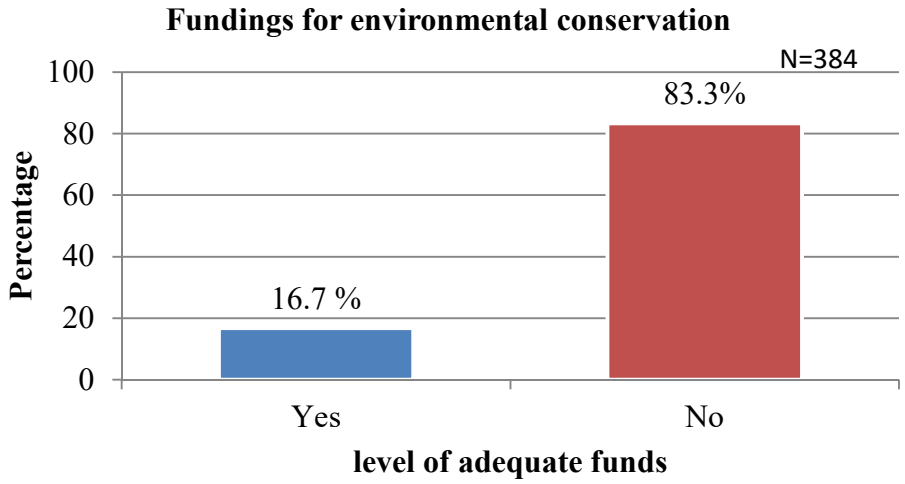

Figure: 4.10 Funding for your activities aimed at environmental conservation Source; Researcher, (2017)

The study found that 83% of the government and NGO agencies did not receive adequate funding for conservation activities whilst 17% acknowledged receipt of adequate funding for conservation activities indicating a low level of funding for these activities in concurrence , to findings by Wamae (2013) that the community forest associations, CFAs get funding mainly from membership contribution, voluntary contribution, selling of seeds and seedlings and annual quotas of government funds given on a rationed basis dependent on funds availability.

4.4.2 Source of financing for the environmental protection committee and community conservation initiatives

Money is often a limiting factor in conservation, and attempting to conserve the environment can be costly. Contrary to findings by Wamae (2013) that the community

forest associations, CFAs get funding mainly from membership contribution, voluntary contribution, selling of seeds and seedlings among others.

The study findings Figure 4.11 shows the Sources of financing for the committee activities for Environmental Conservation for Key informants in Kakamega county

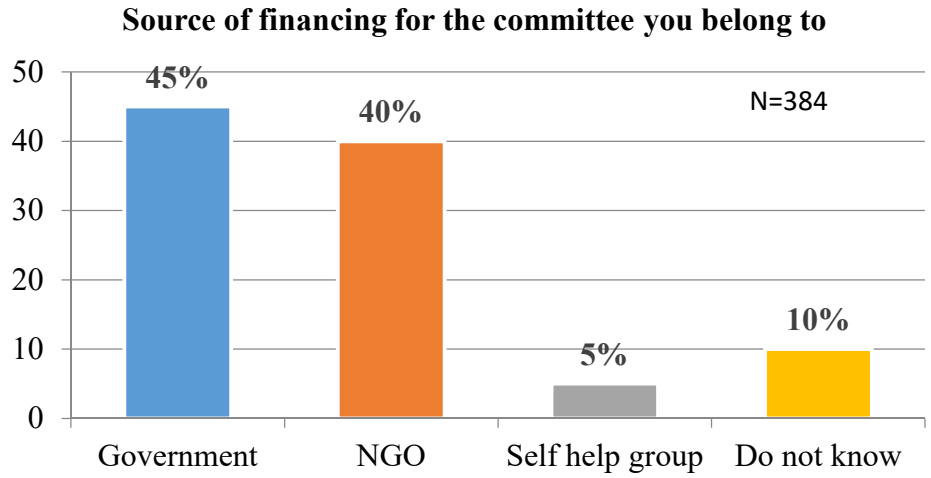

Figure: 4.11: Sources of financing for the committee activities
Source; Researcher, (2017)

This research established that, the government was the main financing body responsible for funding the committee activities at 45%; community 5% and NGO at 40%; 10% however did not know of any funding sources.

4.5 Community and institutional structures

The Environmental Conservation Committee (ECC) are the link between government institutions such as the ministry of environment, the Kenya Forest Service and Kenya Wildlife Service and the community. They typically organize different educational programmes and activities to promote public awareness of environmental issues and encourage the public to contribute actively towards a better environment.

Knowledge of these local area committees is an indicator of how active these committees are. The research findings Figure 4.12 shows forest adjacent dwellers knowledge of environmental committees.

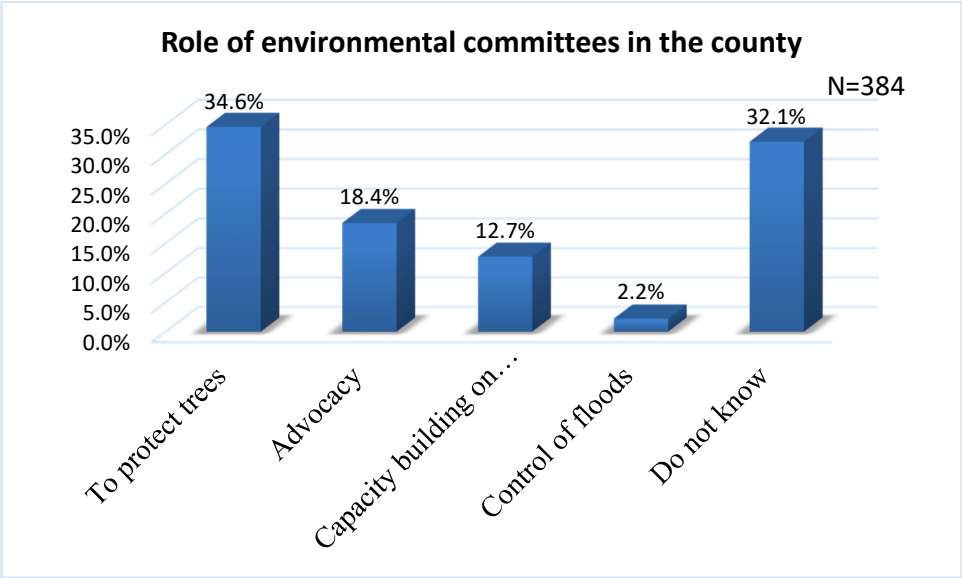

Figure: 4.12: Role of the environmental committees in the community
Source; Researcher, 2017)

The research found that the community perception of environmental committees works 34.6% consisted of protection of trees, 32.10 % do not know of any role of the environmental committees whilst 18.4% perceived the role committees to be advocacy; whilst 12.7% accounted for capacity building on conservation and 2.2% accounted for control of floods. The conservation political theory assumes that environmental reforms generally are opposed by business and industry which typically support conservationists (Dunlap, 1975). Secondly, an extension of government activities and regulations entailed by environmental reforms is generally opposed by conservationists. Thirdly, environmental reforms often require innovative action which is opposed by

conservationists, (Dunlap, 1975). The evidences supporting this hypothesis can be found in several studies such as, (Dunlap, 1975; Hine *et al*, 1991; Samdahl *et al*, 1989; Howell *et al* 1992; and Daneshvary *et al*. 1998). However, it has been shown that the relationship between environmental concern and political ideology decreased in the 1980s (Howell and Laska, 1992).

4.5.1 Household members belonging to Conservation Group

Figure 4.13 shows the study findings on household members participation in conservation groups, 25% responded affirmatively that some household members belonged to environmental conservation group. 25% do not belong to any conservation group while 40% do not know of any conservation group and 10% are not sure about conservation groups.

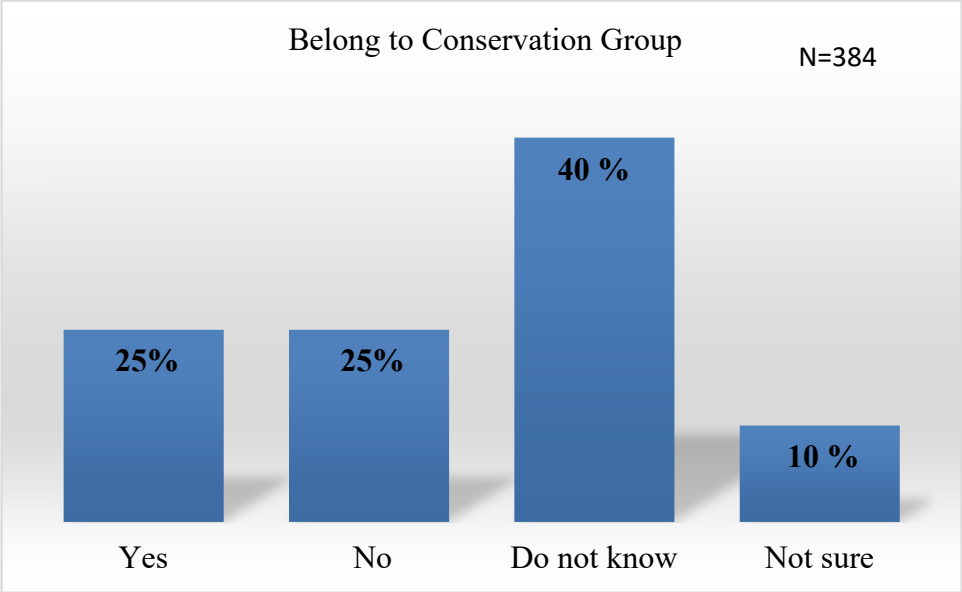

Figure :4.13: Role of the environmental committees in the community Kakamega county

Source; Researcher, (2017)

4.6 Training/Capacity building Support for Conservation activities

The study findings in figure 4.14 show that a majority of respondents did not know or were not sure of any support given by NGOs for trainings or provides technical support for the households engaged in environmental conservation.

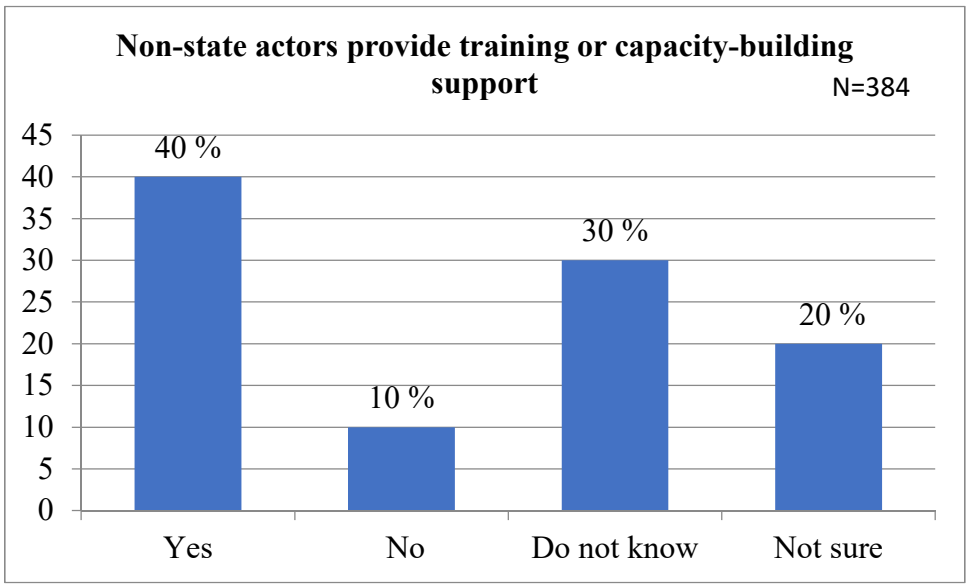

Figure: 4.14: Non-state actors provide training or capacity-building support for the public to participate in conservation activities

Source; Researcher, (2017)

The study found 40% of the respondents agreed that non-state actors provide training for capacity building in public participation, whilst 10% responded in the negative and 30% and 20% did not know or were not sure respectively.

4.6.1 Socio cultural Factor influencing Participation in Conservation Activities

The social, economic and cultural affairs of human beings are closely linked to how they view, utilise and conserve their environment (Wright, 2012).

4.6.2 Policy and Political factors Influencing participation in Conservation Activities

The study findings on Political influence in environmental conservation revealed that a majority, 70% respondents were not sure of any political influence in environmental conservation affairs whereas 10% affirmed that their political party promoted environmental conservation through tree planting activities and 10% denied any political party involvement in conservation.

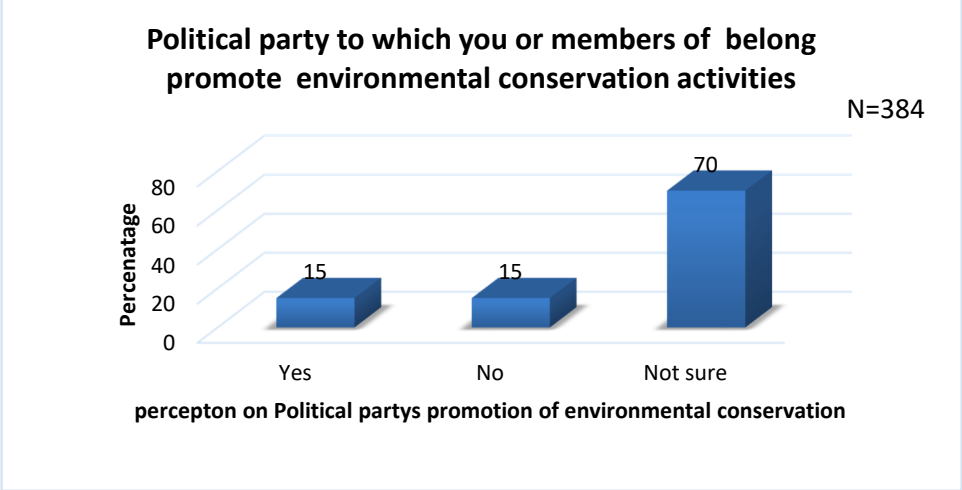

Figure: 4.15: Political party's promotion of environmental conservation activities Source; Researcher, (2017)

Kenya's burgeoning population is a stark contrast to its shrinking forests, as marginalized communities continue to cut down trees every day for firewood and charcoal use, causing the forests cover to retreat. The study findings concur with Sewell *et al*, (1979) as they draw a contrast in Political perspective views on public participation to emancipate and empower less privileged individuals/groups in society.in that whereas political party Participation is used to garner votes and/or gain political popularity during elections.,

political parties, have little influence on environmental conservation in the perception of the public in Kakamega county.

4.6.3 Public perception on Political factors Influencing participation in Conservation Activities

The study findings on public perception about Political influence in environmental conservation found out that 45% were neutral in perception of political influence in environmental conservation, 20% had no response, whereas 5% perceived very highly and 15% highly affirmed that their political party promoted environmental conservation through tree planting activities and 15% had a low perception of political party involvement in conservation.

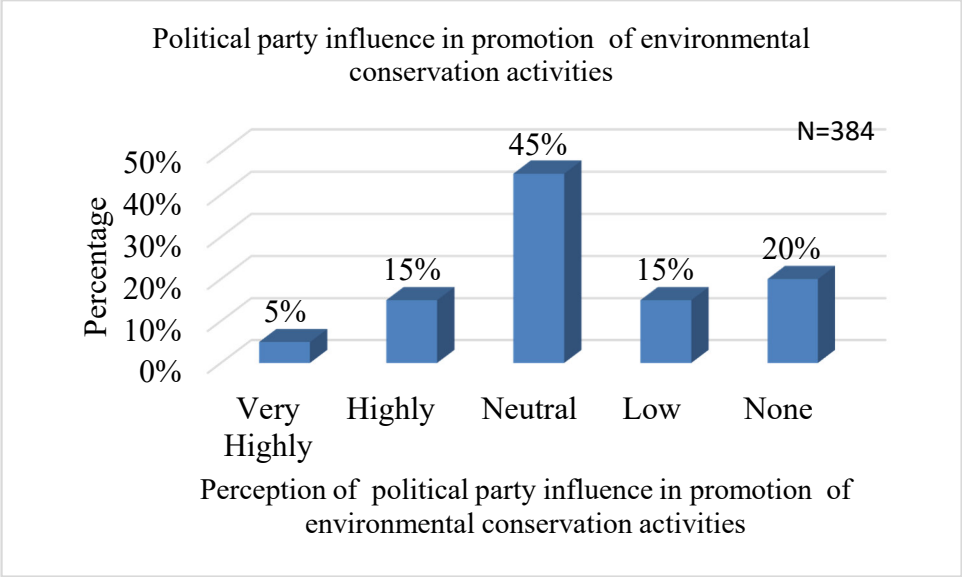

Figure: 4.16: Political parties' promotion of environmental conservation activities
Source; Researcher, (2017)

A study by Nyagero (2016) concurs with these findings of perceptions that low participation in socio-political and cultural activities alongside poverty levels are the major causes of poor implementation of environmental conservation measures.

4.6.4 Financial Capital and Individual Participation in Environmental Conservation

The economic status of a livelihood includes financial as well as non-financial resources that can help improve the standard of living, and are within the control of the individual. This includes access to natural capital, which are those naturally occurring resources that can be tapped into to enhance the quality of life.

4.6.5 Level of Income

Study findings on monthly income levels, 55% reported an income level of less than Ksh. 5,000 (USD $1.6) per day, 27% had an income of Ksh.5,000-10,000 (USD $1.6-3.2) per day; 10% reported an income level of KShs.10,000-40,000(USD $ 3.2-12.9) per day whilst 8% reported an income level between Ksh.40,000 – 100,000 (USD $12.9-32.3)

Environmental degradation has variously been blamed on 'the ignorance and wastefulness of the poor' (Van Liere *et al*, 1980). Conventional wisdom has turned to the explanation that the poor are forced to over exploit the environment by factors outside of their control (Samdahl and Robertson 1989).

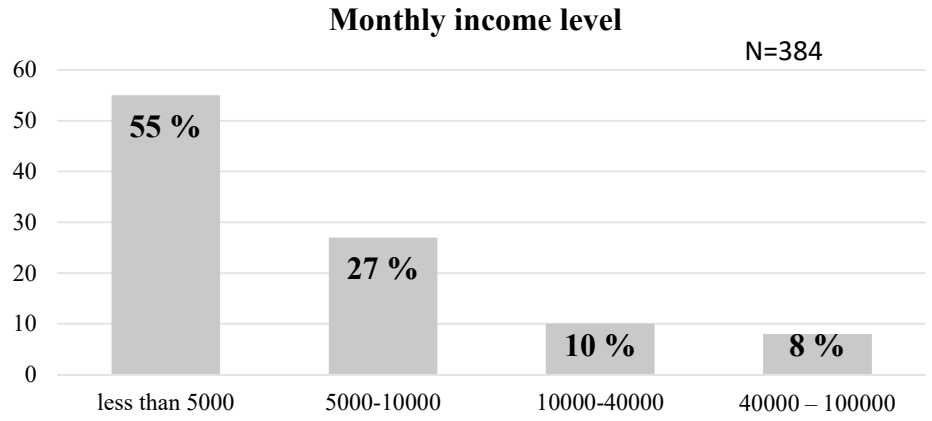

Figure: 4.17 Monthly income levels in the study area.
Source; Researcher, (2017)

Monthly income is an economic indicator of affluence and hence varied interest in conservation. Lower income levels predispose communities to encroachment on natural resources. per day. These findings indicate a majority income level of slightly above the absolute poverty rate of less than a dollar per day and expose the environment to high risk of low to inadequate environmental conservation concerns.

The linkage between poverty and environmental degradation is in terms of two main processes. First, environmental degradation is said to cause poverty because degradation involves the erosion of the resource base upon which the poor often depend for their livelihood, while the adverse impacts of environmental degradation on people's health further limits their productive potential. Second, poverty is said to cause environmental degradation because the poor are forced into marginal resource areas. For instance, they are driven out of the best agricultural lands and into fragile and unproductive ecosystems (Tham, 1992).

4.6.6 Main Source of Livelihood

The social class hypothesis states that education and income are positively correlated with environmental concerns. One explanation for this hypothesis is based on Maslow's hierarchy of needs theory (Maslow, 1970). Increase or decrease in price correspondingly decreases or increases consumers' discretionary income which, in turn, causes a lower or higher demand for the same or some other good or service.

The study findings Figure 4.18 shows the occupation and source of income of forest adjacent dwellers Kakamega county

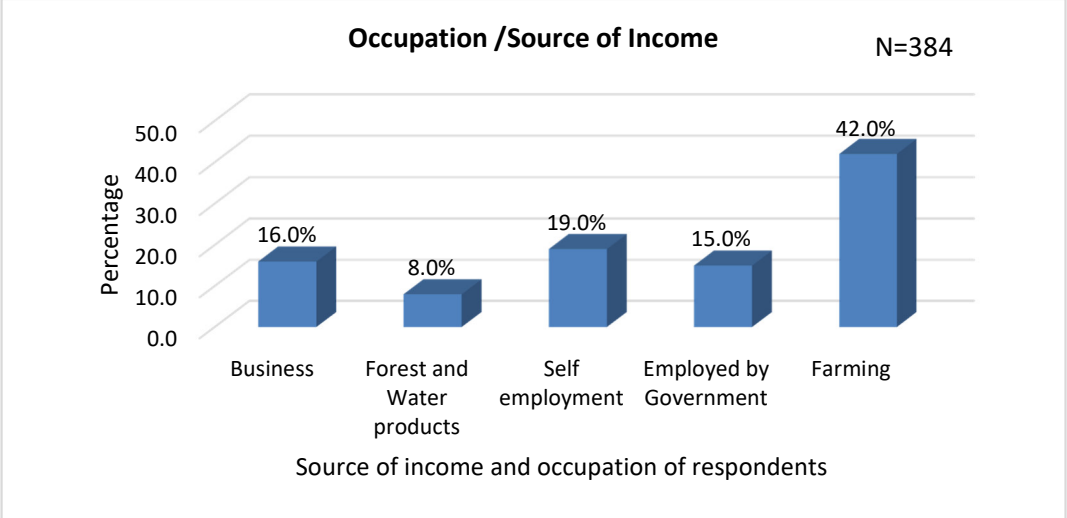

Figure :4.18 Main source of income of forest adjacent dwellers Kakamega county Kenya
Source; Researcher, (2017)

The study findings Figure 4.18 reveal that 15% of the respondents are in formal employment, whilst 19% were self-employed, 16% were engaged in business whilst 42% were engaged in farming to earn money. Income sources have a major effect on affluence described as abundance of money, property, and other material goods and riches.

Rural communities in Kenya are dependent upon subsistence agriculture and have little opportunity beyond farming, and many times can only meet their daily needs at the expense of the environment.

Maslow's hierarchy of needs hypothesis rests on the assumption that concern about environmental quality has the property of luxury goods which can be indulged only after more basic material needs such as adequate food, shelter, and economic security are met (Van Liere *et al*, 1980). Support for a positive correlation between education and environmental concern has been found in several studies (Arcury and Christianson 1990; Howell and Laska 1992; Schahn and Hotzer 1990; Scott and Willits 1994).

However, concerning the relationship between income and environmental concern, the findings are mixed. For example, one study reports that income is negatively related to the perceptions of environmental problems, as well as the support for environmental regulations and ecological behaviour (Samdahl and Robertson 1989), while another study suggests that income may be positively related to concern about the environment (Buttel and Flinn 1974). Moreover, most studies indicate that income is not predictive of environmental concern (Adeola 1994; Antil 1984; Koenig 1975).

4.7 General Level of Participation

The study Figure 4.19 shows the measures the community in Kakamega county takes to mitigate the effets of land degardation.

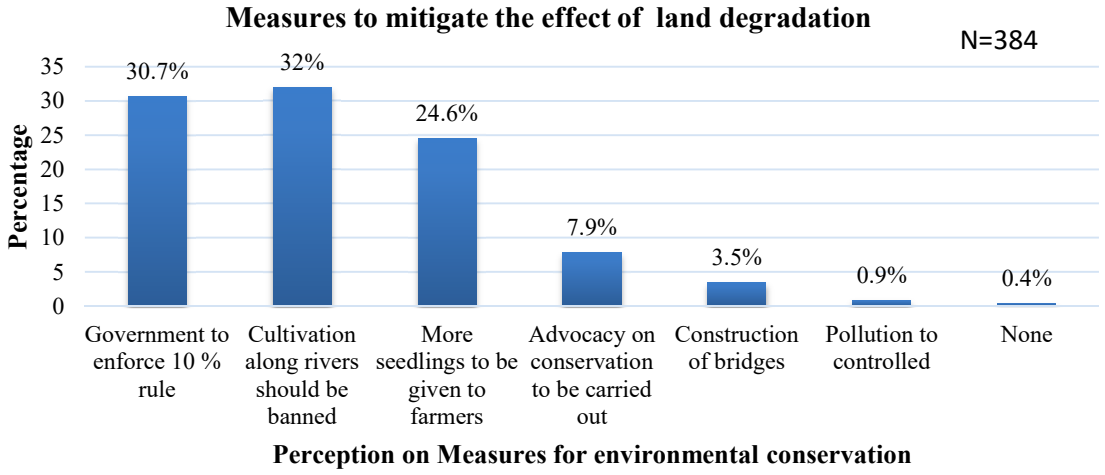

Figure: 4.19 Measures to mitigate the effect of environmental degradation problems in the study area.
Source; Researcher, (2017)

Respondents gave various views on what measures could be implemented to mitigate environmental conservation challenges. 30.7% reported that land owners should set aside

10% of their land to plant trees; 32% of the respondents opined that cultivation along rivers should be banned; 24.6% were of the opinion that more seedlings should be availed to farmers; 7.9% reported a need for advocacy on conservation to be carried out, 3.5% reported that construction of bridges should be done to make the areas more accessible for security and conservation authorities, 0.4% were not aware of any measures that could be implemented and another 0.9% reported that pollution should be controlled.

The study findings agree with (Singh, 2009) that strong political will at both national and county levels in the presence of congenial political and economic environment to use appropriate measures to mitigate the problems of environmental degradation in the large interest of society is important.

4.7.1 Environmental conservation behaviour of community members

Competition and conflict over natural resources manifest through deforestation and cultivating along river banks and are major determinants in environmental conservation of natural resources in Kakamega County as shown in Figure 4.20. This is further outlined by other challenges that have a negative effect on the environment affecting forests, rivers, water sources and catchment areas.

The results show that 22 percent of the respondents in the area need land for cultivation and grazing field and habitually encroach on forest land and riverine areas. This agrees with Kamau (2009) who conducted a research to assess the challenges and opportunities of restoring the forest. He established that on average 5,000 hectares of forest cover are lost every year through encroachment, illegal logging, and excision for settlement of people and cultivation. The study found out that cultivation along river banks and river

beds alongside sand harvesting are among the major problems in the communities, as shown in Figure 4.20.

According to UN Secretary-General Ban Ki-Moon, since 1990, at least 18 violent conflicts have been fueled by the exploitation of natural resources such as timber, minerals, oil and gas (UNEP,2001). Sometimes this is caused by environmental damage and the marginalization of local populations who fail to benefit economically from natural resource exploitation." (UNEP, 2001).

The study Figure 4.20 shows the Environmental degradation factors affecting rivers and forests in kakamega county.

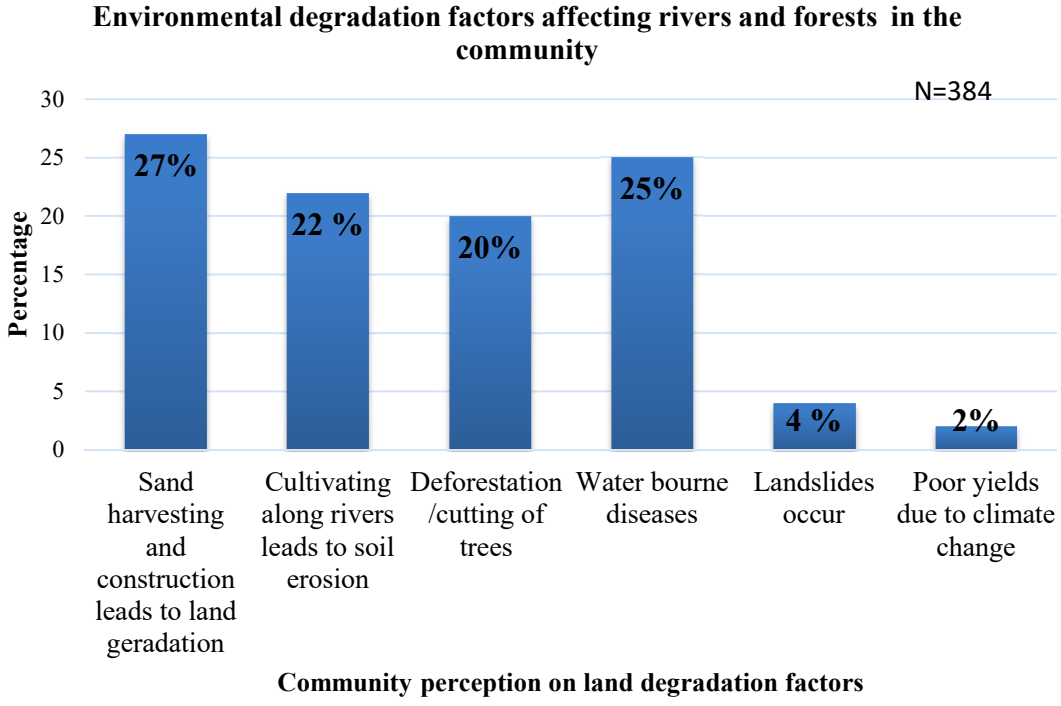

Figure: 4.20 Environmental degradation affecting rivers and forests in the study Area
Source; Researcher, (2017)

The study Figure 4.20 reveals that land degradation affects rivers and forests in the community, 27% of forest adjacent dwellers indicated sand harvesting and construction were the biggest problems. 22% reported that cultivation along rivers and water catchment areas was a problem. Uncontrolled cutting of trees and flooding/ landslides was mentioned by 20% and 4 % of the respondents respectively 25% opinioned that environmental degradation can be associated with waterborne diseases, while 2% indicated that uncertain rainfall and low yields were a problem.

These findings agree with studies by Waswa *et al* (2004) who found that over 55% of the farms in Malava lacked any form of soil and water conservation (SWC) technologies. Sheet erosion was the most dominant form of soil loss having been observed in over 70% of the farms sampled. Agriculture (crop cultivation) was identified as the main activity with highest impact on the habitat.

4.8 Land degradation challenges effect on the community land holdings

Land degradation is highlighted as a major concern that contributes to climate change UNISDR (2013). The land degradation challenges experienced by the community manifested in various exploitations of natural resources such as timber and minerals that have a negative effect on the environment and reverse any conservation efforts in the community as outlined in Figure 4.21

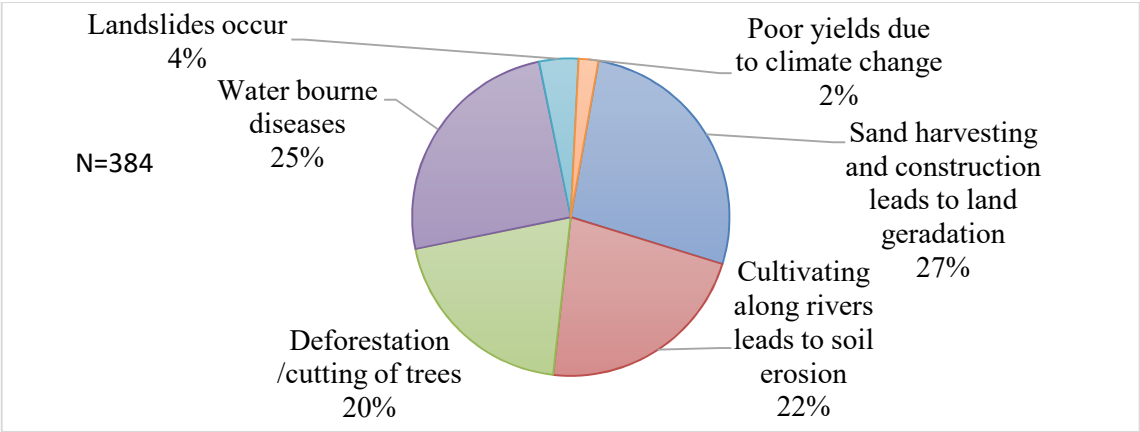

Figure: 4.21 Land degradation challenges effects on the community land holdings

Source; Researcher, (2017)

The study findings reveal that land degradation challenges affected the environment, 27% of the respondents indicated that sand harvesting and construction leads to land degradation; 25% of the respondents indicated that there was water pollution that causes water borne diseases; 22% reported that cultivating along river banks leads to soil erosion; 20% opined that deforestation /cutting of trees destroys ozone layer; some 4% respondents opined that landslides occur and 2% indicated that climate change had occurred leading to poor yields

4.8.1 Individual household contribution to Land degradation

'The Tragedy of the Commons' theorized by Garret Hardin's (1968), was illustrated from the findings of the study that showed continued degradation of the environment due to many unfettered and exploitative individuals use of scarce land forest and water resource.

The study Figure 4.22 shows the Individual perceptions of how households contribute to Land degradation in kakamega county.

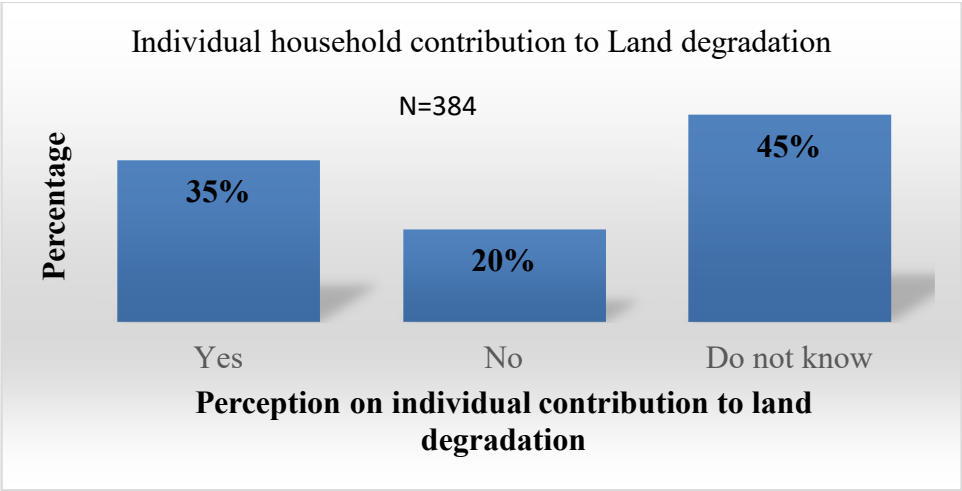

Figure: 4.22 Individual household contributions to Land degradation

Source; Researcher, (2017)

When asked whether Individual households contributed to Land degradation, 35% indicated that individual households do, 20% said individual households did not contribute to land degradation, whilst 45% do not know of any individual households' contribution to land degradation. These findings corroborate the UNRISD report that indicates that there is a reduction in biomass globally by deforestation and burning of wood for fuel which in Kakamega is used by 69% of the population (CIDP 2018). The continued loss of biomass surface contributes to desertification and accelerate climate change through reduction in rainfall and negative changes in rainfall patterns that affect food production. (UNRISD, 2013).

CHAPTER FIVE

INFLUENCE OF GOVERNMENTAL AND NON- GOVERNMENTAL ACTORS' ON COMMUNITY PARTICIPATION IN ENVIRONMENTAL CONSERVATION KAKAMEGA COUNTY

5.1 Introduction

This Chapter presents the findings of objective two of the study at three levels. Section 5.1 expounds findings on influence of government and non-governmental actors on public participation. This section also explores the initiatives and activities of government or non-governmental actors in environmental conservation, the availability of opportunities for the public to participate, and the degree of engagement in environmental conservation.

5.2 Influence of Government Action on Public Participation in Environmental Conservation

The study found that the government has policies and initiatives to conserve the environment, but its agencies are falling short in fulfilling their various mandates. This was established by asking the community to recommend on what can be done to improve the on-going efforts.

Conservation and environmental management are National aspiration, that seeks to yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations.

The study Figure 5.1 shows the Individual perceptions of how Government can mitigate for effects of Land degradation in kakamega county.

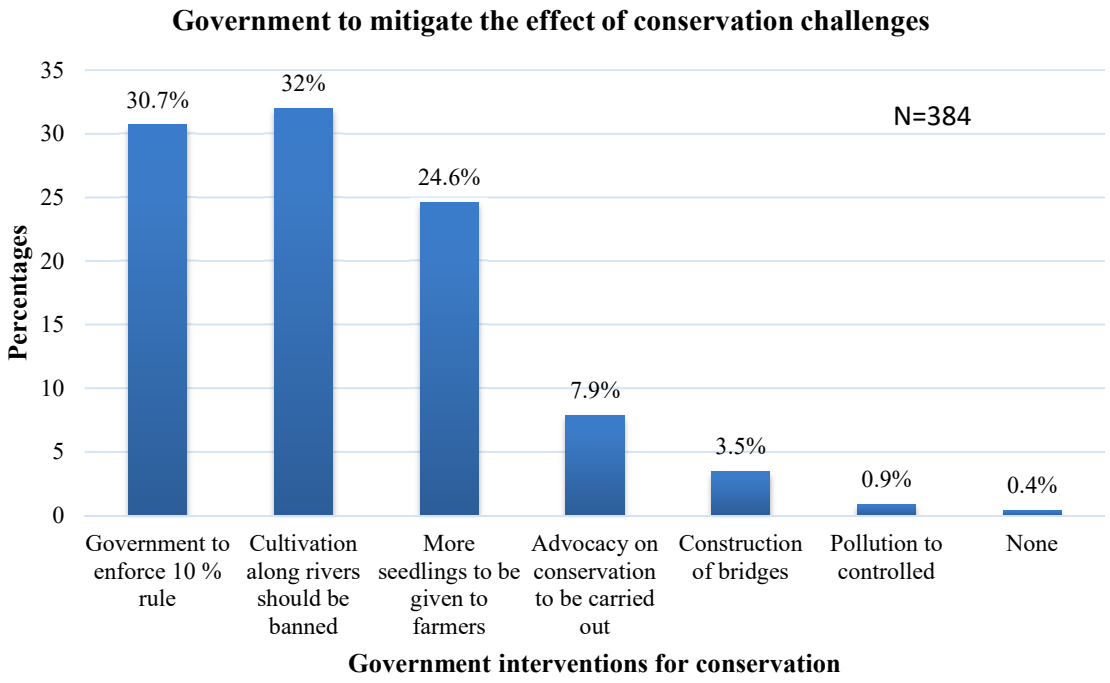

Figure: 5.1 Government to mitigate the effect of land degradation

Source; Researcher, (2017)

The data indicates that the 10% rule is not being adhered to, that cultivation along the river banks is still ongoing, that the government is not giving enough seedlings to farmers; that advocacy on conservation is not being undertaken to the desired extent. It was also revealed that the government needs to build bridges, and to a lesser extent, control pollution.

Respondents gave various views on what measures could be implemented to mitigate environmental conservation challenges. 30.7% reported that land owners should set aside 10% of their land to plant trees; 32% of the respondents opined that cultivation along rivers should be banned; 24.6% were of the opinion that more seedlings should be availed to farmers; 7.9% reported a need for advocacy on conservation to be carried out, 3.5% reported that construction of bridges should be done to make the areas more accessible for

security and conservation authorities, 0.9% were not aware of any measures that could be implemented and another 0.4% reported that pollution should be controlled. This agrees with (Singh, 2009) that strong political will at the national and state levels and a congenial political and economic environment to use appropriate measures to mitigate the problems of environmental degradation in the large interest of society is important.

5.2.1 Environmental conservation in CIDP

The study findings in Table 5.1 revealed during key informant interview and FGD established that 90% participants meet to Prioritize environmental conservation warning in the County development plans and 10% do not.

Table: 5.1 Prioritize environmental conservation in CIDP

	%
Yes	90
No	10

5.2.2 Perception on Government action protect the environment

The study findings in Table 5.2 showed that the training of local volunteers in environmental conservation scored highly on the action that is necessary for government to protect the environment

Table: 5.2 Government action to protect environment

	%
Providing a higher degree of environmental conservation	10
Training local village volunteers in environmental conservation	50
Use of Traditional organizational structures in communities to assist in environmental conservation	30
Training support in risk reduction measures	10

The study reveals that Providing a higher degree of environmental conservation 10%, and Training local village volunteers in environmental conservation scored at 50%, whilst the use of Traditional organizational structures in communities to assist in environmental conservation 30% and Training support in risk reduction measures scored 10%

5.2.3 Frequency of communication on Government conservation activities

The study findings in Table 5.3 showed that Meetings are held to discuss environmental conservation

Table: 5.3 communication on Government conservation activities

	%
No SCAMP	50
Had no consultation with public	45
No funding for activities	5

Meetings were held to discuss environmental conservation plans but 50% of the Key informants reported they had no sub-catchment plans and 45% acknowledged they had no consultation with public, whilst 5% reported they had no funding for activities.

5.2.4 Government support in capacity building and Training for Key informants

Table: 5.4 Capacity building and training needs for KII

N=12	%
Disaster Risk Reduction	5%
Environmental conservation	70%,
Community mobilisation	25%

The study findings in Table 5.4 show that Government provides training and capacity building at the local level for KI Informants 5% acknowledged being DRR officers and 70% stated they were trained in environmental conservation, whilst 25% reported that they had no training in environmental conservation.

5.2.5 Provision of Funding Support for Public Participation in Forest Conservation

The study findings on Provision of Funding Support for Public Participation in Forest Conservation show that 50% respondents do not know whether government provides money to help community members in forest conservation whilst 10% acknowledge that government provides money, 30% and 10% denied knowledge or were not sure

respectively of funding for forest conservation activities indicating a perception low level of funding for these activities. Figure 5.2.

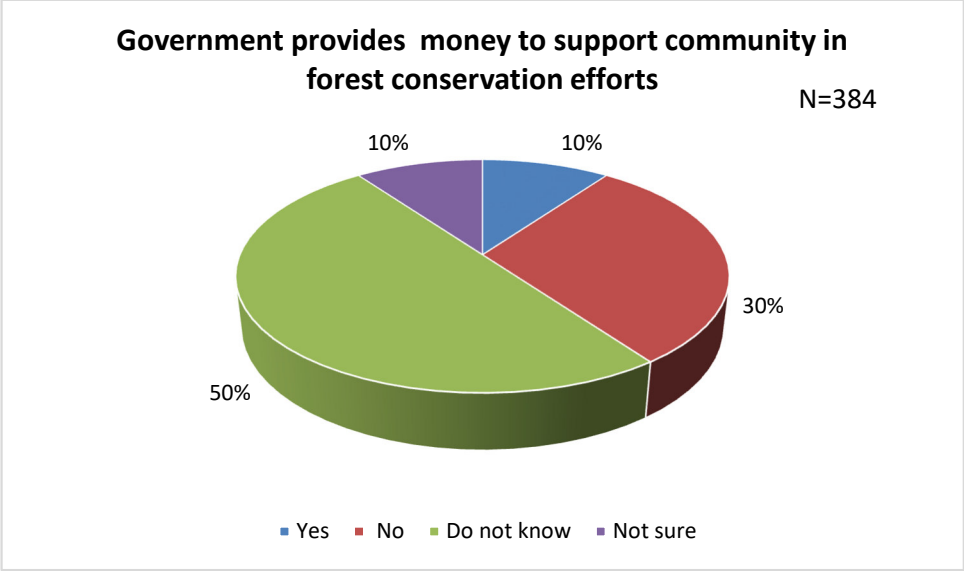

Figure: 5.2: Government provides money to support community in forest Conservation efforts

Source; Researcher, (2017)

5.2.2 Provision of Training and Capacity Building Support

Training in environmental conservation contributes to overall awareness to land degradation and builds capacity to reverse negative climate change and its effects (UNRISD. 2013)

Figure 5.3 shows the study findings on Government initiatives to provide training and capacity building for the public to participate in conservation of forest resources in Kakamega County.

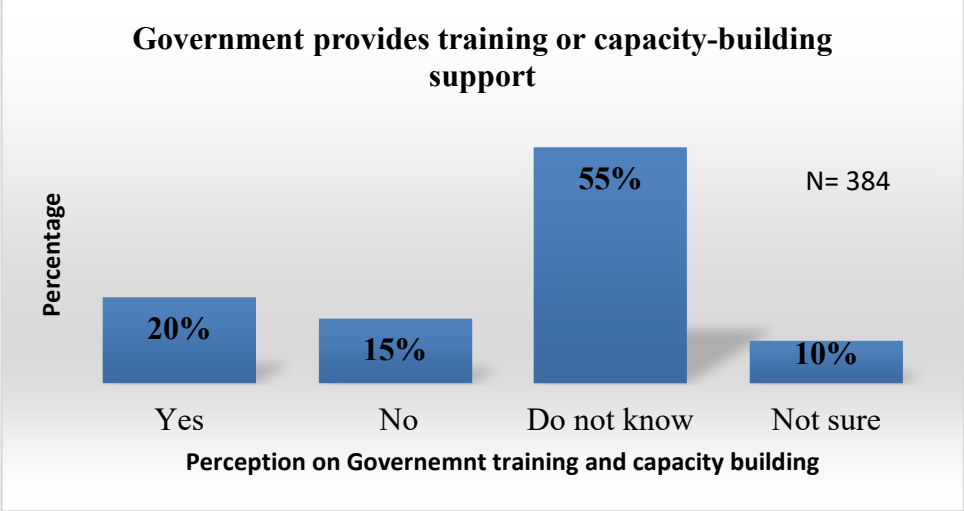

Figure: 5.3: Government provides training or capacity-building support for the Public to participate in conservation of forest resources
Source; Researcher, (2017)

The study found that 20% agree that Government provides training and capacity building to help community members in conservation of water resources whilst 80% denied or did not have knowledge of training and capacity building for water conservation activities.

The study findings Figure C: appendix 11 shows that Government provides training and capacity building at the local level for KI Informants, 5% acknowledged being DRR officers and 70% stated they were trained in environmental conservation, whilst 25% reported that they had no training in environmental conservation.

5.2.3 Provision of Technical Inputs and other Support in Kakamega County

According to the Sendai conference, technical guidance is critical to allow for consistent measurement of progress towards the global targets across countries and over the duration of the Sendai Framework and Sustainable Development Goals, by sharing minimum standards which describe a common and detailed international understanding of

indicators, data required, and providing standard methodologies for countries which may want to voluntarily use them (UNRISD 2013).

Figure 5.4 shows the study findings on Government initiatives to provide technical support to help community environmental conservation in Kakamega County.

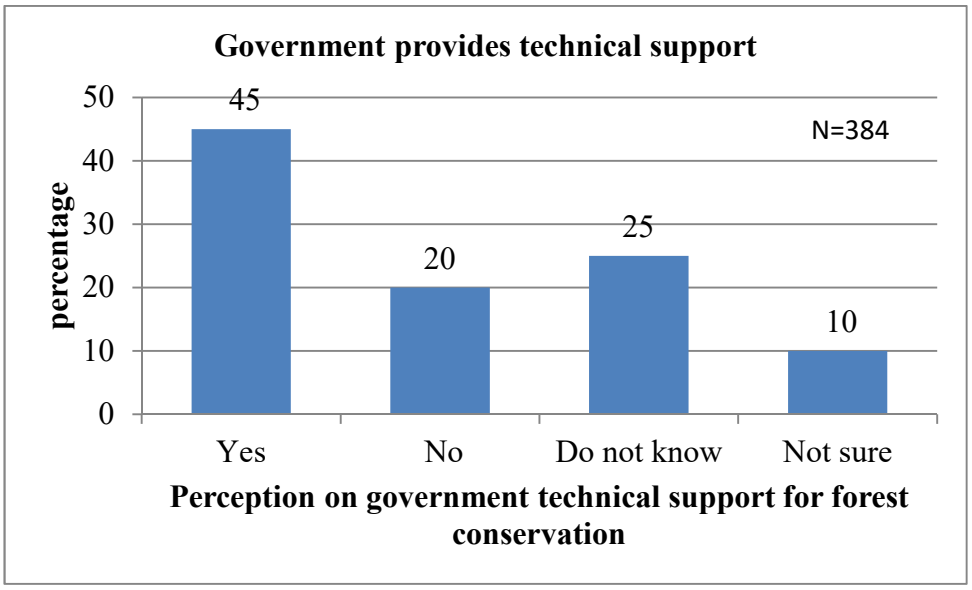

Figure: 5.4: Government provide any technical support to help the community in Forest conservation efforts
Source; Researcher, (2017)

The study found that the level of technical support was below moderate as only 45% agreed that Government provides technical support to assist community members in the conservation of forest resources whilst 20% denied 25% did not have knowledge of technical support for forest conservation activities and 10% were not sure. These findings corroborate with the observation of the Sendai climate change framework that technical inputs re critical in reversing land degradation

5.2.4 Frequency of the Government Support

Outcomes from the Sendai conference on climate change show that state support and frequency of support is key to environmental conservation and mitigation of climate change (UNISRD 2013)

Figure 5.5 shows the study findings on how frequently the Government is giving support to the community in environmental conservation efforts in Kakamega County.

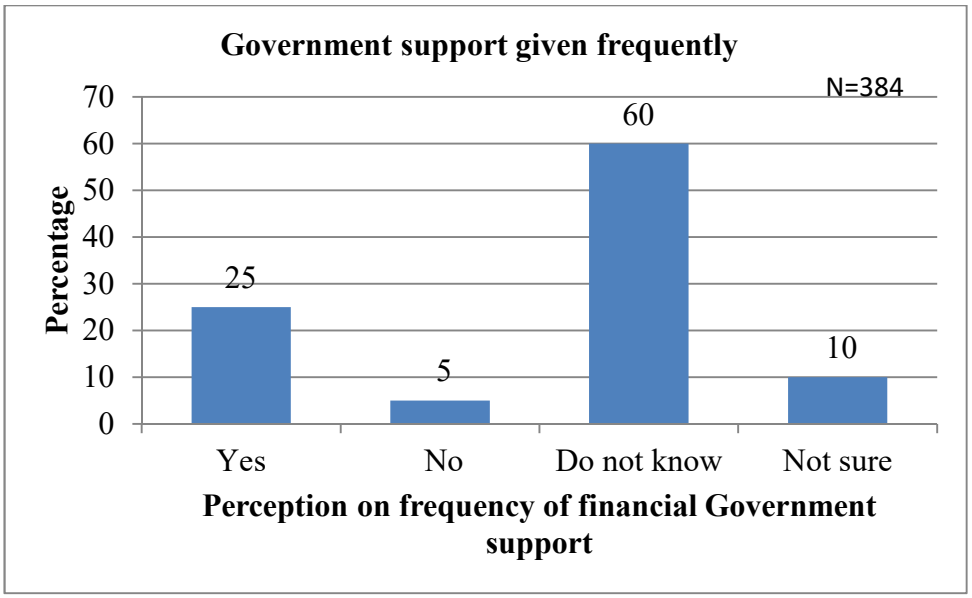

Figure: 5.5 Government support given frequently to conservation in Kakamega County
Source; Researcher, (2017)

The study found that 60% of the respondents do not know the frequency of support given by the government to help community members in conservation of water resources, whilst 25% acknowledged that government frequently provides support for water conservation activities and 15% denied or do not know that government frequently supports conservation indicating a perception of low level of funding for these activities.

5.3 Influence of Government Action to Conserve Water bodies

Water resource management Authority is the government agency tasked with protection of water catchment areas and river bodies. On the other hand, NEMA is the government agency tasked with environmental protection, indicating the core responsibility that government plays in conservation of natural resources.

5.3.1 Provision of water conservation Funding Support in Kakamega County

As a major actor in regulation and legislated use of natural resource the government collects taxes and is expected to avail funding for conservation activities (Constitution of Kenya 2010). The study sought to evaluate the level of state actor contributions to these efforts.

Figure 5.6 shows the study findings on Government initiatives to provide money for environmental conservation in Kakamega County.

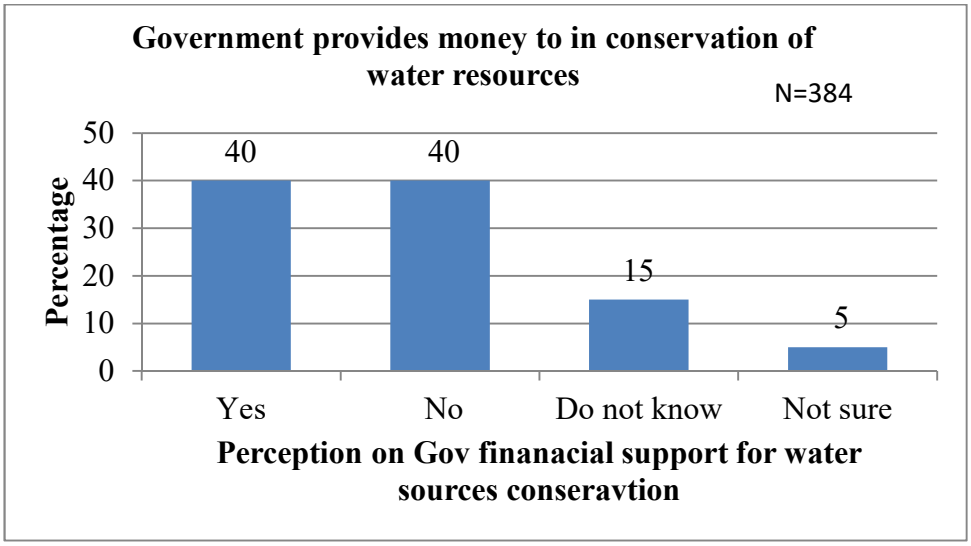

Figure: 5.6: Government financing for conservation of water resources
Source; Researcher, (2017)

The study found that 40% agree that Government provides money to help community members in conservation of water resources whilst 60% denied knowledge of funding for water conservation activities indicating a low level of funding for these activities.

5.3.2 Provision of Training and Capacity Building Support by state actors in Kakamega County

As a major employer of technical and enforcement personnel in the regulated and legislated use of natural resource, the government collects taxes and is expected to enhance stakeholders' participation in resource use and conservation activities (Constitution of Kenya 2010). The study sought to evaluate the level of the actor's contributions to training and capacity building in the conservation of natural resources.

Figure 5.7 shows the study findings on Government initiatives to provide training and capacity building for water conservation to the forest adjacent dwellers in Kakamega County.

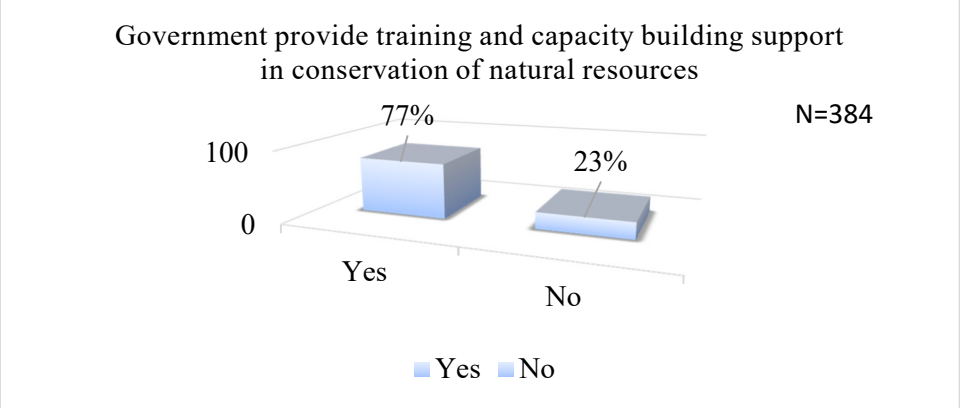

Figure: 5.7: Government provide training and capacity building for conservation of water resources
Source; Researcher, (2017)

The study found that 23% of the forest adjacent-dwellers respondents agree that Government provides training and capacity building to help community members in conservation of water resources whilst 77% denied or did not have knowledge of training and capacity building for water conservation activities.

The study findings during KI interview and FGD (Figure E: appendix 11) established that Government Training support provided as respondents 10% acknowledged Providing a higher degree environmental conservation 50% reported Training local village volunteers in environmental conservation and 30% reported use of traditional organizational structures in communities to assist in environmental conservation whilst 10% reported training support in Risk reduction measures.

5.3.3 Provision of Technical Inputs and other Support in conservation

The legal framework State actors are given responsibility for technical inputs and other support in environmental conservation (Constitution of Kenya 2010).

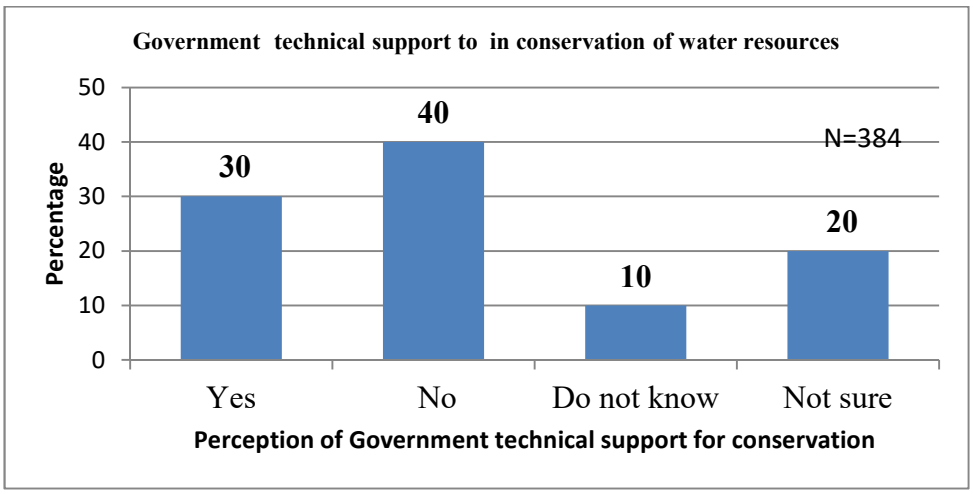

Figure: 5.8: Government technical support to help community members' Conservation of water resources in Kakamega County. Source; Researcher, (2017)

The study found that 30% cumulatively agree that Government provides technical support to help community members in conservation of water resources whilst 70% cumulatively denied or did not have knowledge of technical support for water conservation activities.

5.4 Influence of Government Action to Conserve Forest

Environmental conservation is enshrined in the constitution of Kenya 2010 as an aspiration of the Kenyan people, the study sought to determine the level of government provision of money for forest conservation as perceived by the community.

5.4.1 Provision of Funding Support

Provision of funding is shown in Figure 5.9 and illustrates the public perception of government contribution of money to forest conservation

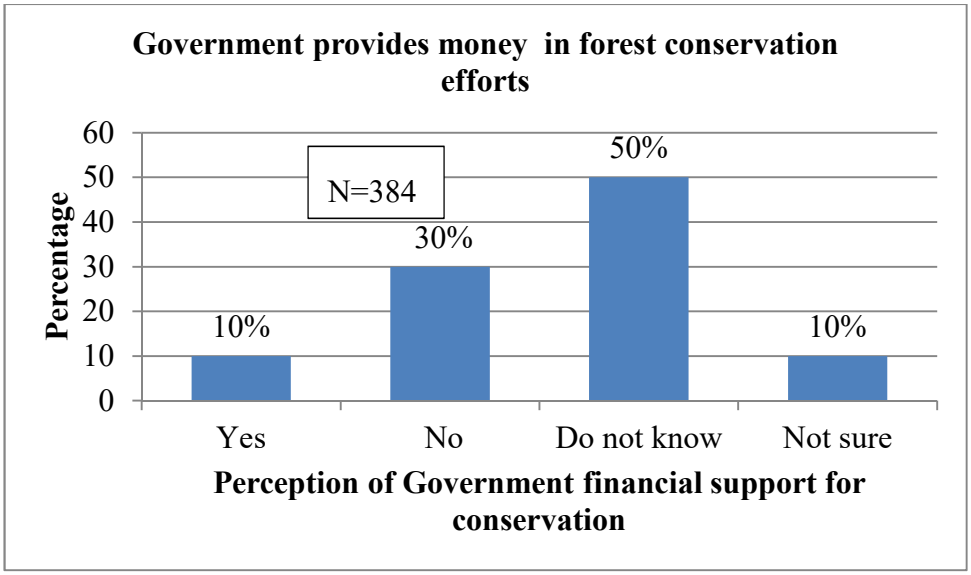

Figure: 5.9: Government provides money to support community in forest Conservation efforts

Source; Researcher, (2017)

The study found that only 10% cumulatively agree that Government provides financial support to help community members in conservation of forest resources whilst 90% cumulatively denied or did not have knowledge of technical support for forest conservation activities.

5.4.2 Frequency of Provision of Technical Inputs and Other Support by government

The study sought to determine the level of frequency of provision of Technical inputs and other support given to the community for environmental conservation as shown in Figure 5.10.

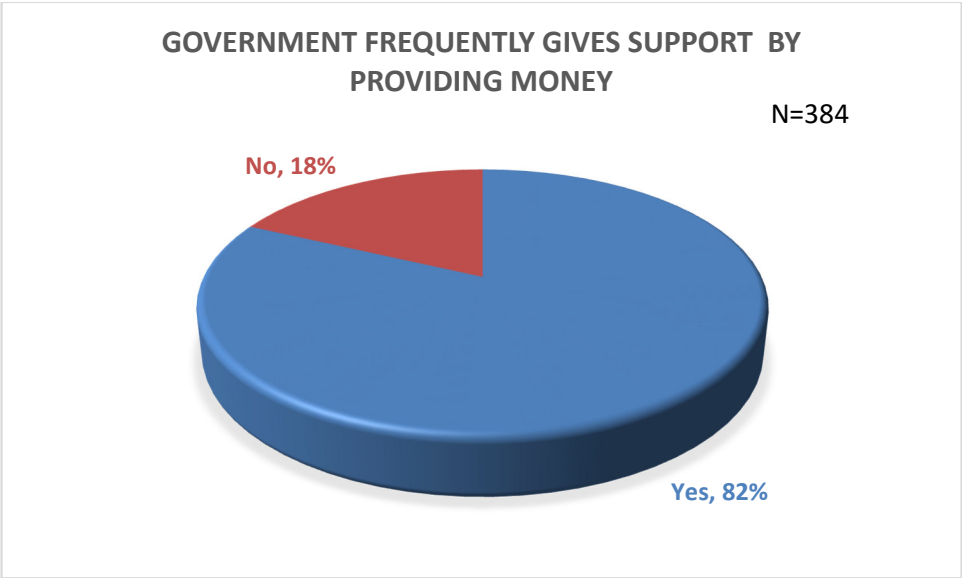

Figure: 5.10: Government support is given frequently in environmental Conservation efforts

Source: Researcher, (2017

The study found that 82% respondents either denied, do not know or were not sure of the frequency of support given by government in providing money to help community members in environmental conservation whilst 18% acknowledge frequent funding for environmental conservation activities indicating a perception low frequency of funding for these activities.

KI interview and FGD established that Government support is given rarely 30% participants and 40% participants observed that government support is sometimes given (three to ten times in the past One year), whilst 33% participants said that Government support is given out Often (more than ten times in the past one year).

5.5 Influence of Civic Society Action on Public Participation in Forest Conservation

The study sought to evaluate the influence of civic society action on public participation in forest conservation as a measure to determine the level of public participation as per Arnstein's ladder theory.

5.5.1 Provision of money Support by Non-state actors toward Forest Conservation

The study sought to evaluate the influence of civil society's action on public participation in forest conservation as shown in Figure 5.11

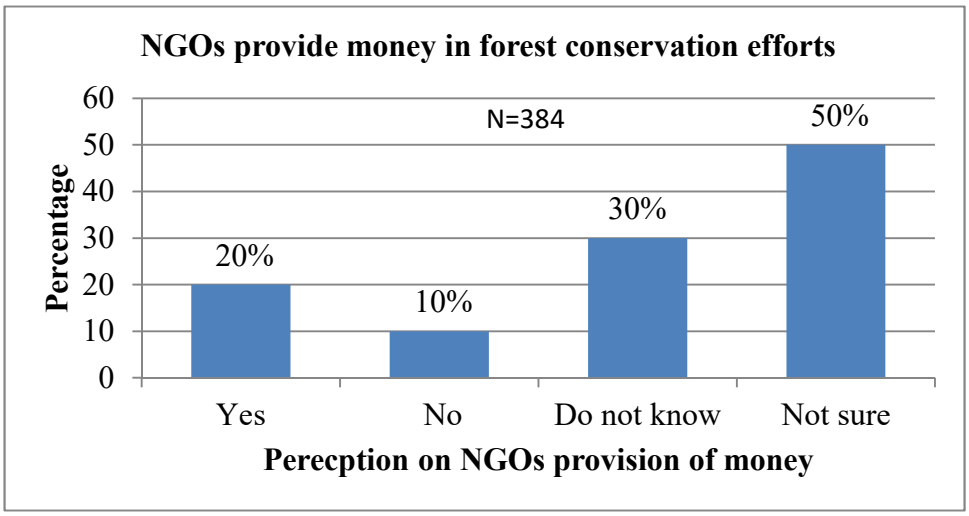

Figure: 5.11: Distribution of responses regarding provision of financial support by non-state actors for forest conservation
Source: Researcher, (2017.

When asked whether or not NGOs provide funding for the public to participate in forest conservation, only 20% said yes. The majority 80% of the household heads cumulatively responded that either there was no support, they were not sure of the support or they did not know of any support.

5.5.2 Provision of Training and Capacity Building Support by Non-state actors

When asked whether NGOs provide training or capacity-building support for the public to participate in conservation of forest resources, 40% of household heads said yes

whilst majority (60%) either said they did not know, were not sure or there was no support Figure 5.12.

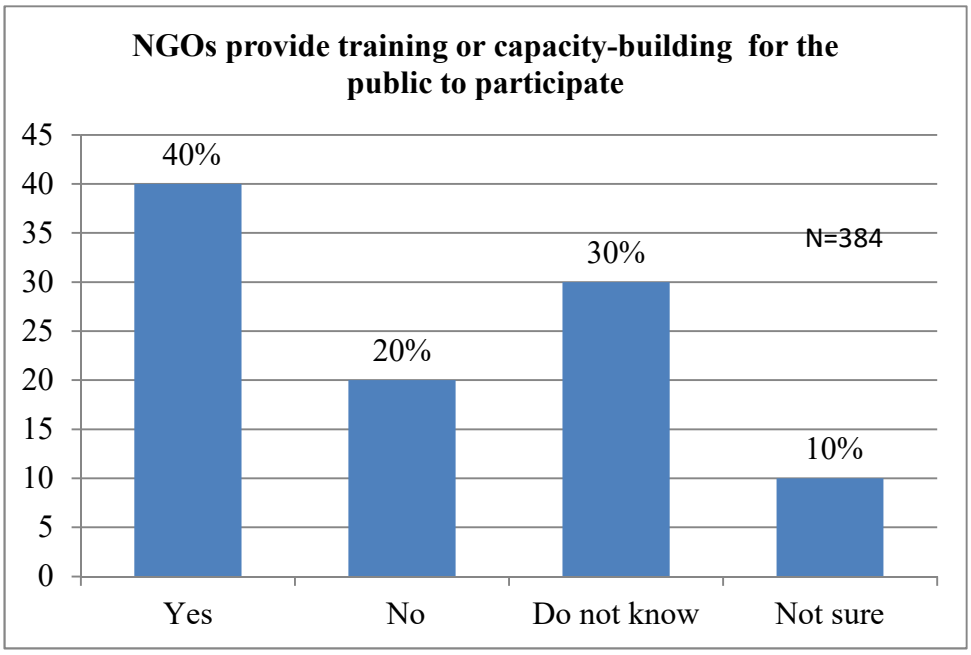

Figure: 5.12: Reponses regarding Provision of Training and Capacity building Support

Source: Field Data, (2017

5.5.3 Overall Level of Public participation in environmental conservation

Based on the ladder of citizen participation, the study sought to establish the level of public participation of the community as in environmental conservation in Kakamega County, arising from engagement with the non-governmental sector as shown in Figure 5.13.

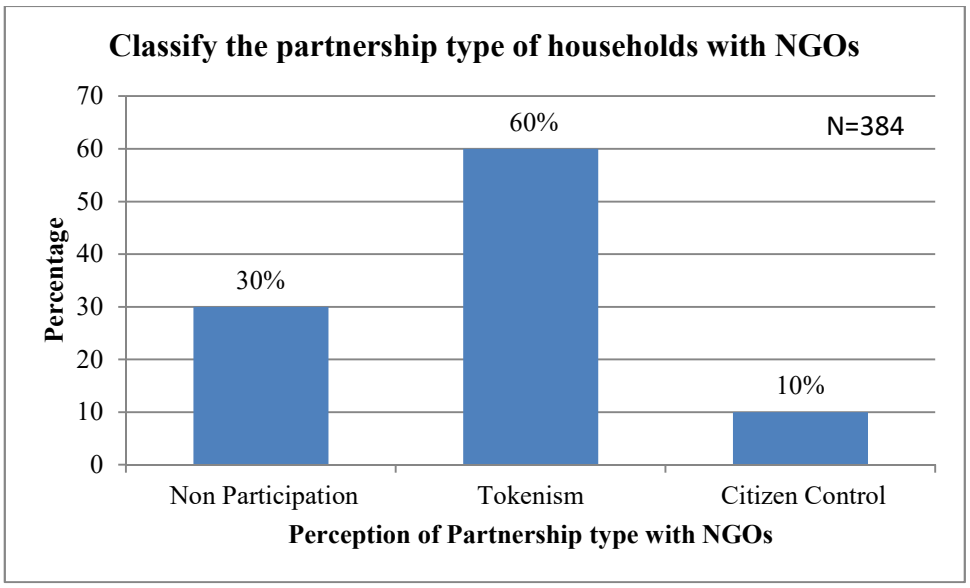

Figure: 5.13 Classify the partnership type of households with NGOs in Environmental conservation in study area
Source: Researcher, (2017

When asked to describe their level of engagement in environmental conservation activities with the civil society actors, majority (60%) of respondents described a level of operation that implies tokenism by the researcher's ranking, 30% described the engagement as Non-participation whilst 10% described the engagement as citizen control this is at average level. Hence the level of public participation as a result of engaging with civic society was found to be medium.

5.5.4 NGOs engagement with the public in conservation efforts

The study sought to determine the level of non-state actor's engagement with the public to evaluate their contribution to environmental conservation as shown in Figure 5.11

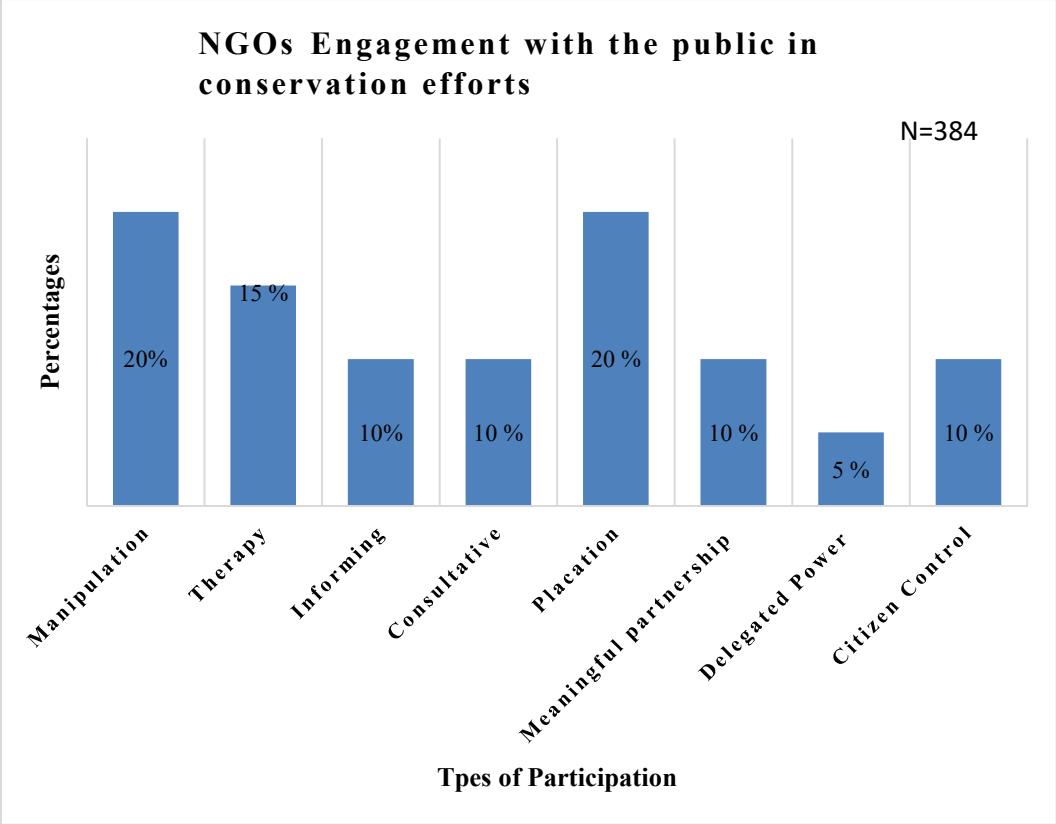

Figure: 5.14 NGOs Engage with the public in environmental conservation Efforts

Source: Researcher, (2017

The study results Figure 5.14 show the level of engagement in environmental conservation activities with the Non-governmental organisations, majority of the respondents described a level of engagements of only 20% as manipulation and 20% view NGO engagement as placation 15% view the engagement as therapy and only 10% view NGO engagement as citizen control showing a low level of public participation as per Arnstein's ladder.

5.6 Level of Public Participation with Government in Kakamega County

The level of public participation with government measures public contribution to state-initiated conservation efforts. The partnership is based on the household's members' ability to contribute human, social and economic resources to environmental concerns.

5.6.1 The Public participation type of partnership in Kakamega County

Based on the ladder of citizen participation, the study sought to establish the level of public participation of the community in environmental conservation in Kakamega County, arising from engagement with the government.

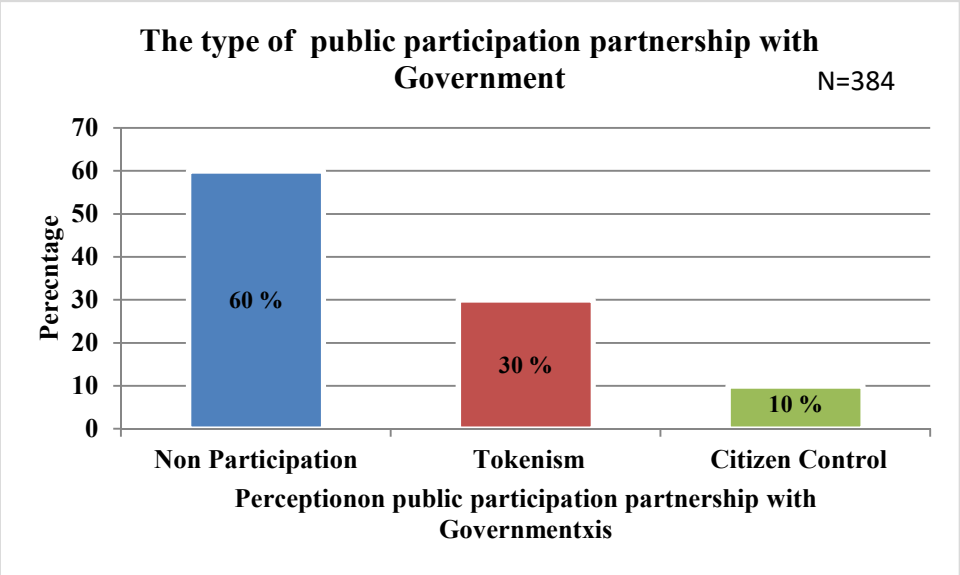

Figure: 5.15 partnership type of the household public participation in Environmental conservation efforts
Source: Researcher, (2017

When asked to describe their type of partnership in public participation environmental conservation activities with the government, majority 60% of respondents stated non-participation as the type of partnership, whilst 30% described the partnership as Tokenism and only 10% described it as citizen control. These findings showed an overall indication of the type of partnership as being of Non-Participation of the community in Kakamega County.

CHAPTER SIX

THE STRATEGIES FOR PUBLIC PARTICIPATION IN ENVIRONMENTAL CONSERVATION KAKAMEGA COUNTY.

6.1 Introduction

Chapter 6 presents the strategic options that need to be adopted or strengthened to enhance and ensure environmental conservation in Kakamega County, thereby fulfilling specific objective three. It also presents descriptive and inferential statistics using the Probit model, means and standard deviation analysis.

6.2 National aspirations on sustainable use of water and forests

Conservation, environmental management and use of the biosphere is a National aspiration, that seeks to yield the greatest sustainable benefit to the present generations while maintaining its potential to meet the needs and aspirations of the future generations. The study revealed a positive attitude by the forest adjacent dwellers towards sensitization on environmental conservation Figure 6.1, 40% agreed, 1% disagreed, whilst 40% agreed strongly and 19% didn't know. The positive finding indicated an acceptability and receptibility to sensitization as a component of strategy that can increase public awareness on environmental degradation effects and the corresponding sensitivity to conservation concerns.

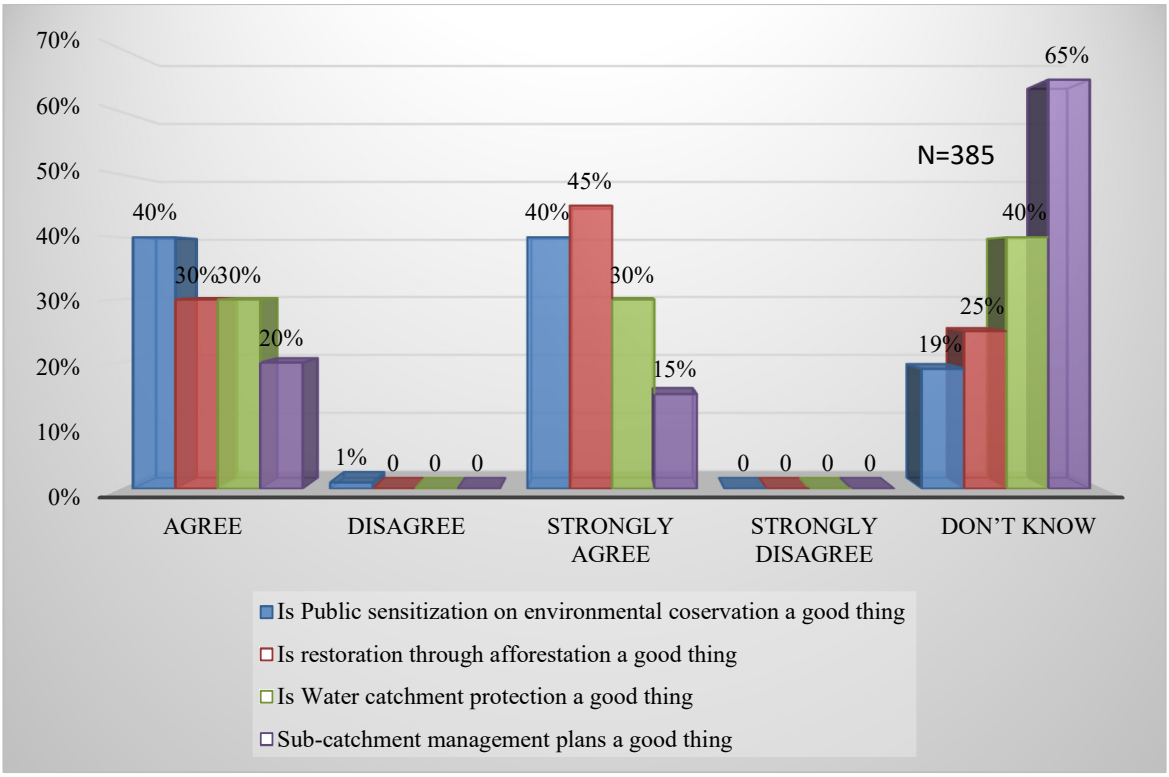

Figure: 6.1 Attitude of forest adjacent dwellers on environmental degradation and Conservation in the study area.
Source; Researcher, 2017)

The study findings further revealed that the forest adjacent dwellers were positive on restoration of environmental conservation through afforestation indicating the aspiration for sustainable exploitation and conservation of natural resources. On the same note, 30% agreed, none disagreed, 45% agreed strongly, 25% don't know. The positive finding on restoration of degraded lands and conservation through afforestation is another component of strategy that can reverse environmental degradation effects and afforestation.

The outcome of the study also indicated that Water catchment protection was positively embraced by the forest dwellers whereby 30% agreed, none disagreed, 30% agreed

strongly, that Water catchment protection was important for environmental conservation, none disagreed and 40% don't know about Water catchment protection.

The study revealed that Sub-catchment management plans (SCMP) could play an important role in environmental conservation, 20% agreed, none disagreed, 15% agreed, strongly and 65% didn't know about SCMP. According to IUCN (2013) a SCMP is an integral part of environmental conservation that enables the "involvement of stakeholders in planning and sustainable management of their water, land and related resources for improved livelihoods".

The study findings on the forest adjacent dwellers' positive attitude on SCMP could contribute immensely to public participation in identification and analysis of land degradation, water and the environment conservation; prioritisation; identification of the immediate and strategic interventions," as well as activities and sub activities, required to address the issues and; development of an associated budget. In addition, the approach entails agreeing on the timeframe for implementation of activities/sub activities, in addition to identifying and agreeing upon appropriate indicators by which to assess progress and/or success" (IUCN, 2013).

The Table 6.1 show findings of KI Interviews during FGD with 12 Key informants which disclosed that (f=6) 55% engage the media and other institutions whilst (f=5) 45% did not engage the media and other institutions for publicity of environmental conservation activities.

Table: 6.1 Engage the media and other institutions for publicity

Engage the media and other institutions for publicity
N=12

	F	%
Yes	6	55
No	5	45

Source; Researcher, 2017)

6.2.1 Normative/democratic sovereignty perspective and Citizen control/self-mobilization

Table 6.2 shows study findings on Key Informant Interviews and FGD that discussed "Who should be responsible for handling of environmental conservation" and 75% observed that the community should be responsible.

Table: 6.2 Responsibility for handling environmental conservation

N=12	**F**	**%**
Community	9	75
Government	2	20
Forest and Water resource managers	1	5

Source; Researcher, 2017)

20% reported that the government should be responsible for handling environmental conservation whilst 5% said forest and water resource managers should be responsible for handling environmental conservation.

The study findings concur with Walls *et al*, (2005) who argues that in democratic society, the citizen has the right to participate in the decision-making process. This means the public must be given the opportunity to participate in decision-making processes of any project that affects their lives if they choose to do so (Brynard, 1996). The Public

participation Bill published in 2018, to become an Act of parliament once enacted has not been devolved to county level and public participation in government environmental conservation initiatives remains at a tokenism stage with low partnership and minimal citizen control (GoK 2018).

6.2.2 Empowerment perspective and partnership/collaboration.

For policies to be implemented in a sustainable manner that benefits the environment and local economies, communities must be willing to support and participate in the efforts.

Partnerships and collaboration with authorities can help to control use of environmental resources, and provide critical information about ongoing illegal activities.

6.3 Public involvement in any form of conservation in Kakamega County

The study sought to determine the level of involvement of the community in any form of the environmental conservation activities as shown in Figure 6.2

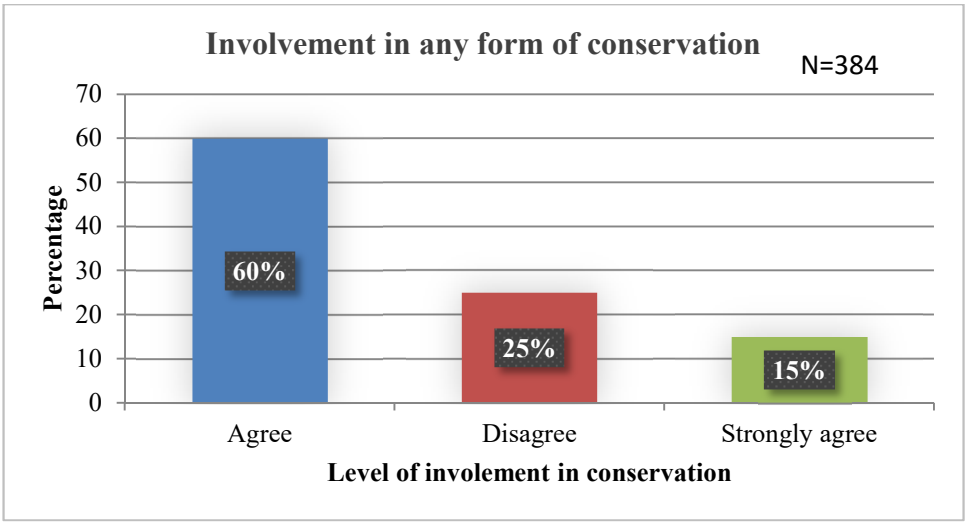

Figure: 6.2 Community Involvement in forms of environmental conservation

Source; Researcher, (2017)

The researcher sought to determine the level to which the community is involved in any form of conservation efforts. At least 60% of the respondents in the study indicated that they agreed with the statement and were involved in conservation in one way or the other, 15% strongly disagreed, while 25% disagreed.

6.3.1 Personal Initiatives to Protect Rivers and Forests in Kakamega County

The study sought to evaluate the conservation initiatives undertaken in any form by individuals for protection of rivers and forests as shown in Figure 6.3

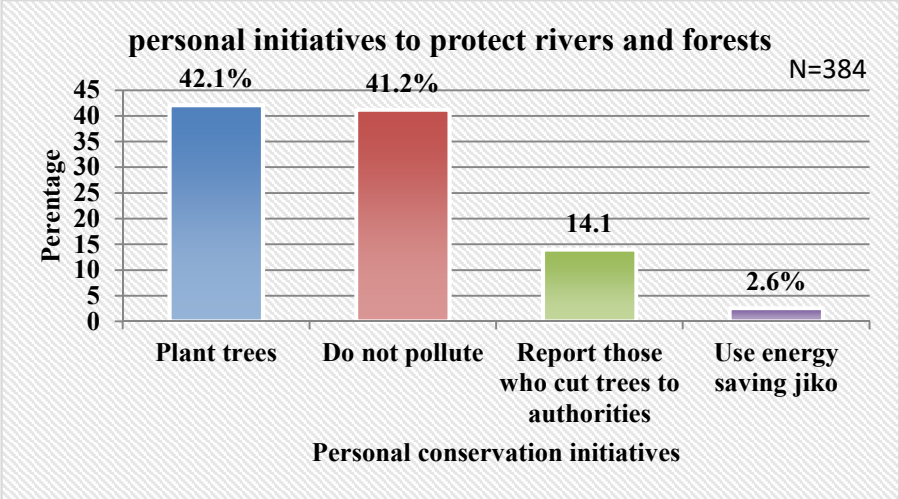

Figure: 6.3 Personal initiatives to protect rivers and forests

Source; Researcher, (2017)

The forest adjacent dweller respondents during interviews gave various views on how they are involved in conservation. The study found that 42.1% plant trees as a personal initiative whilst 41.1% stated they dispose off waste safely and are not involved in pollution; 14.1% of the respondents reported to the authorities on those who illegally cut trees and 2.6% used energy saving *jikos* as a conservation effort.

6.4 State actor's involvement with public in conservation Kakamega County

One of the most important players in environmental protection and economic development is a country's national government. Africa's long history of colonial rule and state-ruled land allocation has resulted in a large portion of forest reserves being degraded through misallocation and misuse. Like many others, Kenya's government has struggled to balance the competing demands of population growth and forest conservation (KIFCON 1994).

The success of long-term sustainable management of natural resources depends on local people's support. Assessing local people's attitudes, considering their needs, and respecting their opinions should become a management priority.

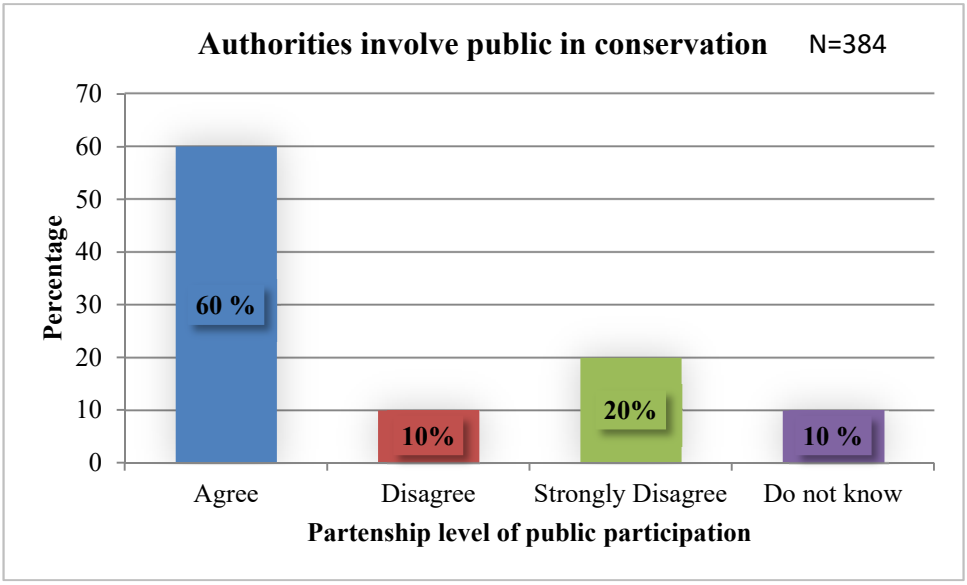

Figure: 6.4 Authorities involve public in environmental conservation

Source; Researcher, (2017)

Fostering a sense of ownership among those most directly impacted by deforestation is a key driver of success in environmental conservation. The research sought to reveal the

level to which the community is engaged by authorities in environmental conservation efforts, on a Likert scale, 60% of forest adjacent dweller respondents agreed with the statement and were involved in one way or another with official initiatives on conservation. However, another 40% cumulatively either disagreed strongly, disagreed or did not know of any government initiatives.

6.5 What the Government and Community can do to protect the Environment, Rivers and Forests

The study evaluated the public perception on strategies the government and community can adopt to stop land degradation and conserve rivers and forests Figure 6.5.

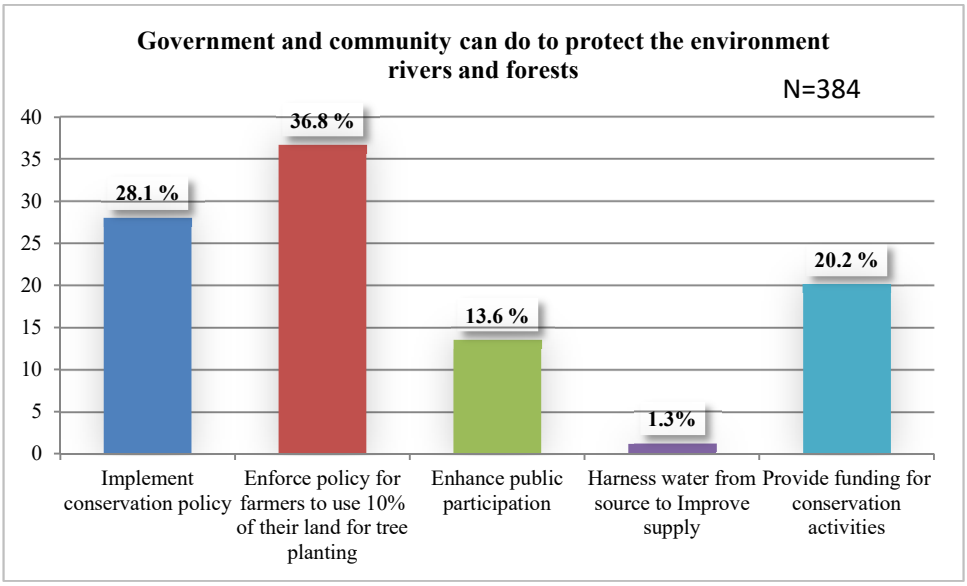

Figure: 6.5 What Government and community can do to protect the environment Source; Researcher, (2017)

When asked the question on what the government and community can do to protect the environment, 36.8% reported enforcement of 10% land use policy on tree planting, 28.1%

reported implementation of conservation policy, 20.2% reported provision of funding for conservation activities, 36.6% reported enhancement of public participation whilst 1.3% reported harnessing of water from source to improve supply.

6.6 Provision of Technical Inputs and other Support by Non-state actors toward Forest Conservation

The Sendai global conference on climate change and mitigation measures for climate change confers responsibility on non-state actors to augment state actors support to enable stakeholders' participation in natural resource use exploitation and conservation

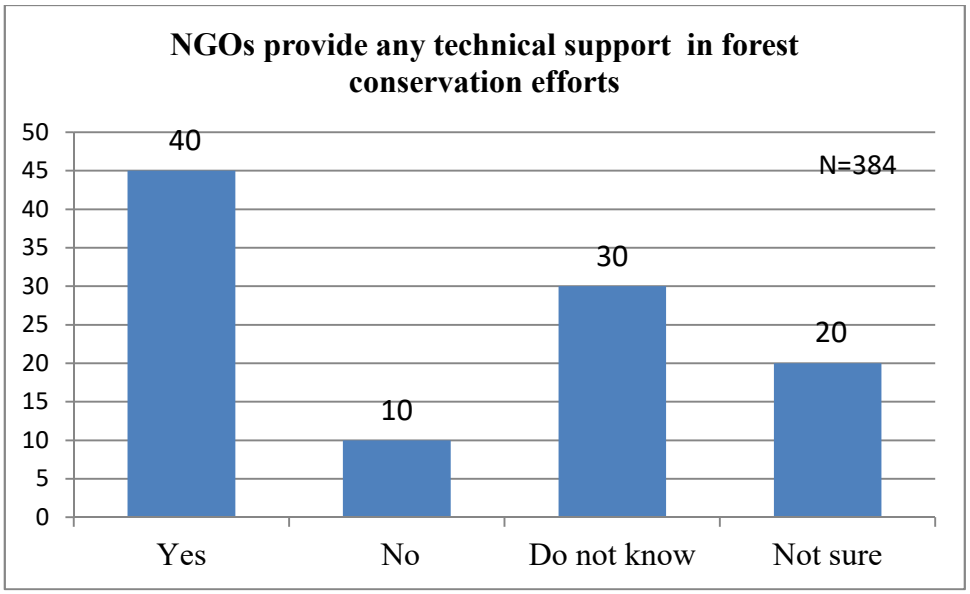

Figure: 6.6: NGOs provide technical support to help the community in Forest Conservation efforts
Source; Researcher, (2017)

The study shows the extent to which NGOs provide technical support to help the community in forest and soil conservation efforts, 40% responded in the affirmative while most (60%) either did not know, were not sure or said there was no support.

6.7 Influence of Civic Society Action on Public Participation in Water Conservation in Kakamega County.

The study found that the civil society was active to a moderate extent in environmental conservation in Kakamega County corroborating the findings by Seaba (2006) who observed that neither conservation industry nor elected representatives were making or effecting enough good decisions in the interest of the public good.

6.7.1 Provision of Funding Support by non-state actors for Water Conservation

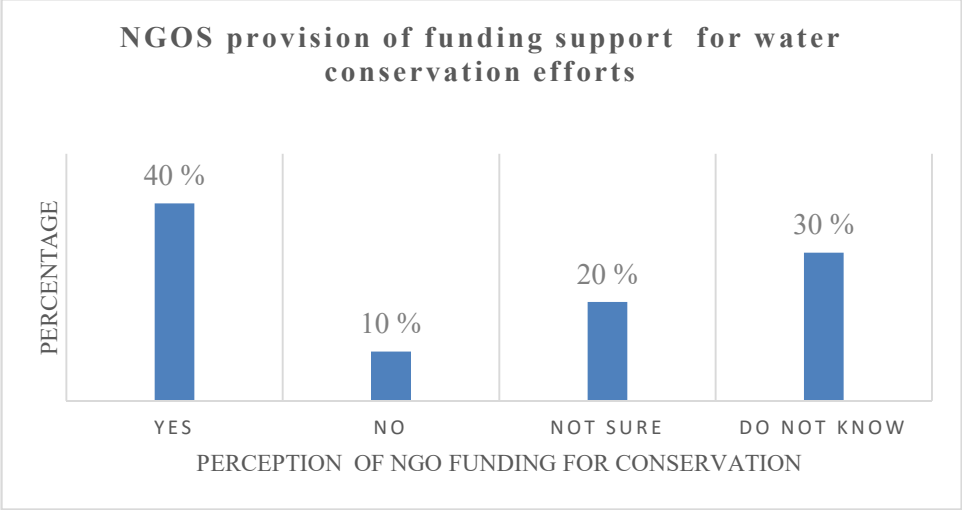

Figure: 6.7: provide Funding Support for Water Conservation efforts in the Study area
Source; Researcher, (2017)

When asked whether NGOs provide Funding Support for Water Conservation efforts to the community in forest conservation efforts, 40% responded in the affirmative while 60% did not know, were not sure or knew there was no any form of assistance.

6.7.2 Provision of Training and Capacity Building Support by non-sate actors in Water Conservation

The study evaluated the provision of training or capacity-building of non-state actors in support of water conservation efforts

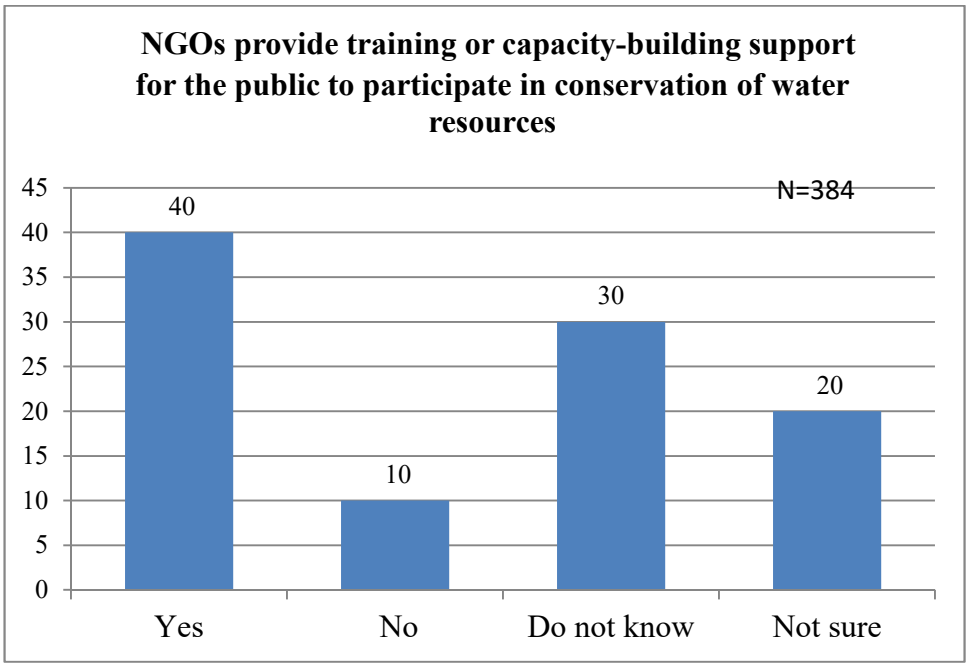

Figure: 6.8 NGOs provide training or capacity-building support for the public to participate in conservation of water resources
Source: Researcher, (2017)

When asked whether NGOs provide any training or capacity building support to the community for water conservation, 40% of the household heads said yes, while 30% claimed they did not know, and another 30% claimed they were not sure or did not know.

6.7.3 Provision of Technical Inputs and other Support towards Public Participation in water conservation Kakamega County

The study evaluated the provision of technical support of non-Governmental actors in water conservation efforts.

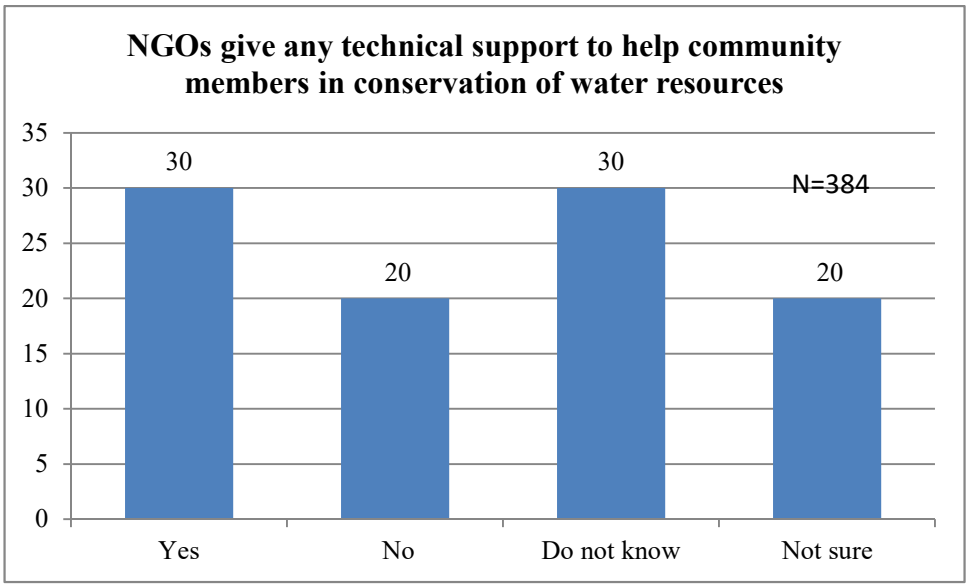

Figure: 6.9 NGOs give any technical support to help community members in Conservation of water resources
Source: Researcher, (2017

When asked whether or not NGO provide technical support to help community members in conservation of water resources, 30% of households responded in the affirmative whereas 70% denied, did not know or were not sure of any technical support given by non-Governmental actors.

6.11 Inferential statistics correlation of independent and dependent variables

The study aimed at investigating the determinants of environmental conservation and public participation in more details. The main findings of this study are threefold. First, it defined eleven environmental conservation indices covering general environmental

problem as well as specific conservation issues and public participatory pro-environmental attributes.

Through the Probit model, the study identified individual environmental factors which determine conservation and public participation, but also discerned independent and dependent factors and their roles through predicting each factor's marginal effect on the probability of the most and/or least environmentally concerned individual's organisations and structures.

6.11.1 Pearson's Moment Correlations of Knowledge, attitude, practice and environmental concerns

Measures to mitigate the effect of these degradation problems and personal initiatives to protect rivers and forests found insignificant correlation of (R=0.020; P=0.05) indicating a very low correlation between the two variables.

The correlation between the level of education and knowledge of any environmental committees in the community was significant at (R=0.147; P=0.05) indicating a high correlation of level of education, environmental committees and initiatives.

The study found that Pearson moments correlation between how land degradation affects the community and Measures to mitigate the effects of these problems was low at (R=0.014; P=0.05) inferring that current measures to mitigate the effect of these degradation problems had a statistically insignificant effect, indicating that further mitigation measures to stop land degradation were not addressed by current efforts, Table 6.3.

The study found that Pearson moments correlation between how land degradation affects the community and knowledge of any environmental committees in the community was high at (R=0.136; P=0.05) inferring that knowledge of any environmental committees in the community had a statistically significant effect indicating that knowledge of environmental committees in the community was a key driver to reverse land degradation, Table 6.3.

The study also found that Pearson moments correlation between how land degradation affects the community and Opinion on importance of environmental committees in the sub-county was low at (R= -0.086; P=0.05) inferring that Opinion on importance of environmental committees in the sub-county had a statistically insignificant effect on reversal of land degradation.

The study however found that the Pearson moments correlation between personal initiatives to protect rivers and forests and perception on importance of environmental committees in Kakamega county was high at (R= 0.101; P=0.05) inferring that Opinion on importance of environmental committees in the county had a statistically significant p-value effect on reversal of land degradation as shown in Table 6.3.

Through Measures of environmental conservation indices, socio-economic characteristics were captured as follows: Respondents' Gender, Age of respondents, and main source of income and level of education.

Questions were used in the questionnaire to illustrate the different measures as follows: How do land degradation problems affect the community? Measures to mitigate the effect of these land degradation problems. Knowledge of any environmental committees in the community, Opinion on importance of environmental committees in the sub-county,

Knowledge on role of environmental committees in the sub-county, Personal initiatives to protect rivers and forests and what the Government and community can do to protect the environment, rivers and forests.

The study measured three types of statistics. The first type was to examine the mean and standard deviation of the respondents' socio-economic characteristics (Table 6.3), which was measured with four questions

6.12 Mean and standard deviation of Age to environmental concerns

The second type of measures, used was the mean and standard deviation of eight indices (Table 6.3), which aims to indicate individual's concern about specific environmental issues ranging from local land degradation problems to public participation in environmental conservation which Consisted of open questions posed to randomly selected residents of Kakamega County in the study area and provided the answers for these specific environmental issues.

Table: 6.3 Summary of environmental conservation indices

Characteristics index for environmental conservation	Mean	Std. Deviation	N
How do these problems affect the community	1.91	1.159	384
Measures to mitigate the effect of these problems	2.27	1.214	384
knowledge of any environmental committees in the community	1.45	.573	384
Opinion on importance of environmental committees in the sub-county	1.24	.519	384
Knowledge on role of environmental committees in the sub-county	2.22	1.174	384
Personal initiatives to protect rivers and forests	1.77	.786	384
What Government and community can do to protect the environment rivers and forests	2.84	1.867	384

Source; Researcher, (2017)

A study by Wall, (1995) compares two measures of environmental concern (concern about the environment in general and concern about a specific, local environmental issue) and

reports that measure reaction to a specific, local environmental issue and posing economic trade-offs that consequently do not result in substantially improved explanatory ability, or more pronounced class differences.

In contrast, a recent study Poortinga *et al*, (2004) suggests that concern about different specific environmental issues is found to have correlation with different socio-economic characteristics. This study, examined both the contribution of public participation in environmental conservation in general and specific issues about the respondent's true participation in environmental protection.

Figure 6.11 shows the mean and standard deviation for age and interrelationship of age concerns and other dependent and independent variables that have an impact on environmental conservation in Kakamega County.

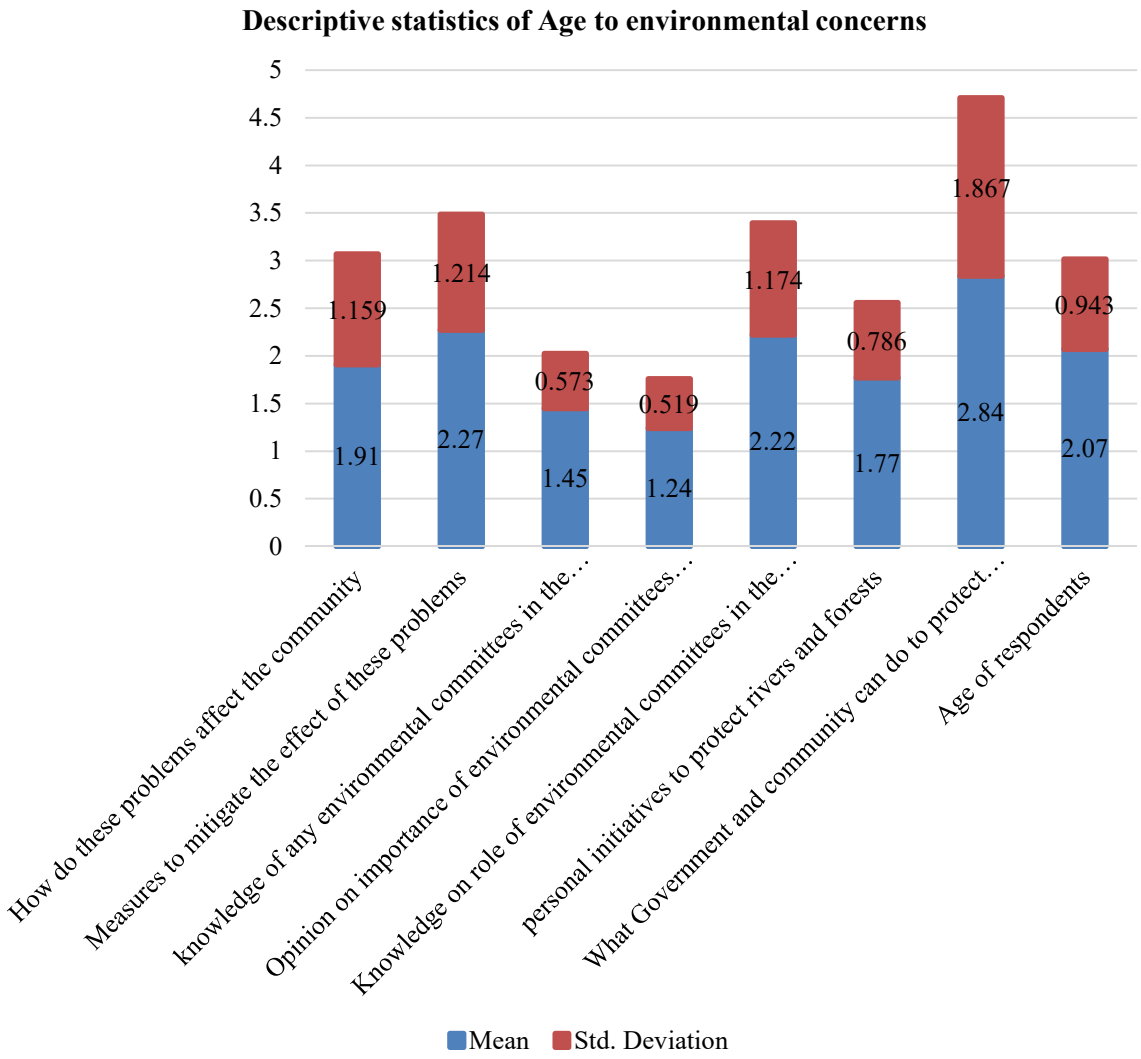

Figure: 6.10 are you involved in any form of the conservation

Source; Researcher, (2017)

Descriptive statistics of Age to environmental concerns is the third type of environmental concern measures, which comprises of two indices: the attitude towards pro-environmental behaviour and public participation.

The probit model indicates that education and income is positively correlated with environmental concern as shown in Table 6.4.

The study sought to identify the inferential relationship between the independent and dependent variables (land degradation and public participation, Governmental and non-Governmental actors' correlation) the Pearson's Moment statistical significance (p-value, probability -value) was determined as 0.05 for a two tailed test that measured the positive and negative relationship from standard variance.

Table :6.4 Correlation matrix of independent and dependent variables in Kakamega county

Correlations of Education and environmental concerns

		How do these problems affect the community	Measures to mitigate the effect of these problems	knowledge of any environmental committees in the community	Opinion on importance of environmental committees in the sub-county	Knowledge on role of environmental committees in the sub-county	personal initiatives to protect rivers and forests	What Government and community can do to protect the environment rivers and forests	level of your education
How do these problems affect the community	Pearson Correlation	1	.014	.023	.044	.076	.020	.072	.005
	N	228	228	228	228	228	228	228	228
Measures to mitigate the effect of these problems	Pearson Correlation	.014	1	.136*	-.087	.033	.004	.089	.063
	N	228	228	228	228	228	228	228	228
knowledge of any environmental committees in the community	Pearson Correlation	.023	.136*	1	.009	-.056	.054	-.253**	.146*
	N	228	228	228	228	228	228	228	228
Opinion on importance of environmental committees in the sub-county	Pearson Correlation	.044	-.087	.009	1	-.042	.101	.017	.047
	N	228	228	228	228	228	228	228	228
Knowledge on role of environmental committees in the sub-county	Pearson Correlation	.076	.033	-.056	-.042	1	.035	.201**	-.019
	N	228	228	228	228	228	228	228	228
personal initiatives to protect rivers and forests	Pearson Correlation	.020	.004	.054	.101	.035	1	.020	.020
	N	228	228	228	228	228	228	228	228
What Government	Pearson Correlation	.072	.089	-.253**	.017	.201**	.020	1	.014

and community can do to protect the environment rivers and forests	N	228	228	228	228	228	228	228	228
level of your education	Pearson Correlation	.005	.063	.146*	.047	-.019	.020	.014	1
	N	228	228	228	228	228	228	228	228

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

(Source; Researcher, 2017)

The study also found that the Pearson moments correlation between 'What Government and community can do to protect the environment, rivers and forests' and 'Knowledge on role of environmental committees in the sub-county' was very high at (R=0.202; P=0.5) inferring that What Government and community can do to protect the environment, rivers and forests had a statistically significant p-value effect on reversal of land degradation, as shown in the entire correlations Table 6.4. The findings also show a negative linear relationship between age and active engagement in environmental conservation in that the most active age sets were the lower ages between 20-35 youth and the older age sets 36 and above engaged less in environmental conservation activities.

6.13 Knowledge of Any Environmental Committees in the Community

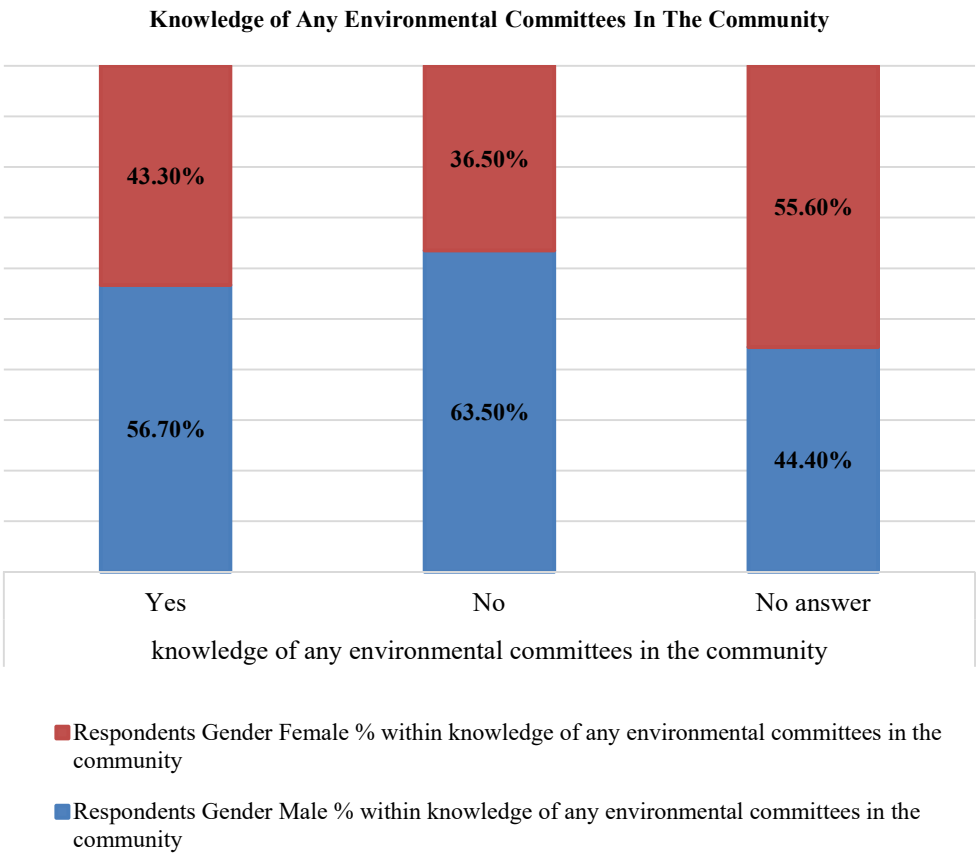

Figure: 6.11 Knowledge of Any Environmental Committees in the study Area
Source: Researcher, (2017)

Men at 53% of the respondents seem to be more environmentally aware with knowledge of committee members in the community than women at 43% of respondents. These findings corroborate observations by Jumbe and Angelsen, (2007). 'Women's involvement in decision making has hardly kept pace with the earlier changes and they don't seem to fare any better under devolution programs' (Jumbe and Angelsen, 2007).

6.14 Personal Initiatives to Protect Rivers and Forests

Personal initiatives between men and women generally indicate more environmental concern amongst men than women. However, women surpass men in complying with conservation laws. 62% men plant trees as personal initiatives in conservation whilst only 38% women do so. The findings concur with the Government legal framework which, in recognition of the important roles played by women in communities adjacent to forests, made provision for their involvement in the current Forest Policy (Forest Act Cap 384 amended 2015).

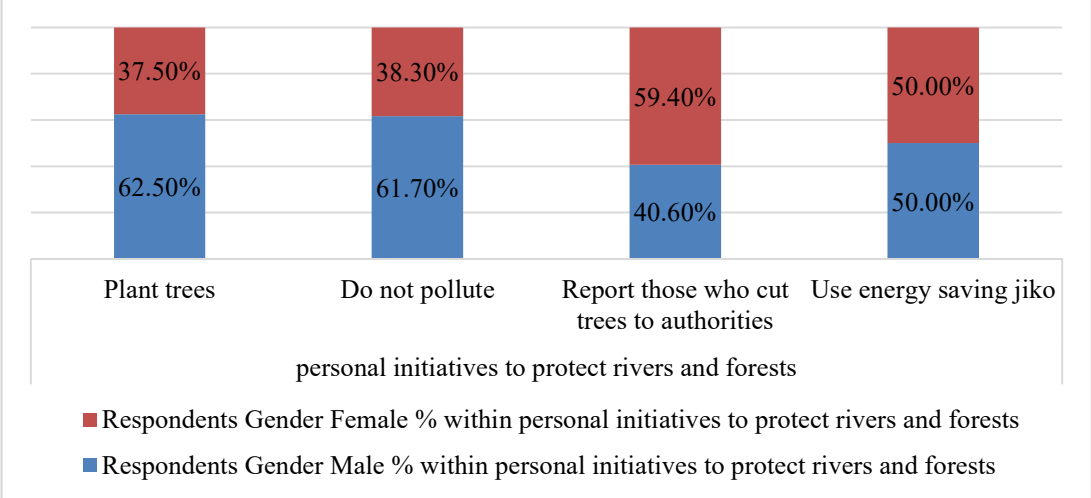

Figure: 6.12 Personal Initiatives to Protect Rivers and Forests

Source; Researcher, (2017)

The respondents were asked about personal conservation initiatives and found that 62% men do not pollute the environment whilst 38% women do so, when it comes to reporting on illegal harvesting most of the men, 59% do report to authorities whilst only 40%

women do so. There is however a similar percent of men and women who use energy saving *jikos* to conserve the environment.

As a summary of the above empirical results, the study found that income and education level are the two consistent dependent determinants of each environmental concern measure defined in the study. Age is a significant factor in most of the measures with either positive or negative signs. Age and conservation efforts has a negatively inclined relationship as seen in Figure 6.12. The mixed results of age factor imply that the effect of age on environmental concern depends heavily on which measure is used. Additionally, men are found to be more concerned about environment than women in five of seven indices.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

7.0 Introduction

The study evaluated the contribution of the public participation to environmental conservation in Kakamega County as guided by the overall and specific objectives. This chapter summarizes concludes and recommends findings of the study. The study was done with specific reference to the objectives and research questions being used as units of analysis. Data was interpreted and the results of the findings were correlated with both empirical and theoretical literature available. The conclusion relates directly to the specific objectives and research questions. The recommendations were deduced from discussions conclusion of the findings.

7.1 Summary of Major Findings

The overall findings of the study revealed that demographic factors (gender, age, education and knowledge, morbidity, social and financial status) and the level of public participation partnership between governmental and NGO initiated activities result in competition and conflict over natural resources and are major outcomes of land degradation. it was found that intervening factors (Legal, Institutional, Administrative Framework) play a significant role in environmental conservation in Kakamega County.

Findings reveal that Kakamega county is beset by various challenges that have negative effects on the environment, affecting forests, rivers, water sources and catchment areas, such as illegal logging, encroachment on fragile wetlands, wrongful cultivation, sand

harvesting and building construction are endemic along river banks. Furthermore, little soil conservation is carried out on farmlands with appropriate soil conservation structures.

7.1.1 Summary Findings for Objective One

The first objective was to determine the livelihood factors (human, social, financial) that influence the participation of households in environmental conservation of natural resources in Kakamega County.

The study identified that gender, age, financial status and morbidity played a large role in environmental degradation and impacted negatively on conservation the study particularly revealed that tree cutting and sand harvesting is predominantly carried out by men and cultivation along river banks and water catchment areas is carried out by both men and women. A good example is; majority (58.8%) of males play a dominant role in conservation while a lower percentage (41.2) female does the same. The findings about age indicate that the age bracket above youth interact more with environmental degradation and conservation.

7.1.2 Summary Findings for Objective Two

The second objective of the study was to examine the influence of governmental and non-governmental actors on community participation in environmental conservation in Kakamega County.

The study found out that there exist structures through which the community views can be integrated into government agencies initiatives and these structures are manifested as

environmental committees and they provide a link between institutions such as government departments and the community. the Pearson moments correlation between 'What Government and community can do to protect the environment, rivers and forests and 'Knowledge on role of environmental committees in the sub-county was very high at (R= 0.202 ;P=0.5) inferring that what Government and community can do to protect the environment, rivers and forests had a statistically significant p-value effect on reversal of land degradation, that was linked to age sets Table 6.3. It was however noted that there is little to no regular public participation awareness education and dialogue between the various environmental committees and the general public. The committees along with the NGOs have avenue to integrate with community through the CFAs and the WRUAs and both however are lowly funded and lack capacity to carry out effective public participation to curb cultivation along river banks and encroachment of water catchment areas following the amendment on useful laws like the Chiefs' Act which gave the local administration power to enforce observation of riverine and river banks boundaries.

7.1.3 Summary Findings for Objective Three

The third objective of the study was to evaluate the strategies for public participation, in environmental Conservation in Kakamega County. Regarding national aspirations on sustainable use of environmental resources the study found out that majority of the respondents opined that cultivation along rivers should be banned and members of the community encouraged to set aside at least 10% of their land for tree planting in line with Kenya's national policy on land use.

7.2 Conclusions

Fostering a sense of ownership among those most directly impacted by resource mismanagement, is a key driver of success. The study revealed that respondents in the study were involved in one way or another with official initiatives on conservation.

7.2.1 Conclusions for Objective One

The study found that the Pearson moments correlation between personal initiatives to protect natural resources and Opinion on importance of environmental committees in the sub-county was high at (R=0.101; P=0.5) inferring that Opinion on importance of environmental committees in the sub-county had a statistically significant p-value effect on reversal of land degradation.

It was also found out in the study that socio-economic attributes are key determinants in conservation: they affect the degree to which individuals and age groups are motivated to acquire more income from the environment and seek to get more benefits by interfering with conservation efforts such as preservation of natural resources.

7.2.2 Conclusions for Objective Two

The Pearsons moment correlation on how land degradation affects the community and measures to mitigate the effects of land degradation has an insignificant correlation of .014 indicating that current efforts to address land degradation are unrelated negatively and have no effect in reversing degradation.

The above statistics highlight that Governmental and non-state actors are key players in the use of and management of environmental resources and environmental degradation, they are also key determinants in environmental conservation for which funding and budgetary allocations from various stakeholders forms an integral component in conservation of the environmental activities. From the responses obtained from the study, it was noted that majority of the respondents indicated that they never received any funding for conservation whilst a few acknowledged receipts of funding for conservation activities indicating a low level of funding for these activities.

7.2.3 Conclusions for Objective Three

The Pearson's correlation on What Government and community can do to protect the environment, rivers and forests and knowledge of any environmental committees in the community is highly significant at correlation of (R=0.-253; P=05) indicating a positive relationship on the low lack of information on governmental structures and what the state can do to enhance conservation also indicating presence of other underlying causes that negatively affect conservation.

The level of funding to the various environmental committees by the government and other organizations should be improved, more support should be given to community groups to increase awareness of environmental rights and the benefits of sustainable environment as Professor Wangare Mathai once said, "You cannot protect environment unless you empower the people, you inform them and you help them understand that these resources are their own and that they must protect them".

7.3 Recommendations

7.3.1 Policy Recommendations

i. The contribution of public participation ought to be enhanced through regular consultation, awareness creation and education on public's role in enhancing conservation

ii. A policy with rules and regulations on environmental conservation along the policy of the repealed Chiefs' Act (which gave the local administration power to enforce observation of riverine and river banks boundaries.) be legislated and enacted with public participation to halt and reverse environmental degradation.

iii. There is need to formulate a comprehensive policy for equitable sharing of natural resources to mitigate the practices that have a negative effect on the environment and which are caused by inequitable distribution of these resources. More still, promotion of tree planting ought to be enhanced on farmlands and the law banning cultivation along river banks and within water catchment areas ought to be enforced through the reintroduction of a similar mechanism that was used in the repealed chiefs act, but was ceded to WRUAs and WRMA on a voluntary basis that presupposes a highly educated public on matters environmental conservation which is sorely lacking in capacity at the moment. Conservation will be more readily achieved when a concerted effort is put in place by the drivers of environmental conservation when such factors as age, gender, socio-economic background and levels of incomes are taken under consideration when the

community is to be involved in environmental conservation or a policy for the same is to be developed.

7.3.2 Recommendations for Further Research

i. An area for future research is about factors that affect community's level of environmental awareness, attitude and participation in environmental activities.

ii Another area for further study should be on the Traditional and indigenous knowledge and communication methods on environmental conservation in Kakamega county Kenya.

iii. It is recommended that a broad-based study covering all players in environmental conservation be done to find out the effects of strategic environmental conservation determinants on policy formulation.

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APPENDICES

Appendix 1: Letter of Introduction

CDS/G/12/10

Masinde Muliro University

P.O. Box 190- 50100

KAKAMEGA

To the kind attention of

.....

RE: Research Questions for MSc Study.

We are collecting research data for a study entitled the contribution of Public Participation in Environmental Conservation in Kakamega county Kenya of Kenya.

This study is for a MSc Thesis at the School of Disaster Management and Sustainable Development of Masinde Muliro University of Science and Technology, in Kakamega, Kenya.

You have been selected to participate in this exercise by answering to the Questionnaire provided.

The information you give will be treated confidentially and used only for academic purposes

Your honest response will be highly appreciated.

Thanking you in anticipation.

Yours sincerely

Joesph Kimutai Ngeny

Appendix 1:Individual Questionnaire for Household Heads

(To be answered by household head or their representative)

Cluster…….

Respondent Number…….

SECTION I: LIVELIHOOD FACTORS

Human Capital (Demographic) Factors

1. Age of Respondents

1. 20-24
2. 25-30
3. 31-39
4. 40-49
5. 50-59
6. 60-69
7. 70 and above

2. Gender of Respondent

1. Male
2. Female

3. Marital Status

1. Single never married
2. Married monogamous
3. Married, Polygamous
3. Separated/Widowed

4. Education level of Respondent

1. None
2. Primary level
3. Secondary Level

5. Skills, Knowledge, Information and Competence in Environmental Conservation

5a. Knowledge of environmental conservation

1. Respondent possesses land and forest conservation knowledge
2. Respondent possesses water conservation knowledge

5b. Attitude of Community Regarding Conservation:

To what extent do you agree with the statement that the protection of plants and animals is a good thing?

1. Disagree
2. Agree
3. Strongly Agree

6. Morbidity and Ability to Work in Environmental Conservation Initiatives:

Are you or members of your household ever too sick to participate in conservation activities?

1. Rarely
2. Sometimes
3. Often

Social Capital Factors

7. Knowledge of existence of environmental committee

Do you know of the existence of environmental committees in your community?

1. Yes
2. No

8. Belonging to conservation Group

Do you belong to any conservation group?

1. Yes
2. No

9. Budgetary support to households for conservation activities

Does your household receive any money from government, NGOs or other source for conservation activities?

1. Yes
2. No

10. Training/Capacity building Support for Conservation activities

Does your household receive any training/capacity building support for conservation activities?

1. Yes
2. No

11. Socio cultural Factor influencing Participation in Conservation Activities

11a. Are there any socio-cultural factors that influence the participation of your household in environmental conservation activities?

1. Yes
2. No

111b. if yes, explain how.

……
……
……

12. Policy and Political factors Influencing participation in Conservation Activities

12a. Are there any political factors that influence the participation of your household in environmental conservation activities?

1. Yes
2. No

12b. if yes, explain how.

……

13. Has the participation of your household political factors that influenced the participation in environmental conservation activities?

1. Yes
2. No

13b. if yes, explain how.

……

14. To what extent has your participation in political affairs influenced participation of your household in environmental conservation activities?

Very Highly () Highly () Neutral () Low () None ()

Economic Capital Factors

113. Level of Income of Respondent (data available)

1. Less than 5000
2. Between 5000-10,000
3. Between 10,000 and 40,000
4. Between 40,000 and 100, 0000

114. Main Source of Income

1. Informal employment
2. Formal employment

Partnership level 10. Type and level of partnership

10 a. Answer the following questions to help us determine how you participate in environmental conservation efforts

Level 1: Manipulation

When we participate, they only inform us what they have decided to do and get us to agree with their decision

1. **Yes**
2. **No**

Level 2: Therapy

To participate, they listen to the problems we have regarding the actions and activities they are undertaking, and counsel us on how we can change our minds to feel better

1. Yes
2. No
3. Sometimes

Level 3: Informing

The officials just provide information of our rights and responsibilities in environmental conservation (through radio, posters and other means) without giving us a chance to respond to their decisions

1. Yes
2. No
3. Sometimes

Level 4: Consultative
The officials usually ask us to give our opinion even though we are not sure they will actually use them in the decisions about environmental conservation in our area

1. Always
2. sometimes
3. Never

Level5: Placation

A few members of our community are part of the environment conservation committee or group formed by government or NGOs. The community members do not make up the majority

1. Yes
2. No

Level 6: meaningful partnership

We are given power to negotiate what is best for us as a community when it comes to environmental conservation issues. We share decision-making responsibilities through our own organised group

1. always
2. sometimes
3. never

Level 7: Delegated Power

Do you and other community members ever make the final decisions over environment conservation programs in your community?

1. Never
2. Sometimes
3. Always

Level 8: Citizen Control

Is the community fully in charge of the policies and programs regarding environmental conservation in this area?

1. Yes
2. No
3. Sometimes

10 b. (Enumerator) Classify the partnership type of the household

1. Non-Participation
2. Tokenism
3. Citizen Control

SECTION II: GOVERNMENT AGENCY FACTORS

201.Funding support:

201a. Does the Government provide money to help community members in conservation of water resources?

1. Yes
2. No

201b. Does the government provide money to support community in forest conservation efforts?

1. Yes
2. No

201 c. Comment on the level of financial support (if any)

……
……
……

201d. is the support given frequently?

1. Yes
2. No

202.Training and capacity building support

202a. Does the government provide training or capacity-building support for the public to participate in conservation of water resources?

1. Yes
2. No

202b. Does the government provide training or capacity-building support for the public to participate in conservation of forest resources?

1. Yes
2. No

202 c. Comment on the type of training or capacity building support given in general for conservation

……
……
……

202 d. Is the support given frequently?

1. Yes
2. No

203. Technical support:

203 a. Does the Government any technical support to help community members in conservation of water resources?

1. Yes
2. No

203b. Does the government provide any technical support to help the community in forest conservation efforts?

1. Yes
2. No

203 c. Comment on the level of support (if any)

……
……
……

203d. Is the support given frequently?

1. Yes
2. No

204.Type and level of partnership

204a. How do you feel the government and its agencies engage with the public in conservation efforts? (Enumerator remind respondent of former choices then Tick the relevant one)

1. Manipulation
2. Therapy
3. Informing
4. Consultative
5. Placation
6. meaningful partnership
7. Delegated Power
8. Citizen Control

1.

204b. (Enumerator) Classify the partnership type of households with NGOs

4. Non-Participation
5. Tokenism
6. Citizen Control

204c. (Enumerator) indicate the general level of Community Contribution resulting from partnership level

1. Low
2. Medium/Average
3. High

205. Average level of public participation contribution based on overall partnership mode of individual, Government and NGO level partnership

1. low level contribution **2**. Average level contribution **3.** High level Contribution

SECTION III: NON-STATE ACTOR FACTORS

301.Funding support:

301a. Do NGOs provide money to help community members in conservation of water resources?

3. Yes
4. No

301b. Do NGOs provide money to support community in forest conservation efforts?

3. Yes
4. No

301 c. Comment on the level of financial support provided (if any)

……
……
……

301 d. Is the support provided frequently?

1. Yes
2. No

302.Training and capacity building support

302a. Do NGOs provide training or capacity-building support for the public to participate in conservation of water resources?

1. Yes

2. No

302b. Do NGOs provide training or capacity-building support for the public to participate in conservation of forest resources?

1. Yes
2. No

302 c. Comment on the type of training or capacity building support given in general for conservation

……
……
……

302d. Is the support given frequently?

1. Yes
2. No

303.Technical support:

303 a. Do NGOs give any technical support to help community members in conservation of water resources?

5. Yes
6. No

303b. Do NGOs provide any technical support to help the community in forest conservation efforts?

5. Yes
6. No

303 c. Comment on the level of support (if any)

……
……
……

303d. Is the support given frequently?

3. Yes
4. No

304.Type and Level of Partnership

304a. How do you feel the NGOs engage with the public in conservation efforts? (enumerator remind respondent of former choices then Tick the relevant one)

1. Manipulation
2. Therapy
3. Informing
4. Consultative
5. Placation
6. meaningful partnership
7. Delegated Power
8. Citizen Control

304b. (Enumerator) Classify the partnership type of households with NGOs

7. Non-Participation
8. Tokenism
9. Citizen Control

304c. (Enumerator) Indicate the general level of Community Contribution resulting from partnership level

4. Low
5. Medium/Average
6. High

305. Average level of public participation contribution based on overall partnership mode of individual, Government and NGO level partnership

1. Low level contribution **2**. Average level contribution **3.** High level Contribution

Appendix 2: Key Informant Interview Guide for Government Representatives

Theme: Individual Livelihood Factors

Probing Questions:

1. Human Capital Factors:

What are the characteristics of individuals in this community that influence their participation in water and forest conservation? *(Probe for age, gender, health, marital status, education issues)*

2. Social Capital Factors:

- How do cultural and social factors affect the participation of community members in environmental conservation for water and forest resources in this community? *(Probe for affiliation to conservation groups, traditional practices)*
- How does this community engage with government in conservation issues *(probe for knowledge, attitude and competence practices, group initiatives, compliance with policies)?*

3. Economic Capital Factors:

- Which ways does the general economic status of people in this community affect their participation in environmental conservation activities for forests and water?

Theme: Government Agency Factors

Probing Questions:

4. Provision of funding support:

In which ways does the government and its agencies finance environmental conservation initiatives for water and forest resources?

5. Provision of training and capacity building support:

How does the government build the capacity of community members for water and forest conservation here in Kakamega county?

6. Provision of technical support:

What kind of technical support in water and forest conservation does the government provide to communities in Kakamega County?

7. Type of engagement:

Describe how the government agencies on the ground relate with the community while working in terms of level of decision making given to the public *(probe for relational issues that will reveal the general type of partnership)*

Theme: Non-State Actor Factors

Probing Questions:

8. Comment on the role that Non-governmental organisations play in encouraging or discouraging public participation in environmental conservation for water and forest resources in Kakamega *county (probe for funding, technical and training support)*
9. How do NGOs generally relate with the community when engaging them for conservation of water and forest resources *(probe for type of partnership engagement characteristics)*

Appendix 3: Key Informant Interview Guide for Representatives of Non-Governmental Organizations (NGOs, FBOs CBOs)

Theme: Individual Livelihood Factors

Probing Questions:

1. Human Capital Factors:

What are the characteristics of individuals in this community that influence their participation in water and forest conservation? *(Probe for age, gender, health, marital status, education, knowledge, attitude and competence practices issues)*

2. Social Capital Factors:

- How do cultural and social factors affect the participation of community members in environmental conservation for water and forest resources in this community? *(Probe for affiliation to conservation groups, traditional practices)*
- How does this community engage with civic society (NGO/CBOs/FBOs) in conservation issues *(probe for, group initiatives, compliance with policies)?*

3. Economic Capital Factors:

- Which ways does the general economic status of people in this community affect their participation in environmental conservation activities for forests and water?

Theme: Non-State Actors Factors

Probing Questions:

4. Provision of funding support:

In which ways does civic finance environmental conservation initiatives in Kakamega?

5. Provision of training and capacity building support:

How do NGOs like yours build the capacity of community members for water and forest conservation here in Kakamega County?

6. Provision of technical support:

What kind of technical support in environmental conservation do your NGOs provide?

7. Type of engagement:

How does your organisation relate with the community while working in terms of level of decision making given to the public *(probe for relational issues that will reveal the general type of partnership)?*

Theme: Government Actor Factors

Probing Questions:

8. Comment on the role that government and its agencies plays in encouraging or discouraging public participation in environmental conservation for water and forest resources in Kakamega *county (probe for funding, technical and training support)*

9. How does the government generally relate with the community in water and forest conservation? *(probe for type of partnership engagement characteristics)*

Appendix 4: Focus Group Discussion Guide

Theme: Individual Livelihood Factors

Probing Questions:

1. How do people in this community participate in water and forest conservation?

2. What are the household factors that help or hinder the process? (Probe for demographic, social and economic characteristics of individual *community members)*

Theme: Government Agency Factors

Probing Questions:

3. How does government affect the participation of communities in forest and water conservation in this community? *(probe for issues of funding, training and other support)*

4. What kind of working relationship does the government have with the community? *(probe for issues that reveal the type and level of partnership)*

Theme: Non-State Actor Factors

Probing Questions:

5. How do NGOs, CBOs and FBOs affect the participation of communities in forest and water conservation in this community? *(probe for issues of funding, training and other support)*

6. What kind of working relationship do the NGOs have with the community? *(probe for issues that reveal the type and level of partnership)*

INTERVENING VARIABLES

Legal, Institutional, Administrative Framework

LEVEL OF PUBLC PARTICIPATION IN AND CONTRIBUTION TO ENVIRONMENTAL CONSERVATION OF WATER AND FOREST RESOURCES

LOW (NON-PARTICIPATION) LEVEL OF CONTRIBUTION

(1) Manipulation

(2) Therapy

MEDIUM (TOKENISM) LEVEL OF CONTRIBUTION

(3) Informing

(4) Consultation

(5) Placation

HIGH (CITIZEN POWER) LEVEL CONTRIBUTION

(6) Partnership

(7) Delegated Power

(8) Citizen Control,

DETERMINANTS OF PUBLIC PARTICIPATION

INDIVIDUAL LIVELIHOOD FACTORS

- Human Capital factors
- Social Capital factors
- Economic Capital Factors

GOVERNMENT AGENCY FACTORS

- Provision of funding support
- Provision of training and capacity building support
- Provision of technical support
- Type of engagement

NON-GOVERNMENTAL AGENCY FACTORS

- Provision of funding support
- Provision of training and capacity building support
- Provision of technical support
- Type of engagement with the community

**Type of engagement refers to type of partnership according to the citizen participation ladder model*

Appendix 5: Direct Observation Guide

1. **Observe for household initiatives to conserve water resources**

(Fill in key ones here)

2. **Observe for evidence of public initiatives to conserve forest resources**

(Fill in key ones here)

Observation checklist for land degradation and conservation Kakamega county, Kenya

Geophysical disasters	**Indicator**	
Soil salinity l	ambient water quality standards	
Drought and crop failures	bare lands	
Earthmoving activities	soil runoff, Sand harvesting, construction on riverbed	
Cutting and Filling	Bare Lands	
Effluents Facilities	Toilets Present	
Violating Any Laws and Ordinances	Social Environment	
Adversely Affected Natural Environment (Ecosystem	Galleys and Uncontrolled Water Runoff	
Areas of Deforestation		
Water Shortages and Increased Workloads to Collect Water	Reservoirs	
Waterlogging of Soils,	Storm Damage	
Areas of forestation		
Soil conservation structures	Gabions, terraces, soil traps	

Appendix 6: Questionnaire for Environmental committee members

The objective of this questionnaire is to facilitate collection of data on the roles of environmental committees WRUAs, CFAs, conservation groups in the integrated water and forest management taking selected sub-counties in Kakamega County. All information given will be used for academic purposes and therefore information given will be used for academic purposes only and it will be treated with the highest degree of confidentiality.

Part 1

Respondent no. ……

Please tick (٧) in the boxes for the correct answer for each item

1. What is your gender?

Male () Female ()

2. What is your age?.....(Yrs.)

Have a question of the income levels first before the source.

3. What is your monthly income level (i) less than 5000 (ii) 5000-10000 (iii)10000-40000 (iv) 40000 – 100000 (v) > 100000

4. What is the main source of your income?

Business ()

Forest and water products ()

Self-employment ()

Employed by government ()

4. What is your level of your education?

University ()

Tertiary ()

Secondary ()

Primary ()

None ()

5. Do you know anybody who is a member of the environmental committee in your area? Yes No

Occupation

Governor 1

CEC 2

County commissioner 3

Sub-County commissioner 4

Asst-County commissioner 5

Chief 6

Assist-Chief 6

MCA 7

Local leader 8

Teacher 9

Villager 10

6 Do you know anybody who is a member of the WRUA in your area? Yes No

Occupation ()

7 Do you know anybody who is a member of the CFA in your area? Yes No

Occupation ()

8 Do you know anybody who is a member of the environmental conservation group in your area? Yes, N No

Occupation ()

6. Do you think this membership is well constituted? Yes or No

7. If No, give reasons

8 Do you think environmental committees in your sub-county are important?

Yes () No ()

8b Do you think WRUAs in your sub-county are important?

Yes () No ()

8c Do you think CFAs in your sub-county are important?

Yes () No ()

8D Do you think environmental groups in your sub-county are important?

Yes () No ()

9. What are the roles of environmental committees in your sub county? State below.

a)

…….

b)

…….

c)……
…….

What are the roles of WRUAs in your sub county? State below.

a)
……

b)
……

c)……

What are the roles of CFAs in your sub county? State below.

a)
……

b)
……

c)……
…

What are the roles of environmental groups in your sub county? State below.

a)
……

b)
…….....

c)……
…

10. Are you satisfied with these roles? If not give reasons

11. Do you face challenges in the management water and forest?

Yes () No ()

12. If yes in (7) above, state some of the problems:

(a)……b)
……

c)…… d)……

e) ……

13. Do you receive any funding for your activities aimed at environmental conservancy?

Yes () No ()

14. What is the source of financing for the committee you belong to?

Government ()

NGO ()

Private sector ()

Self-help group ()

Others (state) ()

15. Is the assistance of the government in the conservation of water and forest management adequate? (Yes) (No)

16. If your answer in 11 above is either Yes or No, briefly state reasons for choosing your option
(a)……

(b)…….

17. What role do the various stakeholders (youth, women, elders, leaders) play in the environmental committees?

18. Do you think the youth and women have a role to play in environmental committees?

Yes () No ()

b. If yes in the above what are their roles in relation to question 13 above?

……

……

19. What are the existing strategies used in the management of water and forest resource in your area?

20. What strategies do you employ in managing water and forests resources in your districts?

i)……

ii)……
…

iii)…….

iv)…….

Question on attitude to conservation

On a scale of 1-5 please state your opinion on the following questions

Scale1 –Agree to 5-Do not know

Statement	Agree	Disagree	Strongly agree	strongly Disagree	Don't know
Is the protection of animals and plants a good or a bad thing?					

Is the prevention of hunting/Logging a good or a bad thing?

Is conservation of the environment a good thing?

Are you involved in any form of conservation?

Do the authorities involve you in conservation?

13. What are the roles of environmental committees in your sub county? State below.

a) …Conserve environment……

b) …Protect environment…….

c)Consult with the public on environment

d) other please state…….

14 What are the roles of WRUAs in your sub county? State below.

a water sources and supply water…… How? …

b) …Protect water catchment areas…… How?

c)Consult with the public on water issues

d) other please state…….

15 What are the roles of CFAs in your sub county? State below.

a) … Conserve environment…… How? …

b) …Protect the forest…… How?

c)Consult with the public on forest and environment

d) other please state…….

.

16 What are the roles of environmental groups in your sub county? State below.

a) Conserve environment……How? …

b) …Protect environment…… How?

c)Consult with the public and advice Gok on local environment issues

d) other please state…….

….

17. Are you satisfied with these roles? Yes (1) No (2)

If not give reasons……
……
….

18. Do you face challenges in the management water and forest?

Yes (1) No (2)

19. If yes in (7) above, state some of the problems:

(a)……b) ……

c)…… d)……

e) ……

20. Do you receive any funding for your activities aimed at environmental conservancy?

Yes () No ()

21. What is the source of financing for the committee you belong to?

Government (1)

NGO (2)

Private sector (3)

Self-help group (4)

Others (state) (5)

22. Is the assistance of the government in the conservation of water and forest management adequate? (Yes) (No)

23. If your answer in 11 above is either Yes or No, briefly state reasons for choosing your option

(a)……

(b)…….

24. What role do the various stakeholders play in the environmental committees

youth,1=Active role2=no role,3=do not know, 4=small role

women, 1=Active role2=no role,3=do not know, 4=small role

elders, 1=Active role2=no role,3=do not know, 4=small role

leaders)? 1=Active role2=no role,3=do not know, 4=small role

25. Do you think the youth and women have a role to play in environmental committees?

Yes () No ()

b. If yes in the above what are their roles in relation to question 21 above?

…1=They receive funding from Gok,2=they receive funding from NGO, 3 They Fund Themselves 4=Do not know……

26. What are the existing strategies used in the management of water and forest resource in your area?1= Public sensitization, 2=restoration through afforestation, 3=water catchment protection, 4=Sub-catchment management plans, 5 =Do not know, 6 other……..

27. What strategies do you employ in managing water and forests resources in your districts?

1= Public sensitization, 2=restoration through afforestation, 3=water catchment protection, 4=Sub-catchment management plans, 5 =Do not know, 6 others……Question on attitude to conservation

29 On a scale of 1-5 please state your opinion on the following questions

Scale1 –Agree to 5-Do not know

Statement	**Agree**	**Disagree**	**Strongly agree**	**Strongly Disagree**	**Don't know**
Is the protection of animals and plants a good or a bad thing?					
Is the prevention of hunting/Logging a good or a bad thing?					
Is conservation of the environment a good thing?					
Are you involved in any form of conservation					
Do the authorities involve you in conservation					

Appendix 7: Interview Schedule to Key informants

This tool is meant to facilitate discussions with and collect views from community leaders and government officials

1. Your portfolio……

2. Area of Jurisdiction……duration served in this station……

Q1. Name the major

……..

…….

……

……

……..

……..

Q2. What is the Environmental Conservation, soil conservation, water conservation and Community mobilization issues in your jurisdiction?

…….

……

…….

……..

…….

…….

Q4 what measures has your office put in place to support Environmental Conservation, soil conservation, water conservation and Community participation?

…….

……

…….

……..

…….

…….

Q10. Please give your assessment of the Environmental Conservation, soil conservation, water conservation and Community participation information and sensitization situation in your area of jurisdiction

Adequate

Adequate in most parts

Not adequate in a significant proportion of the area

Not adequate in 90% of the area

Can't quantify as per now

Q11. What is the government policy on Environmental Conservation, soil conservation, water conservation and Community participation in your area of jurisdiction?

……
……
……
……
……
……
……

Q12 Name intervention measures you have put in place to curb Environmental Conservation, soil conservation, water conservation and Community participation in your area of jurisdiction?

……

…….

……..

…….

…….

Q13 State budgetary provision for intervention measures you have put in place to curb Environmental Conservation, soil conservation, water conservation and Community participation in your area of jurisdiction?

……

…….

……..

…….

…….

1. What do you think the government should do to ensure full implementation of integrated water and forests management within your districts?

2. Which projects do you think government should initiate in order to create and sustain projects aimed at ensuring full implementation if integrated water and resource management?

3. What should government do in order to create job opportunities to women and youth through participatory activities in ensuring proper management of water and forest resources within your districts?

4. What challenges do you face in managing these resources and how do you intend to overcome them?

Appendix 8: Key Informants Questionnaire (II) guideline on Environmental Conservation, soil conservation, water conservation and Community mobilization capacity

A. Your portfolio……

B. Area of Jurisdiction=Agriculture, 2= Forest conservation, 3= Central Government Administration= County Government Administration ,5=Water resource management=water supply= other duration served in this station=less than 1 yr,2= 1-3yrs,4=3-5yrs, more than 10 yrs.……

No	Question	Response Options	Code
1.	Are you trained in Environmental? Conservation, 2. Soil conservation, water conservation Community mobilisation?	0 = No 1=Yes 2= Do not know	
2.	How often do you carry out vulnerability and risk assessment?	1 = Rarely (once or twice in the past three months) 2 = Sometimes (three to ten times in the past One year) 3 = Often (more than ten times in the past one year)	
3.	Do you have a training manual and materials on Environmental Conservation, soil conservation, water conservation and Community mobilisation? activities?	0 = No 1=Yes 2= Do not know	
4.	Do you sensitize community on Environmental Conservation? Soil conservation, water conservation Community mobilisation?	0 = No 1=Yes 2= Do not know	
5.	How often do you hold trainings and seminars?	1 = Rarely (once or twice in the past three months)	

		2 = Sometimes (three to ten times in the past One year) 3 = Often (more than ten times in the past one year)	
6.	Who trains at the local level?	1 = DRR officers) 2 = trained personnel 3 = non-trained personnel weeks)	
7.	How often did this happen?	1 = Rarely (once or twice in the past three months) 2 = Sometimes (three to ten times in the past One year) 3 = Often (more than ten times in the past one year)	
8.	What does the training involve?	1 = Develop solutions to land degradation, 2 = providing a higher degree environmental conservation) 3 = training local village volunteers in environmental conservation 4= Risk reduction measures 5=. use traditional organizational structures in communities to assist in environmental conservation;	
9.	Do you prioritize environmental conservation warning in your County development plan, sub-county development plan, locational development plan	0 = No 1=Yes 2= Do not know	
10.	How often do you meet to discuss environmental conservation plans	1 = Rarely (once or twice in the past three months) 2 = Sometimes (three to ten times in the past One year)	

		3 = Often (more than ten times in the past one year)	
11.	Do you implement community participation and involvement	0 = No 1=Yes 2= Do not know	
12.	Do you engage the media and other institutions;	0 = No 1=Yes 2= Do not know	
13.	Do you invite popular personalities to sensitize the public on environmental conservation	0 = No 1=Yes 2= Do not know	
14.	Have you infused environmental conservation in school programs	0 = No 1=Yes 2= Do not know	
15.	At what level in school programs	Tertiary, secondary, primary, others	
a. PART 2 EWS QUESTIONS RISK KNOWLEDGE/ warning service/			
16.	Are the environmental conservation vulnerabilities well known	0 = No 1=Yes 2= Do not know	
17.	Who should be responsible for handling environmental conservation?	Households 2. Community 3. Flood risk managers 4 government	

Appendix 9: FGD guide on any other general comments?

1. What types of environmental degradation Occur in your area?
2. Can you deal with environmental degradation in your area?
3. Do you insure your business?
4. Do you have environmental conservation days/activities in your area?
5. Who leads these activities?
6. Who trains you on environmental degradation and conservation?
7. What type of Training do you undergo?
8. Who do you collaborate with in environmental degradation/conservation?
9. How often do carry out soil conservation activities on land (others /yours? Quarterly. Bi-annually. Annually never
10. How often do carry out tree planting activities (others /yours? Quarterly. Bi-annually. Annually, never
11. How often do carry out water catchment conservation activities (others /yours? Quarterly. Bi-annually. Annually, never
12. How often do you visit /are you visited by a soil conservation/forest expert?
13. Are there land plans?
14. Do you have soil conservation structures on land?
15. What is your opinion on environmental degradation and conservation??
16. Who should be responsible for environmental degradation and conservation??
17. What can be done to improve environmental conservation?
18. What other actors are involved in environmental protection activities?
19. What are the challenges faced by groups trying to protect the environment?
20. What recommendations would you make towards community protection of the environment?

21 Any other general comments?

Appendix 10: Research Authorization – Ministry of Education, Science and Technology

MINISTRY OF EDUCATION SCIENCE & TECHNOLOGY

Telephone: 056 - 30411
FAX : 056 – 31307
E-mail : wespropde@yahoo.com
When replying please quote.

COUNTY DIRECTOR OF EDUCATION
KAKAMEGA COUNTY
P. O. BOX 137 - 50100
KAKAMEGA

STATE DEPARTMENT OF EDUCATION

REF: REF:WP/GA/29/17/VOL.I1I/ **14th November, 2016**

Joseph Kimutai Ngeny
Masinde Muliro University
of Science & Technology
P. O. Box 10 – 50100
KAKAMEGA

RE: RESEARCH AUTHORIZATION

The above has been granted permission by National Council for Science & Technology vide letter Ref. NACOSTI/P/16/73203/1424 dated 24th October, 2016 to carry out research on **"Determinants of environmental conservation"** in Kakamega County, Kenya, for a period ending 24th October, 2017.

Please accord him any necessary assistance he may require.

PP **A. K. LANGAT**
COUNTY DIRECTOR OF EDUCATION
KAKAMEGA COUNTY

Appendix 11 : Research Authorization-County Commissioner, Kakamega County

REPUBLIC OF KENYA

THE PRESIDENCY
MINISTRY OF INTERIOR & CO-ORDINATION OF
NATIONAL GOVERNMENT

Telegrams "DISTRICTER", Kakamega
Telephone 056 31131
Fax 056 31133
Email-cckakamega12@yahoo.com
When replying please quote

Ref : ED/12/1/VOL.II/181

and date

COUNTY COMMISSIONER
KAKAMEGA COUNTY
P O BOX 43-50100
KAKAMEGA.

DATE: 14th Nov, 2016

Joseph Kimutai Ngeny
Masinde Muliro University of
Science and Technology
P.O Box 190-50100
KAKAMEGA

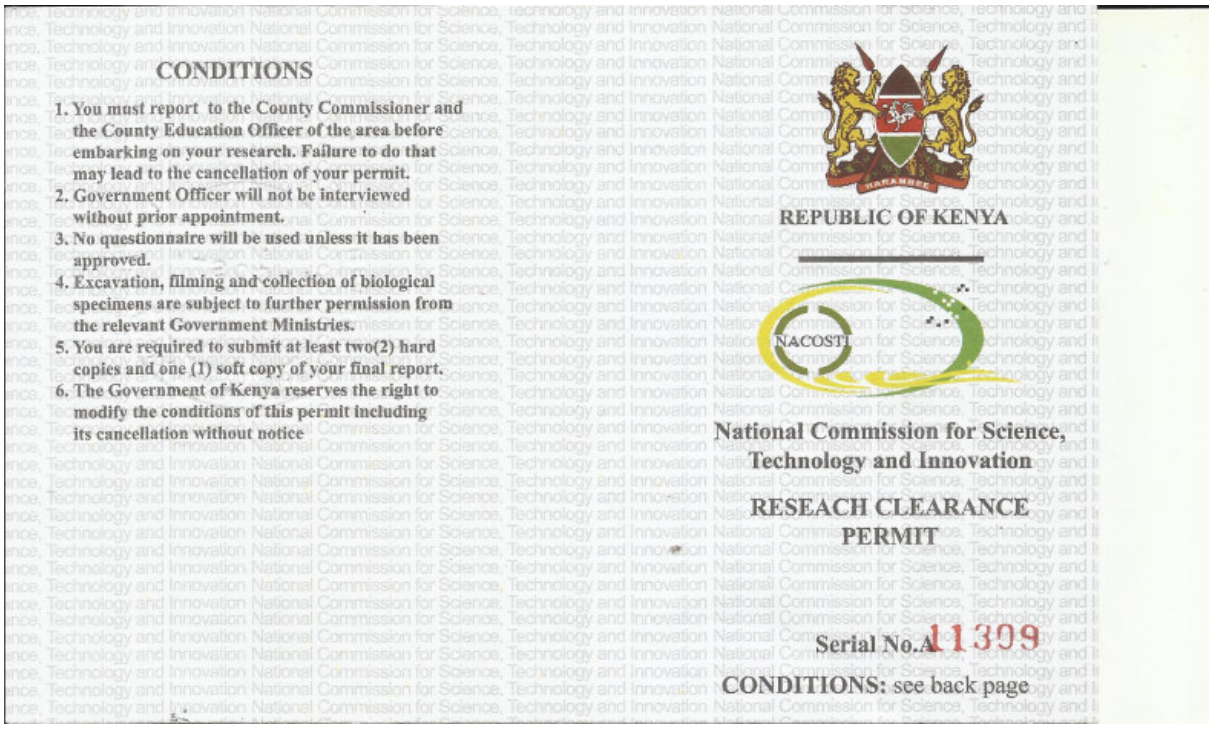
RE: RESEARCH AUTHORIZATION

Following your authorization vide letter Ref: NACOSTI/P/16/73203/14124 dated 24th October, 2016 by NASCOTI to undertake research on "***Determinants of Environment conservation in , Kakamega County, Kenya"***

Iam pleased to inform you that you have been authorized to carry out the research on the same.

E. ATEMI
FOR: COUNTY COMMISSIONER
KAKAMEGA COUNTY

Appendix 12: Research Authorization – NACOSTI



CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.
2. Government Officer will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one (1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

REPUBLIC OF KENYA

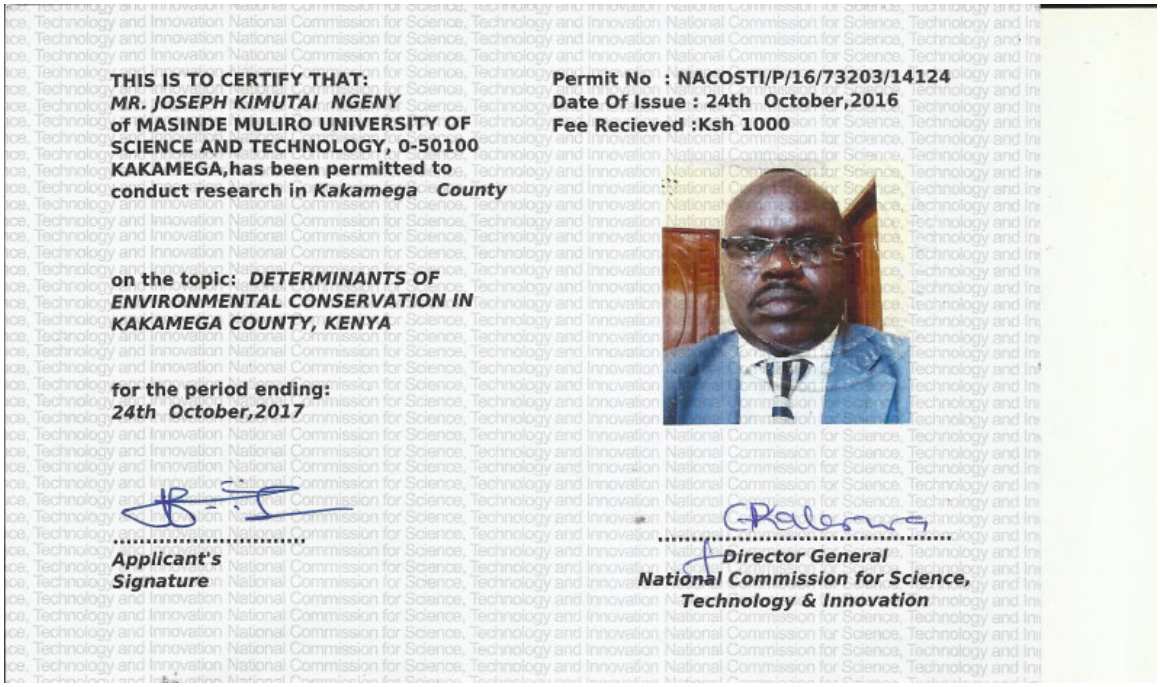
NACOSTI

National Commission for Science, Technology and Innovation

RESEACH CLEARANCE PERMIT

Serial No.A 11399

CONDITIONS: see back page



THIS IS TO CERTIFY THAT:
MR. JOSEPH KIMUTAI NGENY
of MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY, 0-50100 KAKAMEGA,has been permitted to conduct research in *Kakamega County*

on the topic: *DETERMINANTS OF ENVIRONMENTAL CONSERVATION IN KAKAMEGA COUNTY, KENYA*

for the period ending:
24th October,2017

Permit No : NACOSTI/P/16/73203/14124
Date Of Issue : 24th October,2016
Fee Recieved :Ksh 1000

.....
Applicant's Signature

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