

**ACCESS TO FOREST PRODUCTS AND SUPPORT FOR CONSERVATION:
A CASE OF MALAVA FOREST, KENYA**

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DEDICATION

I dedicate this work to my entire family.

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First and foremost, I thank the Almighty God for His favour upon me that has seen me through this milestone. My heartfelt gratitude goes to my supervisor, Dr. Onjala, whose unfailing support has enabled me to sail through this process with ease, confidence, and assurance of great success. May God's blessings be upon you!

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ABSTRACT

Many households are entirely dependent on natural capital for their livelihood activities, and forests, for a long time have provided this critical capital. Forest resources are important sources of livelihoods both for rural and urban dwellers across the world. As human beings have interacted with forest resources, in most cases the resultant scenario has been land degradation, conflicts, and deforestation. Conservation of these resources, therefore, has been and continues to be key in ensuring sustained livelihood support from forest resources. Actions to conserve forest resources have evolved over time in Kenya; from the colonial times when forest lands were rendered inaccessible to local communities, to post-colonial times with the Gazettement of part of the forest lands; with current frameworks characterized by participatory forest management. In all these efforts, as literature points out, the involvement of local communities by allowing them to exploit the resources and participate in decision-making always have had questionable outcome on conservation. This study focused on Malava forest adjacent communities' access to forest products and cross-examined whether this interaction influenced their attitude and behaviour towards support for forest conservation. The study argued that access to forest products provides benefits to the communities which eventually engenders positive attitude and behaviour towards support for forest conservation. The study employed a cross-sectional survey research design and used systematic random sampling method to sample 169 respondents from the households surrounding Malava forest. The study findings show that access to forest products is influenced by household demographic characteristics such as distance to the forest, age, level of education, wealth, household size, gender and occupation. Contrary to empirical findings which have shown that dependence on forest resources adversely affects communities' attitude and behaviour towards support for conservation, our analysis has shown that support for conservation in Malava forest is positively influenced by dependence on the forest for different products. Among others, the study recommends that income-generating activities should be diversified for the surrounding communities to discourage illegal activities that derail the conservation of the forest.

TABLE OF CONTENTS

DECLARATION OF ORIGINALITY FORM	i
DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENTS	iv
ABSTRACT	v
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background to the Study.....	1
1.2 Statement of the Research Problem	4
1.3 Research Questions	5
1.4 Research Objectives	6
1.4.1 Specific Objectives.....	6
1.5 Justification of the Study.....	6
1.6 Scope and Limitations of the Study	7
1.7 Operational Definition of Terms.....	7
CHAPTER TWO	8
LITERATURE REVIEW	8
2.1 Introduction.....	8
2.2 Theoretical Literature.....	8
2.2.1 Affirming the Forest Resource Use.....	8
2.2.2 Theoretical Perspectives on Forest Conservation.....	11
2.2.3 Access to Forest Products and Support for Forest Conservation	14
2.3 Empirical Literature	15
2.3.1 Access to forest products.....	15
2.3.2 Forest Conservation.....	18
2.3.3 Empirical Evidence on Access to Forest Products and Support for Conservation.....	20
2.4 Conceptual Framework	22
CHAPTER THREE	24
RESEARCH METHODOLOGY	24
3.1 Introduction.....	24
3.2 Research design.....	24

3.3 Study Site	25
3.4 Target Population	26
3.5 Sampling Frame and Procedure	26
3.6 Research Instrument.....	27
3.7 Data Collection Methods.....	27
3.8 Data Needs Table	28
3.9 Data Analysis and Presentation.....	29
CHAPTER FOUR.....	30
STUDY FINDINGS AND DISCUSSION	30
4.0 Introduction.....	30
4.1 Household Characteristics of the Respondents	31
4.1.1 Age of the Respondents	31
4.1.2 Community Forest Association Membership.....	32
4.1.3 Household Position of the Respondent.....	33
4.1.4 Occupation.....	33
4.1.5 Level of education	34
4.1.6 Wealth (Landholding, income, agricultural activities).....	34
4.1.7 Distance to the Forest	36
4.1.8 Household Size	37
4.1.9 Summary of Household Characteristics	38
4.2 Types of Forest Products.....	38
4.2.1 Forest Products	39
4.2.2 Accessing Forest Products.....	43
4.2.3 Summary of Forest Products	45
4.3 Access to Forest Products and Support for Conservation.....	46
4.3.1 Access to Forest Products.....	46
4.3.2 Household Characteristics and Access to Forest Products.....	47
4.3.3 Respondents' Views on Forest Conservation Strategies	54
4.3.4 Access to Forest Products, Household Characteristics and Support for Conservation	59
4.4.5 The Policy Environment.....	73
CHAPTER FIVE	76
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	76

5.1 Summary of Key Findings	76
5.2 Conclusion.....	79
5.3 Recommendations	80
5.4 Area for Further Research	81
REFERENCES	82
APPENDICES	88
APPENDIX I: Household Questionnaire.....	88
APPENDIX II: Key Informant Guide.....	95
APPENDIX III: Photos from the Forest	96

LIST OF FIGURES

Figure 2.1 Conceptual Framework	23
Figure 4.1 Types of Forest Products	43
Figure 4.2 Level of Education and Access to Forest Products	48
Figure 4.3 Respondents' Views on selected Forest Conservation Strategies.....	56
Figure 4.4 Access to Forest Products and Opinion on selected Strategies for Forest Conservation	61
Figure 4.5 Level of Education and Support for Contract Farming.....	67

LIST OF TABLES

Table 3.1 Data Needs Table.....	28
Table 4.1 Age of the Respondent.....	31
Table 4.2 Member of Community Forest Association.....	32
Table 4.3 Household Position of the Respondent.....	33
Table 4.4 Occupation of the Respondents	33
Table 4.5 Level of Education of the Respondents	34
Table 4.6 Size of Land.....	35
Table 4.7 Average Monthly Income	35
Table 4.8 Agricultural activities of the Respondents.....	36
Table 4.9 Distance to the forest	37
Table 4.10 Household Size	37
Table 4.11 Use of Charcoal for Cooking.....	39
Table 4.12 Use of Fuelwood for Cooking	40
Table 4.13 Access to Forest Products.....	46
Table 4.14 Occupation and Access to Forest Products.....	49
Table 4.15 Income and Access to Forest Products	50
Table 4.16 Distance to the forest and Access to Forest Resources.....	50
Table 4.17 Household Size and Access to Forest Products	51
Table 4.18 Size of Land and Access to Forest Products.....	53
Table 4.19 Community Forest Association and Access to Forest Products	53
Table 4.20 Household Position of the Respondent and Access to Forest Products.....	54
Table 4.21 Opinion on Payment of User Fees	57
Table 4.22 Opinion on Contract Tree Farming.....	57

Table 4.23 Likelihood of attending a Tree Planting Training	58
Table 4.24 Likelihood of mobilizing others to join CFA	59
Table 4.25 Views on the importance of Forest Conservation.....	59
Table 4.26 Access to Forest Products and Support for Payment of User Fees.....	62
Table 4.27 Access to Forest Products and Support for Contract Farming.....	63
Table 4.28 Access to Forest Products and Likelihood of attending a tree planting Training.....	64
Table 4.29 Access to Forest Products and Likelihood of mobilizing others to join CFA	65
Table 4.30 Types of Forest Products accessed and Support for Conservation.....	66
Table 4.31 Level of Education and Support for Community Governance	68
Table 4.32 Distance to the Forest and Support for Payment of User Fees	69
Table 4.33 Household Size and Support for Conservation on selected Strategies	70
Table 4.34 Income and Support for Payment of User Fees	71
Table 4.35 Income and Support for Contract Farming	72
Table 4.36 Opinion on the Importance of Forest Conservation.....	75

ACRONYMS AND ABBREVIATIONS

CFA	Community Forest Association
CPRs	Common Pool Resources
FAO	Food and Agriculture Organization
IPCC	Intergovernmental Panel on Climate Change
KARLO	Kenya Agricultural Research and Livestock Organization
KEFRI	Kenya Forestry
KFS	Kenya Forest Service
KWS	Kenya Wildlife Service
LRC	Livelihood Resource Centre
MPFMP	Malava Participatory Forest Management Plan
NGOs	Non-Governmental Organizations
NTFPs	Non-Timber Forest Products
PFM	Participatory Forest Management
RBA	Rights-Based Approach
SDGs	Sustainable Development Goals
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WETPA	Western Tree Planters Association

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Forest ecosystems occur naturally and artificially across the globe. According to statistics, of the world's total land surface cover, forested lands occupy 30.6%. For a span of 25 years, from 1990 to 2015, there has been an established record of substantial reduction of forested areas attributed to massive deforestation and human population increase. This reduction is from an estimated 4128 million hectares, which is at 31.6 percent, to approximately 3999 million hectares, which is the stated 30.6 % (FAO, 2016).

The global objective on forests as indicated in policy, such as the Sustainable Development Goals (SDGs) is to ensure efforts are geared towards prevention of degradation of forest resources but at the same time, recognize the potential of humans in the sustainable use and conservation of the forests. Specifically, the SDG number fifteen focuses on the earthly ecosystems and it advances the achievement of well-conserved forests, increased afforestation and appropriate use of forest resources in a fair manner (UNDP, 2016). The SDGs were pioneered by the United Nations (UN), tasking countries to mainstream the laid down goals in their own policies, strategies, and plans in order to realize the common objective of sustainability. Conservation guarantees sustainability of forests, it is of essence, then, that countries embrace efforts towards protection of forests.

Many countries around the world have a considerable percentage of their population, more so the rural poor, deriving their livelihoods from forests. This population amounts to approximately 1.6 billion people whose sources of income and other necessities are derived directly from forests. Besides supporting livelihoods, forests are the main gateway to countering climate change as they sequester carbon, and also reduce the risk of flooding and land degradation (UN, 2017). To add on, forests act as water catchment areas and their presence attract rainfall. Communities living around forested areas, therefore, enjoy favourable climate for agricultural production. Indeed, forests hold values to a country's economic, environmental and social development.

The forest resources crucial to livelihood sustenance are classified as either timber forest products or non-timber forest products. Timber forest products comprise all woody plants extracted from forests, either planted or natural forests, to serve as raw materials for craft industries, pulp and paper industries, among other uses. Most of these industries have designated forest areas where they legally source for timber, but illegal logging is still rampant. Illegal logging often leads to deforestation and consequently hampering the livelihood opportunities for rural communities.

The non-timber forest products (NTFPs) comprise all non-woody products such as medicine, fiber, resins, fodder, honey, among others which are extracted from the forests. There is an implicit connection between the exploitation of NTFPs and forest conservation as advocated for by various persons (Melese, 2006; Belcher et al., 2005). As opposed to logging, harvesting and use of NTFPs provides room for regeneration of plants, which possibly occurs with regulations by the governments and local authorities. Over-exploitation of NTFPs attributed to population pressure and increase in demand may as well lead to degradation of forest resources (Belcher et al., 2005).

Forest resources in Sub-Saharan Africa are essential to supporting the livelihoods of the rural communities. This rural population amounts to an approximate 65 % of the total Sub-Saharan Africa population, which extract fuelwood, building materials, food, medicines, oils, and gums from the forests (Katerere et al., 2009). The resources have been used for subsistence and commercial purpose thus contributing to essential needs supply and cash savings among the communities involved (Shackleton, 2004; Kiplagat et al., 2008; Kisaka et al., 2014). Reports indicate that this interaction by a vast majority of African pastoralists and farmers in the rural settings is daily, and contributes to a 20 % income that is made available to the poor and landless families (Katerere et al., 2009).

At times, depending on the capabilities of the communities regarding assets, forest resources are used as safety-nets during adverse situations. In case of droughts, crop failure, floods, the death of livestock and other unprecedented scenarios, rural households turn to forest resources for their daily supplies (Paumgarten, 2005). Therefore, livelihood activities in forested areas should entirely be guarded with a lense of conservation to ensure sustainability of these critical resources.

In the context of Kenya, the forest cover comprise both indigenous, plantation and mangrove forests which are further classified as either public, private or community forests. In 2010, the total forest cover was at an approximate 1.417 million hectares; this total area was a reduction from 1.558 million hectares in the 1990s (Kenya Forest Service, 2015). The forest cover loss has been attributed to deforestation where it is indicated that approximately 12,000 hectares of forest cover is lost every year (Chepngeno, 2014).

Going back in history, colonialism in Kenya brought about protectionist rule for the forests, justified by the fact that forests are public goods and reserving them was the best solution to ensure conservation. Much of the protection at the time was done at the cost of displacing the local communities who lived adjacent to and inside the forests. It is recorded that a total of 1.93 million hectares of forest land had been gazetted by 1990. As expected, protectionism did not assure conservation for forests, rather, it created an inimical attitude towards forest resources by the rural communities thus leading to illegal activities in the forests (Ongugo et al, 2008).

With evidence from Mau, Mt. Elgon, and Mt. Kenya forests, population pressure has escalated the conflict between forest use and conservation leading to further degradation due to encroachment by schools, homes, police stations and churches. In the 1990s, an estimated 2.9 million people were living adjacent to forests and this number currently is likely to have increased. Forest management departments created by the government were responsible for giving licenses for extraction of forest products, keeping in check illegal activities and also protecting the forests from fire. As approaches towards ensuring forest conservation evolved, participatory forest management (PFM) was recognized as the way forward (Ongugo et al., 2008).

Since its inception in 1997, PFM has gained prominence as an alternative to forest conservation. The private sector, institutions, and communities as the main stakeholders under this approach, and through the creation of community forest associations, are supposed to coordinate activities to ensure benefits accrue to the participating communities and conservation efforts are observed at the same time (Koech et al., 2009). The Forest Act of 2005 underscored this approach by encouraging the communities living adjacent to the forests to be involved in the management process (Koech et al., 2009).

These are some of the government interventions regarding the conservation of our forests, and to add on, the Kenya Management and Conservation Act no 34 of 2016 also gives guidelines on administration of forest ecosystems, articulating the decentralized roles of the county government and the Kenya Forest Service (KFS) regarding the management of the forest resources. The inherent purpose of forests in the supply of wood and non-wood products, education and research, conservation of water and soil, and cultural use for human well-being has been recognized; with a focus in obligating the various management bodies to ensure the conservation of forest ecosystem through sustainable production (Government of Kenya, 2016). These plans of actions for forest management so far have not born many fruits regarding prevention of forest degradation.

The accounts of forest degradation evidenced in the Kenyan forests despite the existing platforms for driving conservation including various strategies such as the Community Forest Associations (CFAs), institutions such as KFS and the county government among others, prompts one to cross-examine whether the benefits gained by the adjacent communities from the forest encourage positive attitude and behaviour towards forest conservation. It is against this background that an importance of examining forest-adjacent communities' access to forest products and support for forest conservation in Malava forest is drawn.

1.2 Statement of the Research Problem

Forests constitute vital portfolios where livelihood needs are met. Forest resources continue to play an essential role primarily in ensuring economic, environmental and social support of communities all over the world (Shackleton, 2004, Ambrose-Oji, 2003; Langat et al., 2016). As such, forest conservation is quite crucial to ensure forest sustainability as a natural resource base for support of livelihoods.

Forest conservation both nationally and internationally has been guided by various policies mainly championed by the UN among other organizations (UN, 2017). Notwithstanding, forest exploitation by communities and individuals to meet demands of food, wood, and fuel; the need for urban housing development and promotion of land use that generate rapid financial returns has led to forest degradation, deforestation, and excision of part of forest lands (UN, 2017).

In Kenya, the recent ban on charcoal burning in the forested areas typifies in part the commitment to sustainable use of forest resources on the policy-makers side, and on the other end, it epitomizes the insensitivity to conservation on the beneficiaries' side. Destruction of forests, consequently, leads to desertification, climate change, loss of biodiversity, natural beauty and most importantly loss of livelihoods (Chakravarty et al., 2012). This scenario presents a need for progressive strategies to ensure a balance between forest resource use and conservation, where communities recognize and support efforts to conserve the forests in their surroundings.

Malava forest, covering an area of 718.8 hectares, is a significant natural resource that plays an important social, economic, environmental and cultural role not only in the lives of the surrounding rural communities but also in the whole country and beyond, because forests' environmental benefits through carbon sequestration are enjoyed globally. There exists an overt documentation of the engagement of the rural communities surrounding the Malava forest in the exploitation of the forest resources, and a number of forest products have been identified including; mushrooms, fodder, medicine, timber, and fuelwood (KFS and CFA, 2015). Nonetheless, the forest possesses a history of degradation mainly attributed to the illegal human activities in the forest. Currently, high population is witnessed in the areas adjacent to the forest, and as such, the forest is threatened by encroachment among other issues (KFS and CFA, 2015).

There is limited and contradictory data as pertains to forest dependency and communities' attitude and behaviour towards support for conservation. Some data indicate that people who depended on forest resources and lived close to forests had a negative attitude towards conservation as opposed to those who lived far away (Shrestha and Alavalapati, 2006); while different data show that a majority of the respondents who lived closer to the forest and depended on the forest resources possessed a positive attitude towards conservation (Infield, 1988). This study, therefore, gave a focus on Malava forest, in Western Kenya, to assess the communities' access to forest products and cross-examining whether this access influences attitudes and behaviour towards support for forest conservation.

1.3 Research Questions

The main research question in this study was; how does access to forest products influence the attitude and behaviour of community members towards supporting forest conservation?

The specific research questions include:

1. What are the household characteristics of the Malava forest adjacent communities?
2. What are the forest products that the adjacent communities depend on in Malava forest?
3. How does access to forest products influence attitude and behaviour towards support for forest conservation?

1.4 Research Objectives

To analyse how access to forest products influences the attitude and behaviour of community members towards supporting forest conservation.

1.4.1 Specific Objectives

1. To examine the household characteristics of the communities surrounding Malava forest.
2. To identify the different types of forest products that the communities around Malava forest depend on.
3. To analyse how access to forest products influences attitude and behaviour towards support for conservation.

1.5 Justification of the Study

This study has been informed by policies, primarily the sustainable development goals. It is a time when significant efforts are being geared towards protection of life on land; ensuring that forests are sustainably managed through practices which are complacent with conservation efforts, combatting climate change, ensuring availability of water and also ensuring that human settlements are safe and sustainable. The interdependency that exists between human, animal and plant life prompts the need to devise ways to ensure all of them co-exist without one compromising on the survival ability of the other.

Malava forest is an indigenous forest covering 718.8 hectares and is known to play a role in supporting the livelihoods of many people who live adjacent to it. Despite this, the forest is adversely threatened by overgrazing, charcoal burning and the destruction of planted trees by livestock, thus the need to understand the ways in which these threats can be attenuated (KFS and CFA, 2015).

The final report out of this study will provide insights regarding the values communities living adjacent to forests hold towards the forests and whether they are encouraged to support the forest conservation efforts. This information will contribute to knowledge and help clarify more on the contradicting data that is in existence. The findings will also serve as an advocacy tool for development practitioners and policy-makers in their decision-making towards promotion of sustainable use of the forest resources.

1.6 Scope and Limitations of the Study

The study area is Malava forest and the findings of this study may not reflect the general pattern of communities' access to forest products and their attitude towards support for forest conservation. Consequently, it may be difficult to generalize from the case of Malava forest.

1.7 Operational Definition of Terms

- **Forest:** “regarded as land which is declared or registered as a forest, or woody vegetation growing in close proximity in an area of over 0.5 hectares including a forest in the process of establishment, woodlands, thickets” (Government of Kenya, 2016).
- **Forest resources:** “means anything of practical, commercial, social, religious, spiritual, recreational, educational, scientific, subsistence, or other potential use to humans that exists in the forest environment, including but not limited to flora, fauna, and microorganisms” (Government of Kenya, 2016).
- **Forest products:** “goods acquired from forest resources including; bark, animal droppings, beeswax, canes, charcoal, creepers, earth, fibre, firewood, frankincense, fruit, galls, grass, gum, honey, leaves, flowers, limestone, moss, murrum, soil, myrrh, peat, plants, reeds, resin, rushes, rubber, sap, soil, seeds, spices, stones, timber, trees, water, wax, withies, among other things as may be declared as forest produce” (Government of Kenya, 2016).
- **Livelihood:** a way of acquiring the essential requirements for earning a living.
- **Forest livelihood:** entails the way activities in the forests that ensure human survival, are organized by people living in or adjacent to forests.
- **Household heads:** The father, mother, guardian or an elder child tasked with the responsibility of providing support for the family, in terms of food, clothing or education.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section allows contextualizing the objectives of this study through a collation of different relevant theoretical and empirical information. The theoretical part provides knowledge of the ideal situations regarding forest resource use and forest conservation. It gives a solid understanding of the concepts explored. The empirical literature review is anchored on the theories explored, providing insight into the reality of communities' access to forest products and their attitude towards forest conservation, and at the same time pointing out existing gaps in literature to justify the viability of this research.

2.2 Theoretical Literature

The theories explored in this review to guide the study are; the common pool resource theory and the social exchange theory. The common pool resource theory informs on the exploitation as well as the conservation of forest resources. It gives the view that forest resources are public goods and, therefore, their access is open except in cases where they have been protected by private entities or the state. It also advocates for a decentralized approach to management of forest resources which ensures conservation (Saunders, 2014). The social exchange theory provides insight into the expected attitudes of individuals towards resources from which a reward is received (Emerson, 1976).

2.2.1 Affirming the Forest Resource Use

Forest products are classified under common pool resources, meaning that their accessibility by individuals or communities is non-exclusive and rivalry. Consequently, forests around the world provide sources of livelihoods through both non-market and market approach (Emery, 1998).

In Africa, the colonial regimes played a significant role in shaping the history of forest resource use and management. Before, the tenancy of public forests was changed as people migrated from

one region to the other (Barrow et al., 2016). With the advent of colonialism, the state controlled access to the forest resources whereby permits were given to rural communities to be able to exploit low valued forest resources, mainly for subsistence purpose. The laws made at the time allowed the state to wrest the communal land and introduce privatization to allow for plantation for industrial purposes and also provide aid to commercial logging (Oyono, 2005).

In the post-colonial era, policies of reforms and decentralization have continued to shape the engagement of communities with forest resources. The dependency of people on forests for their livelihoods, however, has led to massive degradation. The situation in the Congo Basin provides a good example to this degradation, where an approximate 49.4 million hectares of forest cover loss was witnessed (Barrow et al., 2016).

The theory of common property resources considers privatization of common goods, forests included, as to increase the marginalization of the poor who may be denied access to the most important resource, from where they can effortlessly draw their livelihoods (Ostrom, 1990). In Eastern Africa, as well as other parts of Africa, the post-colonial era realized notable changes in policies regarding access to and control of forest resources. The rights of rural communities have been progressively integrated (Barrow et al., 2016).

When we assess the nutritional, health and energy needs of households, we consider forest resources to add complementary and supplementary value to these essential needs. Mushrooms, as well as other edibles, are not the main staple foods in many households but their nutritional value is with no doubt; though occasionally used, such foods from forests add variety to people's diets. Regarding energy, charcoal use complements the conventional fuel energy source such as electricity and gas. As it is known, most commercial charcoal production is facilitated by forest resources. In addition, despite agriculture providing the majority of stock for rural households' food, there comes a time when these stocks are depleted and communities resort to forest resources (Byron and Arnold, 1999). This literature points out to the reality of forest resources being not only important to the lives of the rural forest-adjacent communities but also to the urban households.

Dependency on forest resources cannot be generalized to rural and urban communities in absolute terms. Many forests are located in rural areas where there is limited infrastructural

development and, therefore, rural communities are more directly involved in the consumption of forest products compared to the urban households. In both areas as well, the poorest have a greater share of these resources accruing to their households (Byron and Arnold, 1999; Sapkota and Oden, 2008). In terms of incomes, however, skills and capital endowed households tend to earn more in trading of forest products as they are able to exploit on large scale and efficiently as compared to poor households (Shackleton, 2004).

According to Kaimowitz (2003), an estimated 15 million people in Sub-Saharan Africa depended on forest resources at the time of survey. Poor households easily accessed timber for small-scale saw-milling. Trees, twigs and branches were obtained from the forest for fuel wood, charcoal burning and handicraft production. Sale of these products provided income to the individuals and thus enabling them to survive. Mulenga et al. (2012) notes that on average, about 33% of the household income of households that exploit forest resources is contributed by NTFPs. These are mainly poor households, and, therefore, it is relevant to conclude that there is a positive relationship between poverty alleviation and access to forest products.

The determining factors of forest resource use by households is evidently the economic capability regarding incomes, but also age, sex and the educational level of the households heads play a significant role. It is common knowledge that the old people may find it difficult to go to the forest to source for products and, therefore, this reduces their participation. Households headed by men with low education levels significantly contribute to the number of participating households since they cannot afford a wide range of opportunities for income generation and, therefore, they tend to organize their livelihood activities on forest resources, especially extraction of timber and charcoal burning, in order to sustain their families (Mulenga et al., 2012; Adhikari et al., 2004).

Creating employment opportunities and improving the living standards of the poor is greatly depended on the human capital and physical capital supply in the respective households. Forest resources provide a critical natural capital that households with less human capital in terms of education and skills and physical capital in terms of land can rely on for their livelihoods (Mulenga et al., 2012). As the literature points out, relentlessly, communities have exploited forest resources. These resources do not only provide essential needs supply but also provide

environmental support regarding carbon sequestration, provision of water among others. It is crucial, therefore, not to overlook the aspect of the sustainable use of these resources.

2.2.2 Theoretical Perspectives on Forest Conservation

The idea of forest conservation is one to be entrenched in every society. Safeguarding forests from any kind of harm, while ensuring sustainable use by individuals is of ultimate importance, and this is what the term forest conservation entails. The UN as the embodiment of environmental management has taken pre-eminence in advocating for forest conservation, and in recent times the discourse on environmental management has been underscored by the debate on climate change. Several works including the United Nations Framework Convention on Climate Change (UNFCCC) and also the Intergovernmental Panel on Climate Change (IPCC) have fronted issues of forest degradation and deforestation, which are seen to catalyse the effects of climate change. Their contribution in voicing the need for mitigation against climate change brings to focus the debate on forest conservation; enlightening on policies and methods to ensure forest ecosystems are protected from harm (Check, 2011).

From a global perspective, forest conservation was initially viewed in terms of protection of the forest ecosystems, achieved by setting the forests apart mainly for tourism and as public parks. This type of conservation practice has been referred to as, fortress conservation (Guthiga and Mburu, 2006). The fortress conservation approach followed the 1872 Yellowstone Act of the United States of America. Arguably, this kind of approach to forest conservation raises questions of social justice as forests provide sources of livelihoods to the surrounding communities. The rights-based approach (RBA) to forest conservation stemmed from this concern; it takes into account human rights in its mechanism to foster forest conservation. The notion is that if communities would have their rights over a forest resource recognized, then they will be more willing to uphold its conservation values (Shepherd, 2008).

The use of shared resources mirrors a tragedy as Garrett Hardin articulated in his writings on “Tragedy of the Commons” (Hardin, 1968); however, the common-pool resource theory enlightens on approaches for ensuring protection and conservation of natural resources in general. Ostrom Elinor in her argument on overcoming the tragedy offers three items namely; supply, commitment, and monitoring. Regarding supply, communities must be conferred the

mandate of designing and appropriating the rules that will guide their sustainable use of resources. Their participation in the process will allow formulation of rules acceptable to them thus fostering their compliance and commitment. The aspect of commitment to the rules may be violated at some point by some of them, and that prompts monitoring as equally a critical tool (Ostrom, 1990).

Community governance for CPRs is generally the most advocated for concept with regards to management. Members of the same community set norms and agree to live by them, with willingness to impose punishment on defiant individuals; this is with regard to the protection of commonly shared resources. Such force supersedes what governments could achieve trying to do the same (Bowles and Gintis, 2012). The idea of Participatory Forest Management (PFM) which was initiated as strategies for forest conservation evolved is predominantly embedded in the concept of community governance and CPR theory. When power is given to the beneficiaries it ensures entrenchment of responsibility, sense of ownership and broadly contributes to the conservation effort (United Nations, 1992).

In Kenya, the management of forest areas has long been guided by National Forest Policy (first published in 1957) and several Forest Acts drafted in support of the policy. The main strategies for management of Kenyan forests have been policy and legislation; institutions creation, local participation, licensing to control overexploitation and planting trees for timber and other products to prevent the destruction of indigenous forests. One factor that is paramount in implementing these strategies is the political will (Wass, 1995). Commitment to forest conservation has always been effected by the political class, and, therefore, their endorsement cannot be overlooked. Hardin (1968) advances the importance of good governance to avert tragedy in the commons. With an unfeigned political will, especially at the high level, enforcement of rules in pursuant to development and forest conservation goals becomes inescapable.

In the National Forest Programme of Kenya 2016 - 2030, it has been outlined that appropriate conservation and management strategies of a country's natural resources spurs its economic development. Several strategies have been highlighted including; farm forestry, forestry training, promotion of commercial tree nurseries and community forestry. It is estimated that about 10 million hectares of farmlands have potential for agroforestry. When tree plantations are

established in people's farms, it provides an alternative to sourcing timber from forests and it also ensures increased forest cover. Forestry training ensures individuals acquire specialized skills that will enable them to apply good management practices and leverage on the economic potential of farm forestry. It will also ensure acquisition of knowledge that will enable attitude change towards forests and natural resources. Promotion of commercial tree nurseries is essential to ensure tree seedlings business is not pulled down and also to encourage proper tree seedlings planting and management by farmers (Ministry of Environment and Natural Resources, Kenya, 2016).

Community forestry is expected to provide opportunities for employment for the local communities and also a window for their access to forest, lead to awareness of forest management practices and also to ensure inclusivity regarding decision-making for management. Communities are also expected to be empowered on the forestry rules and therefore increase their ability to tackle forest conflicts. These strategies aim to achieve an increase in Kenya's forest cover from the current 7 percent to 10 percent (Ministry of Environment and Natural Resources, Kenya, 2016).

A good relationship between the governing institution (KFS) and the Malava forest rural community has bolstered community policing towards the forest management. Involvement of the communities has ensured collective actions in stopping forest fires, and tree plantation for wood products supply; plantation forests are a better substitute for exploitation of indigenous forest. KFS provides support through ecotourism development, licensing operations in the forest, formulating policies, spreading awareness and sensitizing the communities on forest management (KFS and CFA, 2015). For the case of Malava forest, there are numerous stakeholders involved aside from the KFS and the existing CFAs. They include; NGOs, the County Government, private companies and research institutions. Predominantly, their works focus on strengthening actions towards promotion of environmental sustainability and economic amelioration (KFS and CFA, 2015).

Constraints to management, however, derail the progressive efforts to ensure enforcement of rules and motivation towards forest conservation. These constraints are a cause of understaffing, poor service delivery and low level of infrastructural development. With the ever increasing population and poverty, the prevalence of illegal activities threatening the survival of Malava

forest becomes a challenge to control. At times it takes the collective initiative of the communities involved to promote a culture of good practices for forest conservation.

The common pool resource theory sheds light on the importance of local participation but if this participation is not guided by tangible benefits and awareness, achieving conservation through adherence to proper conservation practices can be elusive.

2.2.3 Access to Forest Products and Support for Forest Conservation

The social exchange theory states that behaviour is a consequence of a reward provided by humans or non-human environment (Emerson, 1976). People will always value anything that has been rewarding to them. In the context of this theory, forest resources are seen as the non-human environment. The fact that communities obtain benefits from forest resources alone is reason enough for them to possess a positive attitude towards forest protection and consequently portray behaviour that is in support for conservation.

Involvement of local communities serves a great deal in ensuring sustainable management of forest resources (Guthiga and Mburu, 2006). The most important aspect of participation is the impact on livelihoods. Through this participation, communities are able to raise their incomes, diversify their physical capital, build support for each other and hopefully organize their livelihood strategies outside the natural resource base. Needless to say, the livelihoods impact of forest resources on dependent households is expected to drive the support for forest conservation.

With the expansion of markets for NTFPs, there is consequently an increase in the value of NTFPs as equally productive assets. Forest-based communities who benefit from these resources are hoped to be encouraged to protect the forest resources from depletion and degradation; since they would not wish to lose their livelihoods from the forest resources (Richards, 1993). The specific focus on NTFPs follows the progressive literature that points out the ecological benefits of commercializing NTFPs, rather than timber forest products. Exploitation of non-timber forest products is less disastrous as compared to the harvesting of timber (Melese, 2016). NTFPs such as honey, plants inputs for pharmaceutical industries, essential oils, mushrooms among others are important sources of income and nutrition for forest-adjacent communities. These benefits are likely to cause the beneficiaries to protect, especially, the important trees from which these products are found from being harvested for timber (Melese, 2016).

Forest conservation in this context is a factor of attitude and behaviour of the beneficiaries. One author notes that the perception of the attitudes of surrounding local communities towards conservation is an important tool that ensures continued sustainable management of natural resources such as forests (Garekae et al, 2016). As it is expected that those who benefit from forest resources support forest conservation, the same regard is not held for those who do not benefit from forest resources.

The dependency on forests is a factor of the size of the household, education levels, wealth, distance from the forest and infrastructure (Koech et al., 2009). The same factors come into play when considering attitudes and behaviour change towards forest conservation. Distance to the forest resources is a likely factor to determine whether communities will utilize forest resources or not. In most cases we expect that those far away will not depend on these resources and therefore, their attitude towards forest conservation is expected to be negative. Conversely, Shrestha and Alavalapati (2006) note that communities living not in close proximity to the forests would find it more costly to engage in forest activities for their livelihoods, and therefore, possess a more positive attitude towards protection of forests from destruction.

Regarding infrastructure, wealth, education levels and household size, these factors incorporate the socio-economic costs of a community. When these costs are high, it is argued that cooperation and positive attitude towards conservation from local communities may be degraded (Richards, 1993). High socio-economic costs will drive increased dependency on natural resources and it may be unlikely that households will adhere to conservation efforts. Educated people who understand the benefits of protecting the environment will be more appreciative to conservation efforts and most of their livelihoods strategies are likely to be organized outside the natural resource base.

2.3 Empirical Literature

2.3.1 Access to forest products

In this empirical review of the literature, there is cognizance of the fact that communities have been allowed to exploit forest resources; though to some extent, the exploitation is limited due to the reality of protected areas. Non-timber forest products as well as timber forest products have sustained humanity throughout the decades and also served as an influence to the trends in

economic development through the support they give to livelihoods (Agrawal et al., 2013; Emery, 1998). It is estimated that forest-dependent people add up to 1.6 billion, 60 billion among them relying entirely on the forest resources and 1.2 billion among them are in developing countries (World Bank, 2004).

The use of NTFPs as merchandise or otherwise, began in the United States of America when the country became integrated into the world economy (Emery, 2001). In the early 1700's, roots that were harvested from the forests were sold to China; and income from all the forest products sold, among them, maple syrup, wild fruits, and honey, contributed mainly to the economy of the U.S (Emery., 2001). Frances Densmore (1974) in his book, documents how Native Americans in the Upper Midwest used wild plants for food, medicine, dyes, crafts, and utensils during the first quarter of the 20th century. To this day, the Americans have continued to harvest, use and sell NTFPs.

Communities living in the rural areas have engaged in activities involving collection of forest products to meet the food supply needs of their households; cutting down of trees to obtain timber for sale, for making crafts, and also for burning charcoal; and they have also collected medicine, resins and other raw materials for sale to various industries. The outcome of these activities has been employment opportunities, reduced food insecurity, and increased incomes for the rural communities (Ndoye and Tieguhong, 2004).

In a review of some case studies, Emery (1998) examined the contribution of NTFPs to the livelihoods of the communities in the Upper Peninsula, Michigan State, in the United States of America. The study explored relevant aspects related to collection and use of NTFPs including; techniques used in harvesting and how the skill was acquired. It pointed out the recurrent attribute of various livelihood activities which was evidenced among the communities; the communities mainly procured the forest products for subsistence use but little cash income from the sale of the products was also considered critical. A similar study conducted in the East Mau forest, Kenya also revealed that the exploitation of the resources was mainly for subsistence purpose (Langat et al., 2016). In the example of the Upper Peninsula and the East Mau forest, evidence points out to the fact that forest resources differ within forests and livelihood activities vary depending on the economic and social endowment of the forest adjacent rural communities.

Population pressure and increased dependence on forest resources leading to degradation (Ndoye and Tieguhong, 2004) instigate a conflicting relationship between forest resources and livelihoods. Chepngeno (2014) in her study of Mau forest, Kenya, found out that the surrounding communities' strategies were always parallel to the law enforcement institutions' strategies. They reported that the Kenya Forest Service limited their access to resources and they were not welcoming to the KFS strategy. This is despite the fact that the limiting factor was a way of conserving the forest. Nonetheless, promotion of livelihood diversification through forest resource use seems viable, especially when the rural poor are taken into consideration.

In a study conducted in Zambia to examine the role of NTFPs in rural household welfare and the characteristics of households that rely on NTFPs for livelihood and income, it was found out that male-headed households significantly participated in the exploitation of forest resources, higher levels of education enabled households to organize their income-generating activities outside the forest and also households with bigger farmlands had low dependence on the forest products. Access to markets was another determining factor of exploitation of forest resources, whereby, nearness to the markets encouraged exploitation of NTFPs as this ensured ease of the sale of the products (Mulenga et al., 2012). Nearness to the market may be a significant factor of forest products access as per the findings of the study in Zambia, though, whether the markets are available or not, participating communities are mainly driven by the need for survival and, thus, a bigger percentage of the extracted products go into subsistence use.

Regarding households characteristics and access to forest products, further, Mwera (2014) in her study found that literacy, years of education, family size and gender did not hold any significance regarding the exploitation of the forest resources by the individual households. This report is inconsistent with that of Mulenga et al. (2012) that indicated the significance of gender in determining the forest resource extraction by households.

Most studies seeking to provide data on the role played by forest resources on the livelihoods of the rural communities have failed to obtain the feedback from the forest beneficiaries interrogating whether they are encouraged to conserve the resources (Shackleton, 2004; Emery, 1998; Chepngeno, 2014). Rural communities need to understand that their continued access to forest products will depend on the efforts that they will put to ensure sustainable use and conservation of the forests.

2.3.2 Forest Conservation

For many years until now, forests have provided communities with essential resources for their day to day needs. When there is increased use of forest resources by communities, it serves as an impetus to conservation efforts by the communities themselves. If the communities do not draw any sense of value from the forests, it is unlikely that they will consider its management through sustainable use (Ambrose-Oji, 2003). Besides, extraction of non-timber forest products for economic or subsistence use still allows for the non-diminishing value of the forests (Melese, 2016).

World over, conservation is of essence and various strategies have been employed to counter the various threats to forest resource conservation, which have mainly been imposed by overexploitation of these resources by communities as well as individuals. Sutherland et al. (2017) highlight numerous threats to forest conservation including; residential and commercial development, agriculture, transport corridors, biological resource use, invasive and other problematic species, pollution, climate change, and severe weather. Interventions involving exploitation and non-exploitation of forest resources have provided evidence on different approaches to conservation.

In countering the agricultural threat, empirical literature points out to livestock farming whereby allowing for animal grazing is more beneficial rather than preventing the animals from grazing in the forest. The grazing is done in a fenced area to exclude other sections of the forests thus allowing progression of the economic use and at the same time allowing for increased resource cover (Sutherland et al., 2017). Thinning, which involves cutting down of tree branches to make it less dense, allows the trees to increase in density which is a positive way to enable increased forest cover thus conserving it. Regarding the harvest of forest products, it is noted that the adoption of certification and use of non-timber forest products in a sustainable manner has contributed significantly to curb the related threats (Sutherland et al., 2017).

Insights into the Russian history of forest conservation provides a good example of strategies that many countries have adopted to ease the pressure on forests. In 1722, driven by the desire to protect forests, which were sources of timber, Peter the Great categorized the forests into two; as protected and unprotected forests. Under the protected forests, all exploitations for economic purposes were excluded, rendering the forests as natural laboratories. To protect the hydrological

systems, cutting of trees was prohibited within 55 kilometers and 16 ½ kilometres wide strip along the banks of large rivers and small rivers respectively. Under the unprotected category, forest resources were exploited without restrictions (Bonhomme, 2002).

As the years progressed, during the late 18th century and early 19th century, Catherine the Great, Alexander I and Emperor Paul brought in reforms which saw the growth of private ownership of forests. Private owners cleared forest lands for agriculture and this greatly undermined the progress the country had made in forest protection. In respect of the massive destruction witnessed, further legislation bestowed upon the state the right to issue a regulation on all forests whether state, privately or communally owned. The state had the right to purchase any forest land which the owners had failed to reforest and protect. Notwithstanding, issues of corruption, budget constraints, the inconsistent punishment of violators and many other issues debilitated the protection efforts by the state (Bonhomme, 2002).

Countries have done well to introduce legislation that allows the state to issue regulation even for privately owned plantations. Owners must obtain a permit before being allowed to cut down trees (Ministry of Environment and Natural Resources, Kenya, 2016). The only danger with regulations is that it may instigate a negative attitude towards forests and encourage illegal activities. It is of importance that communities understand the need for forest conservation, and strategies be built on this understanding in order to create a favourable environment that ensures access to forest resources and support for conservation at the same time.

In Kenya, the management of various forests can be likened to that of Russia. It involved state control of forests, with regulated and restricted exploitation in various parts of the forest ecosystems (Guthiga and Mburu, 2006). A study done on the various conservation incentives offered by different management regimes, and the local people's perception of the management regimes, in Kakamega forest reveals that the poor entirely depended on the forest resources and despite the regulated extraction, illegal activities could not be prevented (Guthiga and Mburu, 2006). Management regimes include; the Forest Department, Quakers church, and the Kenya Wildlife Service. Interestingly, the KWS imposes total restriction on extraction unlike the two other regimes yet the local community was more satisfied with the performance of KWS in regards to their conservation systems (Guthiga and Mburu, 2006). The practice of forest

conservation has mostly involved the state and the communities but gaps in success stories continue to prevail. Mostly the success has been curtailed by the resource users themselves.

The reports on Malava forest record that the forest is threatened by overgrazing, livestock destruction of planted trees, illegal charcoal burning among others. As research has not yet shown, it would be important to find out the value that the rural communities draw from the use of the forest resources in Malava forest and whether it is an incentive enough to drive their attitude and behaviour towards support for conservation of the forest.

2.3.3 Empirical Evidence on Access to Forest Products and Support for Conservation

Access to forest products, as this study advances, contributes to positive attitudes and behaviour towards support for forest conservation. Different studies have been conducted to look at access to forest products linking to household characteristics of forest-adjacent communities, and then the relationship in terms of attitudes towards forest conservation.

In reference to attitude and behaviour towards support for conservation, studies have revealed conflicting reports. Shrestha and Alavalapati (2006) in their analysis of local people's attitude towards conservation of Koshi Tappu Wildlife Reserve in Nepal, found that respondents who were living near the Reserve, with larger household size, who were poor and depended on forests for firewood and other raw materials possessed a negative attitude towards conservation. Farmers and educated respondents had a more positive attitude towards conservation. The justification of the negative attitude towards conservation in this case, as theoretical literature points out, is that of socio-economic costs. It would be more expensive for poor households to withdraw from forest resource use since they would have to incur extra costs to acquire capital outside the natural resource which was easily available.

Reports from a different study in South Africa indicated that 65% of the respondents who lived closer to a conservation area had a more positive attitude towards conservation. The increase in positive attitude was backed by the respondent's household wealth and education (Infield, 1988). Mwera (2014) in her study on Ngong forest dependence and household welfare recommended that the communities should be allowed to receive the benefits from the forest in order for them to realize the value of the forest to be able to protect and preserve the forest. It is a clear concept

that supports the fact that access to forest products ensures communities' positive attitude towards support for conservation.

Garekae et al, (2016) in the study which also sought to analyse the attitudes of local communities towards conservation, concluded that communities' attitudes and perceptions should be taken into account when strategies for forest management are laid down. In this survey, it was revealed that several factors including; age, residential place, and forest dependency significantly impact positively on attitudes towards forest conservation. Conversely, Obua et al., (1998) in analysing the attitudes of local communities towards forest management established that only education as socio-economic characteristic of the household significantly impacted on the attitudes towards forest management practices. Other household characteristics such as gender and age showed insignificance in terms of influence in participation in forest management and attitude towards forest conservation.

A study to investigate the attitude of farmers towards conservation in Jigme Singye Wang Chuck National Park in Bhutan further demonstrates that benefits received from an environment drives positive attitude towards its conservation. It was found out that farmers who had been educated on the expected future economic benefits of conservation were positive about conservation of the park while those who had been barred from accessing fuelwood and other NTFPs from the park and those whose crops and livestock had been destroyed by wild animals had a negative attitude towards conservation of the park (Wang et al., 2006).

On Participatory Forest Management (PFM), a study done in Ethiopia established that most of the respondents found PFM to be apt in fostering forest conservation. Since its outset, the communities reported to have increased their participation in forestry activities such as the management of tree nurseries and planting of trees. The researchers gave a record of the respondents' positive attitude towards forest conservation which was engendered by the benefits that they received, including participation in the activities for forest protection (Gobeze et al., 2009).

The past studies highlighted above have similarities with this study by the fact that they present an analysis of local communities' attitudes towards forest conservation. However, some of the studies conceptualized household characteristics to directly influence the respondents' attitude towards forest conservation, as opposed to access to forest products (Obua et al., 1998; Garekae

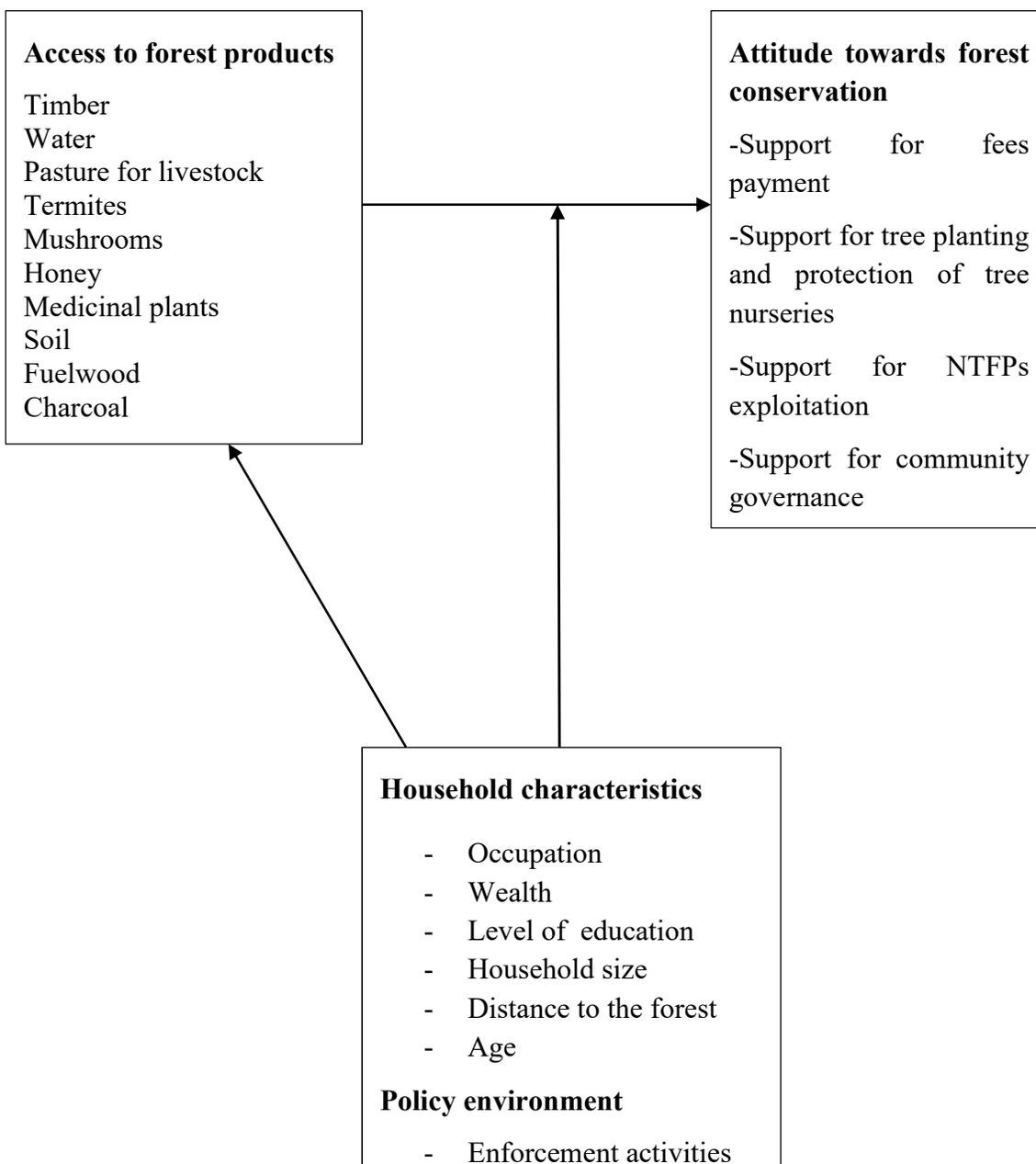
et al, 2016). Furthermore, Participatory Forest Management (PFM) has been the forest management and conservation strategy immensely focused on to determine the local communities' attitude towards forest conservation (Obua et al., 1998, Gobeze et al., 2009). An analysis of more than one strategy for forest conservation will allow for a substantial conclusion in regards to household characteristics, access to forest products and attitudes towards forest conservation.

2.4 Conceptual Framework

The study conceptualizes that forest resources are significant for rural communities to draw their livelihoods from. The values held by communities towards the forest resources may promote or undermine positive attitude and behaviour towards support for forest conservation. The independent variable is access to forest products and the dependent variable incorporates attitude towards support for conservation efforts by rural communities. Generally, seeking to understand their views and opinions regarding support for fees payment, for tree planting and protection of tree nurseries, restrictions on timber harvesting from the forests and community forestry. These are strategies for ensuring conservation of forests.

Household characteristics such as occupation, wealth, level of education, household size, distance to the forest and age play a crucial role in determining whether households participate in forest resource exploitation or not. The policy environment, which ensures various stakeholders are charged with management of forest resources to provide incentives to communities and enforce rules towards forest conservation, also determines how communities will engage with the forest resources. These two variables, according to the study, have a direct relationship with the independent variable. They, therefore, play a moderating role.

Figure 2.1 Conceptual Framework



(Source: Author's conceptualization)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section provides a description of the methodology used to undertake the research. It encompasses the research design, study site, target population, sampling procedure, research instruments, data needs table, data analysis, and data presentation.

3.2 Research design

A research design is sort of a game plan; it enables the researcher to govern how the answers for the research question will be obtained. As such, the research design must be in line with the purpose of the study, the question, the research type and the information required (Nishishiba et al., 2014).

The research design adopted in this study was a cross-sectional survey design. It allows information to be obtained at one time, whether with one visit or several visits over a short period of time (Shanahan et al., 2012). It also enables researchers to obtain information about practices or situations from a randomly selected sample in a field setting, having interviews or questionnaires as the data collection instruments (Bhattacharjee, 2012). From the description, it made it an appropriate research design for this study as it sought to answer the question of how

access to forest products enables rural communities surrounding Malava forest to support forest conservation efforts.

3.3 Study Site

The study was carried out in Malava forest. It is geographically located in Malava sub-county, Kakamega County, and it is positioned 25 kilometres North of Kakamega town along Kakamega-Webuye road (KFS and CFA, 2015).

It is an expansive area of 718.8 hectares, hosting a natural forest occupying 438.9 hectares, plantation forest covering 269.9 hectares, grassland occupying 5.5 hectares and also a 4.5 hectares excised land hosting Malava Girls' High School. It is part of the larger Kakamega forest ecosystem, though with much less abundance of biodiversity as compared to Kakamega forest. The Kenya Forest Service holds the management of the forest and it is divided into three administrative areas namely; Makhwabuye, Shitirira and Fukoye (KFS and CFA, 2015).

It experiences an annual rainfall averaged at 2,000mm. The rains mainly fall between April to June and September to November. Due to the favourable climatic conditions, the forest adjacent communities engage in agricultural activities, including drawing a number of economic, cultural, social, spiritual and moral values from the forest (KFS and CFA, 2015).

High population of 17,594 people with a density of 572 is experienced in the surrounding of the forest. The population is diverse in terms of material wealth; they range from the very rich to the very poor. About livelihood activities, the largest percentage (75%) are subsistence farmers, some (10%) are employed and earn wages, others (5%) engage in casual jobs and a smaller percentage (4%) practice trading (KFS and CFA, 2015).

The Kenya Forest Service, The Kenya Wildlife Service, and Community Forest Associations are some of the institutions put forth to reinforce protection and conservation of Malava forest. That notwithstanding, overgrazing, encroachment, and illegal charcoal burning are some of the overt threats reported to be facing this important forest resource, hence the rationale to carry out the study in this location (KFS and CFA, 2015).

3.4 Target Population

The unit of analysis was the household, the respondents being the household heads. The researcher purposively carried out the interviews in households where the household heads were present. In cases where both the parents were available, preference was given to the males. The key informants included; the clerk of the forest manager and the corporal in-charge of protection and security.

3.5 Sampling Frame and Procedure

The study area of Malava forest has a population size of around 17,594 people and approximately 1,000 households within a radius of 1 kilometre from the forest, bordered by several villages. The respondents were picked from the bordering villages within 5 kilometres radius from the forest namely; Makhwabuye, Matioli, Township, Shitirira, Machemo, Malanga, Fukoye, Muhoni, Masungutsa, Mungakha, Harambee, Teresia, Mukavakava, Lukala, and Shivanga. Matioli, Shitirira, and Machemo villages are located at 3 kilometres and above from the forest and due to time and financial constraints, the researcher did to cover the villages that were at 3 kilometres to 5 kilometres all around the forest.

To achieve the most appropriate sample size, the formula provided by Cochran (1963) was applied.

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

Where (n) is the sample size. N is the population size, which is 1,000, and (e) is the margin error, given at 7%; which means that every value obtained from the population and expressed in percentage will be between 7% less or 7% high. The confidence level is assumed at 95%. When all the values are appropriated in the formula above, the sample size is 169 households. It is a representative sample and, therefore, the results can be generalized to the whole population under study with confidence.

The 169 respondents were randomly sampled. Systematic random sampling technique was used and is done by selecting one household randomly and the subsequent households at an equal interval. The interval is determined by dividing the population size by the sample size, which was at an interval of 5. Systematic random sampling is a type of probability sampling which

allows for each sample in the population to have a chance of getting picked and, thereby, reducing bias (Kothari, 2004). The key informants were purposively sampled given the nature of their identities.

3.6 Research Instrument

The primary instrument for the collection of data was a semi-structured questionnaire for the household respondents and a key informant guide with open-ended questions for engaging the key informants.

3.7 Data Collection Methods

A semi-structured survey questionnaire was used by the researcher to conduct face-to-face interviews with the respondents and the responses recorded at the same time. The interview allowed the researcher to seek clarification for the responses that were inconsistent. Open-ended and closed questions were used to provide both qualitative and quantitative data. The questions mainly focused on the household characteristics of the respondents, household's access to forest resources and attitudes regarding forest conservation. Prior to the full-scale interviews, the researcher conducted a pre-testing with 5 respondents to identify the actual time that the interview would take and also sought out unclear questions which were corrected.

The key informants were purposively selected and the key informant guide with open-ended questions was used to guide the interviewer. The use of open-ended questions enabled the researcher to obtain more important information regarding the study. The questions focused on the execution of their mandate in order to establish the influence of policy on access to forest products by communities and consequently support for conservation.

The researcher also employed the direct observation method to identify the types of products exploited by the adjacent communities in the forest. A review of secondary data was also done, which intensively informed on the primary data collection. The secondary data was obtained from the internet, scholarly articles, journals, books, project papers, and policy papers.

3.8 Data Needs Table

Table 3.1 Data Needs Table

Research question	Data needs	Type of data	Source of data	Instrument
What are the household characteristics of the Malava forest adjacent rural communities?	Household characteristics	Qualitative/ quantitative	Beneficiary/ household head	questionnaire
What are the forest products that the adjacent rural communities depend on in Malava forest?	Forest products	qualitative	-beneficiary -key informant	-questionnaire -key informant guide

How does access to forest products influence attitude and behaviour towards support for forest conservation?	Attitude and behaviour towards support for forest conservation.	qualitative/ quantitative	beneficiary key informant	questionnaire key informant guide
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3.9 Data Analysis and Presentation

Data analysis involves a process of seeking out omissions and errors in data collected, before coding, classifying and tabulating. All these for the purpose of identifying patterns of relationship between the dependent and the independent variables in order to make conclusions (Kothari, 2004).

This study applied both qualitative and quantitative methods of analysing data. The field data recorded in the questionnaires and notes from the key informant interviews were first cleaned to guarantee cleanness and accuracy. This involved checking if codes for the close-ended questions were correctly marked and whether there were missing data. Followed by content analysis on open-ended questions where themes were identified and assigned codes. The questionnaire data was then entered in Ms excel and then transferred to SPSS for analysis in frequencies and cross-tabulations.

Descriptive statistics was used to generate frequencies and percentages for variables under household characteristics and access to forest products. These variables were then cross-tabulated with each other and the ones under attitudes towards forest conservation in order to identify the relationships. Tables and graphs were used to summarize the data and corresponding discussion given.

CHAPTER FOUR

STUDY FINDINGS AND DISCUSSION

4.0 Introduction

This chapter presents the study findings as per the objectives of the study. In the first section, the information on the household characteristics of Malava forest-adjacent communities is provided. The second section presents information on the type of products that the Malava forest-adjacent communities depend on. The last section discusses how the different levels of access influence attitude and behaviour towards support for forest conservation strategies. Figures and tables have been used to illustrate the findings and the relationships between different variables in regards to access to forest products and household characteristics; and access to forest products and support for conservation.

The study target population was 169 household heads and 2 key informants from Kenya Forest Service (KFS). The researcher achieved a 100% response rate, of which is satisfactory to derive conclusions for the study. Mugenda and Mugenda (2008) note that a response rate of 70% and above is excellent. All the respondents were either male or female provided they were in charge of decision-making in their respective households. The female respondents were more than the

male respondents, at 66.9% and 33.1% respectively; nonetheless, the target of the study was not to achieve an equal number of respondents from both genders.

4.1 Household Characteristics of the Respondents

This section discusses the findings as per the first objective to analyse the household characteristics of the Malava forest adjacent communities. The focus of the study was on access to forest products as an incentive to positive attitude towards conservation but considered household characteristics including; age, occupation, wealth, level of education, household size and distance to the forest as factors determining households' access to forest products and, therefore, play a moderating role regarding attitude towards support for forest conservation. Other variables have also been discussed including membership in community forest association and household position of the respondent which also have significance in determining the access to forest products by households.

4.1.1 Age of the Respondents

Age is a determining factor when it comes to access to forest products (Garekae et al., 2016). In the study, it was established that 30.8% of the respondents fell in the 26-35 age bracket, which was the highest and a few at 6.5%, which was the lowest percentage, fell in the 18-25 age bracket.

Table 4.1 Age of the Respondents

Range	Count	Percentage
18-25	11	6.5
26-35	52	30.8
36-45	43	25.4
46-55	34	20.1
Above 56	29	17.2
Total	169	100.0
Source: Field Data, 2018		

4.1.2 Community Forest Association Membership

Following the wider concept of Participatory Forest Management, Community Forest Association was instituted (Government of Kenya, 2016). Membership in community forest associations (CFA) guarantees access to certain forest products that non-members are not entitled to (Chepngeno, 2014). The key informants mentioned that Malava CFA was formed in the year 2008 and presently it has 537 members. Through the CFA, the communities have been sensitized on the importance of forest and conservation measures. The members are also given priority when it comes to allocation of lands for farming in the forest, where agroforestry is practiced. They also benefit from the programmes initiated by the government and other institutions in support of forest conservation. The key informants indicated that Nature Kenya issued beehives, motorcycles, wheelbarrows, and cook-stoves to some of the members. The beehives are kept in the forest and some in the homes where there are established forests. It enables the members to appreciate the existence of forests. Motorcycles are mainly for income-generation to minimize dependency on forests.

Table 4.2 Member of Community Forest Association

CFA member	Count	Percentage
Yes	61	36.1
No	108	63.9
Total	169	100.0

Source: Field data, 2018

From the table above, out of the 169 respondents, 61 were found to be members of the Malava Community Forest Association while 108 were found to be non-members. Most of the non-members indicated that they were not aware of the existence of CFAs while others were aware but did not bother to join or they were unable to pay the membership fee of Ksh 200. Some of the women indicated that they did not join the Malava CFA because their husbands were already members.

4.1.3 Household Position of the Respondent

Men and women have different interests, responsibilities and capabilities to involve themselves in collective actions in areas such as income generation, management of natural resources among others (Meinzen et al., 2007). The household position of the respondent was important in the analysis of access to forest products and support for forest conservation as it is perceived that the engagement of the women in forest-related activities is of a lesser extent compared to that of men (Mulenga., 2012), and, therefore, gender differences present a significant variable for cross-tabulation with access to forest products. From the study, 31.4% were fathers, 66.3% were mothers and 2.4% were elder brothers, sisters, and guardians.

Table 4.3 Household Position of the Respondent

	Count	Percentage
Father	53	31.4
Mother	112	66.3
Other	4	2.4
Total	169	100.0

Source: Field Data, 2018

4.1.4 Occupation

Respondents with formal employment are expected to depend less on forest products as opposed to casual labourers and peasant farmers (Mulenga et al., 2012). The different occupations given were analysed and categorized into; farmer, casual labourer, business person, formal employment, farmer or casual labourer and business person, farmers or business person and formal employment, unemployed and retired. From the study, 73.4% were farmers, 4.7% were casual labourers, 5.9% were business people, 3.6% were either teachers, domestic workers or security officers, 7.7% were farmers or casual labourers and business people at the same time, 0.6% were farmers or business people and had a formal employment, 2.4% indicated that they were unemployed, meaning they were not doing any income-generating activities and 1.2% indicated that they had retired from formal employment.

Table 4.4 Occupation of the Respondents

Occupation	Count	Percentage
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Farmer	124	73.4
Casual labourer	8	4.7
Business person	10	5.9
Farmer/casual labourer	13	7.7
Business person/farmer and formal employment	1	0.6
Unemployed	5	3.0
Retired	2	1.2
Total	169	100.0

Source: Field Data, 2018

4.1.5 Level of education

The study sought information on the highest level of education attained. Education is an essential characteristic which determines household's participation in the use of shared resources and also the individual's attitude towards forest conservation (Obua et al., 1998; Shrestha and Avalapati, 2006). The results show that the majority of the people living adjacent to Malava forest did not proceed to universities or colleges. Only 1.2% were university graduates, 4.1% had attended college, 34.9% had at least the secondary education, whether completed or not, 52.7% had at least primary education, whether completed or not and 7.1% indicated that they did not attend school.

Table 4.5 Level of Education of the Respondents

Level of education	Count	Percentage
Post-secondary	9	5.3
Secondary	59	34.9
Primary and below	101	59.8
Total	169	100.0

Source: Field Data, 2018

4.1.6 Wealth (Landholding, income, agricultural activities)

The study sought information on the numbers of acres in possession by the respective households, their average monthly income and the agricultural activities they are engaged in. The study perceived these variables to account for the wealth of an individual household and,

therefore, depending on their status as per these three variables, they would either access forest products or not.

a) Landholding

Majority of the residents around Malava forest have less than an acre of land (54.4%), followed by those who have between 1 to 3 acres (29.6%), those who have between 3 to 6 acres (10.7%), those who possess land that is between 6 to 9 acres (0.6%) and then those who have above 9 acres (0.6%).

Table 4.6 Size of Land

Size of Land (acres)	Count	Percentage
Less than 1.0	92	54.4
1.1-3.0	50	29.6
3.1-6.0	18	10.7
6.1-9.0	1	0.6
Above 9.1	1	0.6
Don't know	7	4.1
Total	169	100.0

Source: Field Data, 2018

b) Income

Household income is an important variable when it comes to analysing the determining factors of participation in, especially, NTFPs exploitation. Poor households will rely more on natural capital base as opposed to wealthier households (Mulenga et al., 2012). From the study, it was found that, out of 149 respondents who provided their average monthly income, 118 earn less than Ksh 5,000; 18 earn between Ksh 5,001 and Ksh 10,000; 4 earn between Ksh 10,001 and Ksh 15,000; 5 earn between Ksh 15,001 and Ksh 20,000; and 4 earn between Ksh 25,001 and Ksh 30,000.

Table 4.7 Average Monthly Income

Income	Count	Percentage
0-5,000	118	69.8
5,001-10,000	18	10.7

10,001-15,000	4	2.4
15,001-20,000	5	3.0
20,001-25,000	0	0.0
25,001-30,000	4	2.4
Did not disclose	20	11.8
Total	169	100.0
Source: Field Data		

c) Agricultural activities

The study inquired into the agricultural activities of the residents around Malava forest. The activities were categorized into mixed farming, crop farming, and livestock keeping. Agriculture contributes to the wealth of a household and it is important to factor it in the wealth spectrum as a household characteristic. Most residents at 78.7% practice mixed farming, including the planting of cash crops (maize, beans, and sugarcane), several horticultural products (vegetables, groundnuts, arrow roots, and cassava), livestock keeping (cattle, sheep, and goats) and poultry farming. Only 19.5% practice crop farming and a 1.8% indicated not to be involved in any agricultural activity.

Table 4.8 Agricultural activities of the Respondents

Activity	Count	Percentage
Mixed farming	133	78.7
Crop farming	33	19.5
No activity	3	1.8
Total	169	100.0
Source: Field Data, 2018		

4.1.7 Distance to the Forest

Distance from the forest is an important factor that determines the participation of households in the exploitation of forest products. People who live close to the forest will find it easy to collect a number of products from the forest more frequently. Those who live far away may not utilize

forest resources at all or they may collect their most significant products once in a while. (Mulenga et al., 2012; Sapkota and Oden, 2008). From the study, it was established that within a radius of 1 km around the forest, the population is dense and 74.6% of the respondents were sampled within the 1km radius, 9.5% within 2 km, 3.6% within 3 km, 5.3% within 4 km and 7.1% within 5 km radius.

Table 4.9 Distance to the forest

Distance (metres)	Count	Percentage
Less than 1,000	126	74.6
1,000-2000	16	9.5
2,001-3,000	6	3.6
3,001-4,000	9	5.3
4,001-5,000	12	7.1
Total	169	100.0

Source: Field Data, 2018

4.1.8 Household Size

The study inquired into the household size of the respondents with the aim of establishing if large households contributed to the exploitation of forest products by the individual households. Households with less than 5 members are considered to be small, those with 6 to 10 members are considered to be large while those with above 11 members are considered to be very large. It was found out that the majority of the households are large (55.6%), followed by small households at 39.6% and then very large households at 4.7%.

Table 4.10 Household Size

Household Size	Count	Percentage
Less than 5	67	39.6
6-10	94	55.6
Above 11	8	4.7
Total	169	100.0

Source: Field Data, 2018

4.1.9 Summary of Household Characteristics

The analysis points out the following outcomes regarding the household characteristics of the Malava forest-adjacent communities: The dominant age bracket among the household heads is between 26 and 35 years, majority of the residents are mostly farmers and earn low incomes. Most of them have attained up to the primary level education only. The highest percentage of households are large comprising of 6-10 members and majority of the households are also located in close proximity to the forest.

These characteristics have also been widely analysed in studies centred on forest-adjacent communities though the results have not revealed similar outcomes among all these variables. For instance, Chepngeno (2014) found that the dominant age bracket among communities surrounding Mau forest was between 41-50 years. Consistently, Mwera (2014) and Langat et al. (2016) found out that the mean household size of communities around Ngong forest and East Mau, Kenya is 6.2 and 8.8 respectively and that the majority of the household heads had attained the primary level education only. Further, in regards to wealth, the results of this study have not shown greater economic disparities among the different households. This finding is inconsistent with that of Sapkota and Oden (2008) which found greater socio-economic disparities among communities around Terai forest in Nepal.

All these household characteristics provide viable variables in analysing household's access to forest products, and, therefore, also influence attitude and behaviour of community members towards support for conservation. The dynamics in household characteristics, which consequently influence the levels of access to forest products, present a case of possible divergent views in regards to support for conservation. It is vital to have an understanding of these household characteristics to generate substantive conclusions for this study.

4.2 Types of Forest Products

This section responds to the second objective which aims to establish the type of forest products that communities living adjacent to Malava forest depend on.

4.2.1 Forest Products

The forest products that households around Malava forest depend on include timber, charcoal, water, fuel wood, soil, pasture for livestock, termites, mushrooms, herbs/medicine, honey, seedlings, seeds, building materials (poles), land for farming and shade for *barazas*.

4.2.1.1 Timber

Tree falling is highly prohibited in the natural side of the forest. Timber harvesting is only allowed in the plantation side where once the planted trees are mature, an advertisement is given by Kenya Forest Service and qualified saw millers are allowed to harvest timber at a fee. Those who wish to collect firewood at the time are also allowed and charged too but less compared to those obtaining timber. The analysis indicates that only 2 respondents (1.2%) from those sampled have ever exploited timber from the forest.

4.2.1.2 Charcoal

Charcoal burning is an illegal activity that has been cited to be threatening the conservation of Malava forest (KFS and CFA, 2015). This activity is highly prohibited; however, 3 of the respondents (1.8%) confessed to be obtaining logs from the natural forest in order to burn charcoal for commercial use. They mentioned that the sale of charcoal contributed to their incomes and, therefore, they had to risk and obtain the logs from the forest by all means despite the prohibition. Two of the respondents indicated that they obtain the logs weekly while one said that he obtains the logs once in a while in order to burn charcoal. The study also inquired into the types of energy sources for cooking and 43.1% of the respondents agreed to be using charcoal either on a daily basis, often or once in a while.

Table 4.11 Use of Charcoal for Cooking

	Count	Percentage
Always	8	4.7
Often	10	5.9
Sometimes	55	32.5
Never	96	56.8
Total	169	100.0

Source: Field Data, 2018

4.2.1.3 Water

Forests serve as water catchment areas (UN, 2017) and from the researcher's observation, there were rivers flowing from the forest and there was also a spring where people were seen drawing water. The key informants indicated that the forest is a source for the rivers Lusumu, Nambirima and Musingu. The respondents who indicated to be obtaining water from the forest were 25 in number (14.8%), with 21 of them drawing water from the forest daily and 4 of them weekly. The study inquired into whether the respondents lack clean water for use and 87.0% of the respondents mentioned that they never lack water.

4.2.1.4 Fuelwood

Fuelwood is a cheap source of cooking energy that poor households can easily afford. A total of 81 respondents (47.9%) indicated that they depend on Malava forest for fuelwood. Among them, 21 indicated to be sourcing fuelwood from the forest daily, 31 weekly, 8 monthly and 12 once in a while. The study sought to obtain information on the types of energy source for cooking that is predominant for the residents around Malava forest and the findings show that 98.8% of the respondents agreed to be dependent on fuelwood as the main source of cooking energy. The fuelwood sourced from the forest is mainly used for subsistence, but also for commercial use.

Table 4.12 Use of Fuelwood for Cooking

Frequency	Count	Percent
Always	166	98.2
Sometimes	1	0.6
Never	2	1.2
Total	169	100

Source: Field Data, 2018

The study further sought to find out if the respondents have ever lacked fuel to cook food, most of the respondents 58.6% indicated that they have never lacked fuel to cook food. This finding indicates that Malava forest is an important source of fuelwood for the residents living around.

4.2.1.5 Soil

From the researcher's observation in the forest, there was evidence of soil extraction from specific locations in the forest. Some of the respondents, 3 of them (1.8%), agreed to be obtaining soil from the forest, whether for building or for establishing tree nurseries.

4.2.1.6 Pasture for livestock

With limited grazing land, the forest provides an important area for livestock grazing which residents make use of. A total of 37 respondents (22.0%) indicated that they take their livestock to the forest for grazing, whether daily (30), weekly (5), monthly (1) or once in a while (1). This dependence is a factor of the household characteristic in terms of land for livestock grazing and distance from the forest. Those who had enough grazing area despite living close to the forest did not take their livestock for grazing in the forest and also those living more than 3 km found the forest to be too far for them to take their cattle for grazing.

4.2.1.7 Termites and mushrooms

Termites and mushrooms are seasonal products that residents can obtain from the forest either for subsistence or for commercial use. They serve as supplementary or complementary foods with a high nutritional value that communities obtain from the forest. In the study, it was established that 28 respondents (16.6%) and 33 respondents (19.5%) indicated that they source termites and mushrooms from the forest once in a while for subsistence and both subsistence and commercial use respectively. Most respondents 62.1% indicated that they have never lacked food for the past one year from the time of the study. The forest, besides being a source for the few edibles, has contributed to the favourable climate which enables agricultural production in the area thus contributing to the abundant food supply.

4.2.1.8 Medicinal-plants

The key informants indicated that the forest has plant species which have very high medicinal value. From the study, it showed that 24 respondents (14.2%) obtained medicinal-valued plants from the forest. The medicine is obtained weekly (1), monthly (8) and once in a while (15) by individual households. The numbers in brackets indicate the frequencies from the analysis of the sampled data. The medicine obtained is for both commercial and subsistence use. The researcher observed several trees in the forest whose barks had been removed to serve as medicine.

4.2.1.9 Honey

Several bee-hives were observed in the forest indicating that honey harvesting is practiced in Malava forest. Of the sampled respondents, 2 of them (2%) indicated that they obtain honey once in a while just for subsistence use.

4.2.1.10 Land for farming

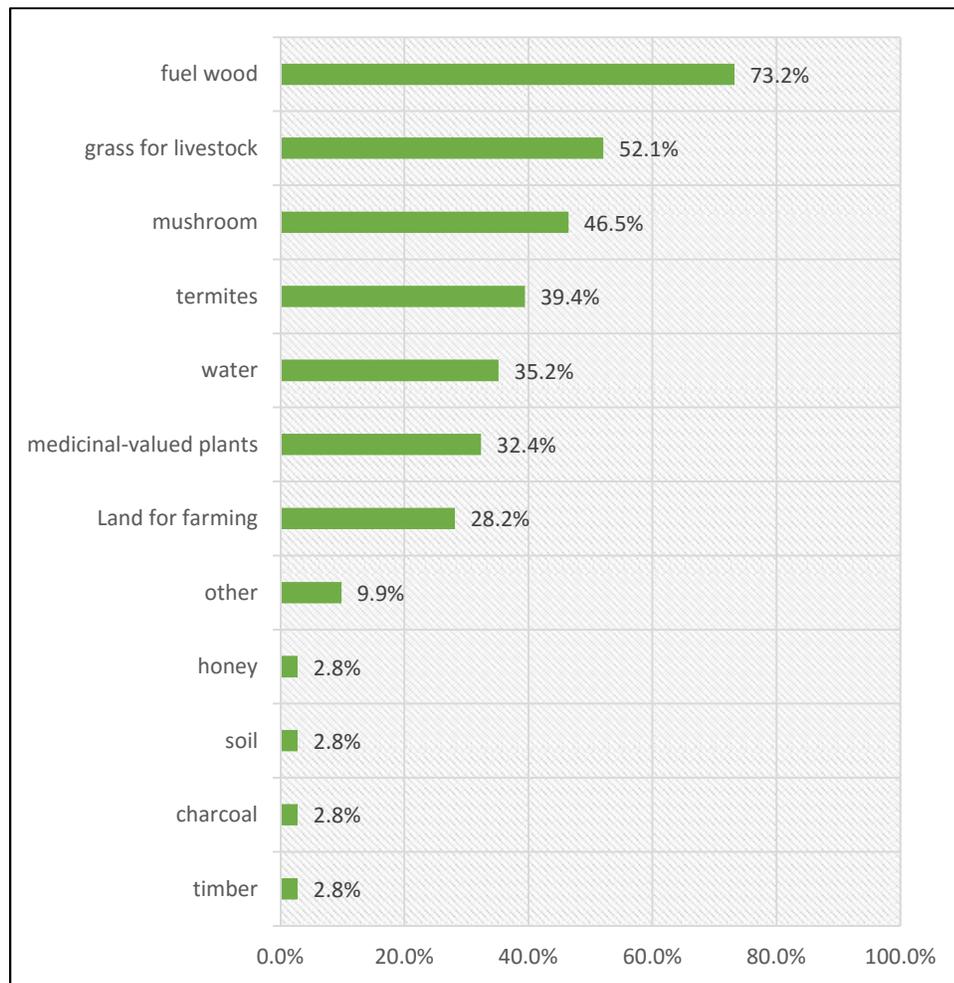
The communities around Malava forest within a radius of 5km have been allowed to competitively access land for farming in the plantation side of the forest to grow maize and beans in the newly established tree plantations; however, priority is given to members of the Community Forest Association and those who can afford a fee of Ksh 1,500. A total of 27 respondents confirmed to be farming in the forests once in a while since it also depends on the availability of the farms as the trees occupy a considerable amount of the land and agroforestry is only practical until the trees grow to a certain height that can no longer support crop production. The crops are appropriated for both subsistence and commercial purposes. Though land is not considered as a product, it was mentioned by a considerable number of the respondents (27) and, therefore, it could not be categorized under other or isolated from the analysis.

4.2.1.11 Others

From the study, a total of 3 respondents mentioned that they have obtained building materials (poles) from the forest, another 3 also indicated that they obtain seedlings, one indicated to collect seeds from the forest and also one mentioned that they have used the forest, specifically on the plantation side to hold meetings. These are the products mentioned under the category of others.

From the study of Malava forest, the rank of the products from the most exploited to the least exploited by the adjacent communities is as shown in the graph below, fuelwood, pasture, mushroom, termites, water, medicinal plants, land for farming, others, honey, soil, charcoal and finally timber.

Figure 4.1 Types of Forest Products



Source: Field Data, 2018

4.2.2 Accessing Forest Products

The study sought to obtain information on the difficulties that the individual households who access forest products face. It was established that 3.6% of the respondents indicated that distance to the forest was an issue and it meant that they had to sacrifice the long walk to the

forest to take their animals for grazing or also incur transportation cost to obtain products such as fuelwood or seedlings among others for use.

Lack of access due to restrictions is a major difficulty. A total of 60.9% of the respondents mentioned that they experienced this difficulty. At the time of the study, access to forest products had been prohibited completely following the directive from the government. Some of the respondents, despite, mentioned that they still sneak into the forest to obtain fuelwood when rangers are not around since they do not have other alternatives. Some of the respondents also from a particular village decried harassment by the rangers on suspicion that they could be culpable whenever there is an illegal access to the forest to obtain fuelwood. They claimed to be always perceived as the suspects despite them being innocent.

From the analysis, a total of 50.9% and 7.7% of the respondents mentioned that lack of license and permits and lack of capital respectively hinder their access to forest products. In a month, they are required to pay 100 shillings for collection of firewood and 50 shillings for each grazing animal. Some of the households are too poor to afford to pay for the permits and, therefore, they cannot access the products freely. Availability of capital also determines a household's access to timber forest products and a venture into saw-milling due to the licenses required. Only the rich can benefit from timber forest products which have a considerably higher return as compared to the non-timber forest products.

Some of the respondents (10.7%) indicated that lack of awareness of the governing rules presents a challenge to them. Information is always disseminated through CFAs, public gatherings, in schools among other forums. It, however, happens that some of the residents are not found within such gatherings and, therefore, miss out on a lot of information. Such individuals are the ones who responded to be unaware of governing rules.

Lack of technology and lack of skills was also cited by 10.7% and 17.8% of the respondents respectively. These are individuals who wish to access certain products, for instance, honey, timber, medicinal herbs among others but are unable because they are incapacitated in terms of skills and technology and their financial status cannot allow them to outsource the services. Distance in the forest was also cited as a challenge whereby some products are located far inside the forest and thus rendered inaccessible. A study on Mau Forest also found that issues of

permits and licenses, not being aware of the governing rules and restrictions presented a challenge to the forest dependent adjacent communities (Chepngeno, 2014).

4.2.3 Summary of Forest Products

Some of the products mentioned above are very similar to those mentioned from other cases. These include fuelwood, pasture for livestock, medicinal plants, honey and timber. Fuelwood is mentioned as the most dominant product exploited by the forest-adjacent communities and timber as the least exploited product. Exploitation of timber requires capital which many households may not afford. Mwera (2014) in the study of Ngong forest found out that the main products obtained from the forest by the surrounding communities include firewood, honey, poles, vegetables, and medicinal herbs. Chepngeno (2014) in the study of Mau forest found that the communities accessed firewood, fodder, medicinal herbs, building material (grass) and timber. Kiplagat et al. (2008) in the study of Kakamega forest found out that the communities obtained firewood, herbal medicine, cut grass, thatch grass, charcoal and also grazed their animals in the forest. Shackleton (2004) in pointing out the forest products in South Africa mentioned medicines, timber, fuelwood, charcoal, sap for beverages, poles, products from grasses (brushes, fodder, thatch), mushrooms, fruits, nuts, seeds, honey, birds for eating, sand for building, clay for pottery, water and rock for building.

It is, however, important to mention that in Malava forest the range of exploited products is not very wide, but uniquely, agroforestry is practiced extensively and there is a considerable number of households benefitting. Besides, the forest boasts of other products such as the African mahogany tree and plant species with high medicinal value such as *pterospermum gillettii*, *kigelia africana*, among others. Malava forest also has a highway passing through it which allows access to products and animals watch by the community members and also tourists with ease.

Literature reveals that exploitation of non-timber forest products ensures the non-diminishing value of forests (Melese, 2016). Assessing the types of products exploited in Malava forest justifies the idea that NTFPs extraction is less undermining to forest conservation. In the natural side of the forest, collection of fuelwood is permitted but limited to only collection of fallen twigs and dead wood and honey harvesting is prohibited during the dry season. Such measures have ensured continued conservation of the forest. However; grazing and agroforestry poses a

risk to the growth of planted trees though to a lesser extent. Some of the planted trees are destroyed by farmers and grazing animals thus reducing the number of trees. Furthermore, some individuals still use cutting tools to access logs for charcoal burning and fuelwood from the natural side of the forest, thus, leading to the accounts of destruction of the forest.

4.3 Access to Forest Products and Support for Conservation

This last section presents the analysis on how access to forest products influences attitude and behaviour towards support for conservation. In the first part the data on access to forest products by the communities is presented. The second part details the data on access to forest products cross-tabulated with the data on household characteristics. The third part focuses on the views of the respondents on the different strategies for forest conservation and the fourth part presents a cross-tabulation of access to forest products, household characteristics and the respective views of the respondents on forest conservation strategies and the last part details information on the policy environment. The goal is to show how access to forest products influence support for conservation.

4.3.1 Access to Forest Products

Out of the 169 respondents interviewed, 111 respondents (65.7%) agreed to be accessing some products from Malava forest while 58 respondents (34.3%) indicated that they do not visit the forest to obtain any product.

Table 4.13 Access to Forest Products

	Count	Percentage
Yes	111	65.7
No	58	34.3
Total	169	100.0

Source: Field Data, 2018

4.3.2 Household Characteristics and Access to Forest Products

The study conceptualizes that access to forest products is a factor of the household characteristics as discussed below.

4.3.2.1 Level of Education

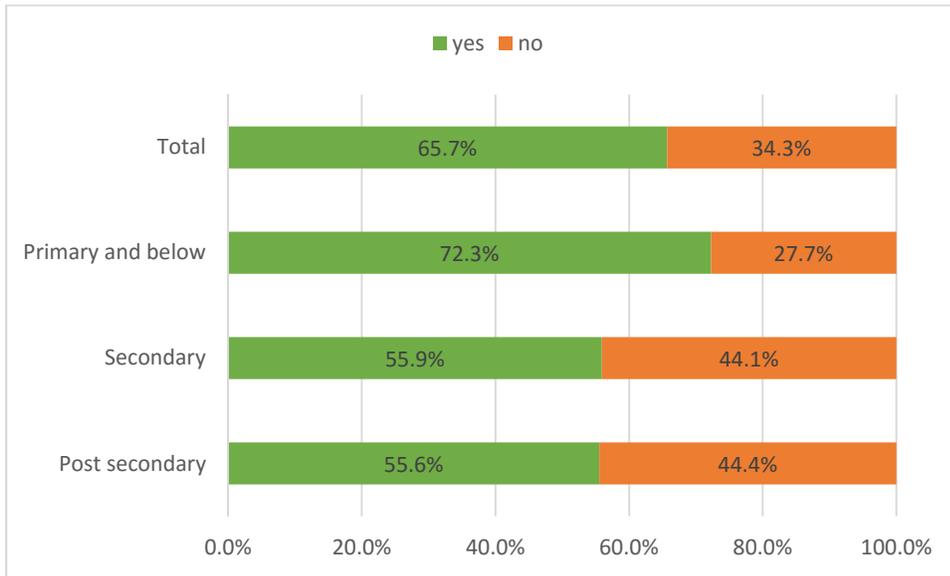
The categories have been classified into post-secondary education, secondary education and primary education and below. The classification is necessary to achieve a good number of respondents to be able to make statistical conclusions, and mainly because the essence of this variable is only to present information on the influence of access to information on access to forest products.

From the analysis, access to forest products decreased with the increase in education level. Those who attained up to the primary level or had no education, 73 in number had a higher percentage of access to forest products (72.3%), followed by secondary level, 33 in number (55.9%) and then post-secondary, 5 in number (55.6%).

In terms of the level of education and access to forest products, from this study, it is evident that education plays a significant role in determining household's access to forest products. There were only 2 respondents who indicated that they had a university degree, and one of them indicated to be benefitting from forest resources through the acquisition of land for farming in the forest and not through the extraction of products for subsistence or commercial use.

It clearly shows that with education, individuals are more aware of the benefits of forest conservation and are also able to organize their income-generating activities outside the forests. This finding is consistent with others which established that educated family members depended less on common property resources (Adhikari et al., 2004; Koech et al., 2009; Mulenga et al., 2012; Obua et al., 1998).

Figure 4.2 Level of Education and Access to Forest Products



Source: Field Data, 2018

4.3.2.2 Occupation

From the analysis, most farmers accessed forest products (75.0%), a higher percentage of casual labourers (75.0%) and those in formal employment (66.7%) did not access forest products. Most of the respondents who indicated farming as their occupation were just peasant farmers, whose produce could not account more to their incomes, and, therefore, always sought alternatives from the forest. This finding is similar to previous studies which found out that poor households are the most dependent on forest resources (Adhikari et al., 2004; Mulenga et al., 2012; Sapkota and Oden, 2008).

Table 4.14 Occupation and Access to Forest Products

Occupation	Access to Forest Products					
	Yes		No		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
Farmer	93	75.0	31	25.0	124	100.0
Casual labourer	2	25.0	6	75.0	8	100.0
Business	5	50.0	5	50.0	10	100.0
Formal employment	2	33.3	4	66.7	6	100.0
Farmer/ Casual labourer and Business	5	38.5	8	61.5	13	100.0
Business/Farmer and Formal employment	0		1	100.0	1	100.0
Unemployed	2	40.0	3	60.0	5	100.0
Retired	2	100.0	0		2	100.0
Total	111	65.7	58	34.3	169	100.0

Source: Field Data, 2018

4.3.2.3 Income

The analysis of the data demonstrates that low-income earners around Malava forest are the most dependent on the forest. There was an overwhelming number of respondents who indicated to be earning less than Ksh 5000 and, therefore, provide a strong statistical evidence to make the conclusion that income determines household's access to forest products, of which corresponds to the findings of Mulenga et al. (2012).

Table 4.15 Income and Access to Forest Products

Income	Access to Forest Products					
	Yes		No		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
0-5,000	84	71.2	34	28.8	118	100.0
5,001-10,000	9	50.0	9	50.0	18	100.0
10,001-15,000	2	50.0	2	50.0	4	100.0
15,001-20,000	2	40.0	3	60.0	5	100.0
20,001-25,000						
25,001-30,000	2	50.0	2	50.0	4	100.0
Did not disclose	12	60.0	8	40.0	20	100.0
Total	111	65.7	58	34.3	169	100.0

Source: Field Data, 2018

4.3.2.4 Distance to the Forest

The results show the significance of the distance to the forest in a household's access to forest products. It was found out that 81.0% of those living within a 1km radius from the forest agreed to be sourcing products from the forest, whether firewood, water, grass for livestock or charcoal among others. Majority of households within 2 km and 5 km radius indicated that the forest is too far for them to organize their livelihood activities therefrom. A few of those who accessed products from the forest indicated that once in a while they went for important products which they could not source from anywhere else such as seedlings, herbs, pasture for livestock and land for farming. This finding is consistent with the findings of Chepngeno (2014) who also indicated that in Mau forest, households that were near the forest depended more on the forest resources due to their ease of access

Table 4.16 Distance to the forest and Access to Forest Resources

Distance (metres)	Access to Forest Products					
	Yes		No		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
Less than 1,000	102	81.0	24	19.0	126	100.0
1,000-2000	5	31.2	11	68.8	16	100.0
2,001-3,000	1	16.7	5	83.3	6	100.0
3,001-4,000	1	11.1	8	88.9	9	100.0
4,001-5,000	2	16.7	10	83.3	12	100.0
Total	111	65.7	58	34.3	169	100.0

Source: Field Data, 2018

4.3.2.5 Household size

The percentage difference between households that access forest products and those that do not access forest products from the three different categories indicate that large and very large households, as opposed to small households, access forest products more. Richards (1993) notes that high socio-economic costs hamper positive behaviour towards forest conservation because forests provide a readily available resource that individuals can capitalize on. Larger households incur higher socio-economic costs and, therefore, with the availability of a significant natural resource and inadequacy of income, these households depend more on forest resources. This finding is, however, inconsistent with that of Mwera (2014) who did a study of Ngong forest and recorded that family size was an insignificant variable in relation to dependence on forest.

Table 4.17 Household Size and Access to Forest Products

Household Size	Access to Forest Products					
	Yes		No		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
0-5	41	61.2	26	38.8	67	100.0
6-10	65	69.1	29	30.9	94	100.0
Above 11	5	62.5	3	37.5	8	100.0
Total	111	65.7	58	34.3	169	100.0
Source: Field Data, 2018						

4.3.2.6 Size of land

The percentage difference in access of the lowest to the highest categories of land sizes includes 34.8%, 40%, 22.2%, -100% and 100% respectively. It reveals that respondents with small parcels of land depended more on forest products than those with larger parcels of land. It is then logical to deduce that landholding significantly impacts positively or negatively on access to forest products. From the researcher's observation, most households occupying larger spaces and with large farms have established tree plantations and can easily source for firewood and timber in the home and, therefore, keep away from the forest. One respondent with a large land who indicated to be accessing forest products cited that he obtains seedlings and sometimes harvests timber from the plantation forest when such exercise is made available by the Malava Kenya Forest Service. This is because of his capability to afford the capital required to benefit from such forest products.

Table 4.18 Size of Land and Access to Forest Products

Size of Land (acres)	Access to Forest Products					
	Yes		No		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
Less than 1.0	62	67.4	30	32.6	92	100.0
1.1-3.0	35	70.0	15	30.0	50	100.0
3.1-6.0	11	61.1	7	38.9	18	100.0
6.1-9.0	0	0.0	1	100.0	1	100.0
Above 9.1	1	100.0	0	0.0	1	100.0
Did not disclose	2	28.6	5	71.4	7	100.0
Total	111	65.7	58	34.3	169	100.0

Source: Field Data, 2018

4.3.2.7 Community Forest Association Membership

The results indicate that 95.1% of the respondents who are members of the Malava Community Forest Association accessed forest products while only 4.9% did not access the forest products. It is, however, important to note that for the case of Malava forest, 49.1% of non-CFA members accessed forest products and, therefore, access to the forest is open to even non-members but they only access limited resources as compared to the CFA members. This finding is inconsistent with that of Chepngeo (2014) who mentioned that communities around the Mau forest only access forest resources through membership in forest associations or user groups.

Table 4.19 Community Forest Association and Access to Forest Products

CFA member	Access to Forest Products					
	Yes		No		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
Yes	58	95.1	3	4.9	61	100.0
No	53	49.1	55	50.9	108	100.0
Total	111	65.7	58	34.3	169	100.0

Source: Field Data, 2018

4.3.2.8 Household Position of the Respondent

The study revealed that more males accessed forest products (69.8%) compared to the women (65.2%). These findings are similar to a study done in Zambia where it was found out that the households that were headed by males had more accounts of participation in the collection of forest products (Mulenga et al., 2012; Langat et al., 2016).

Table 4.20 Household Position of the Respondent and Access to Forest Products

Household Position	Access to Forest Products					
	Yes		No		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
Father	37	69.8	16	30.2	53	100.0
Mother	73	65.2	39	34.8	112	100.0
Other	1	25.0	3	75.0	4	100.0
Total	111	65.7	58	34.3	169	100.0

Source: Field Data, 2018

4.3.3 Respondents' Views on Forest Conservation Strategies

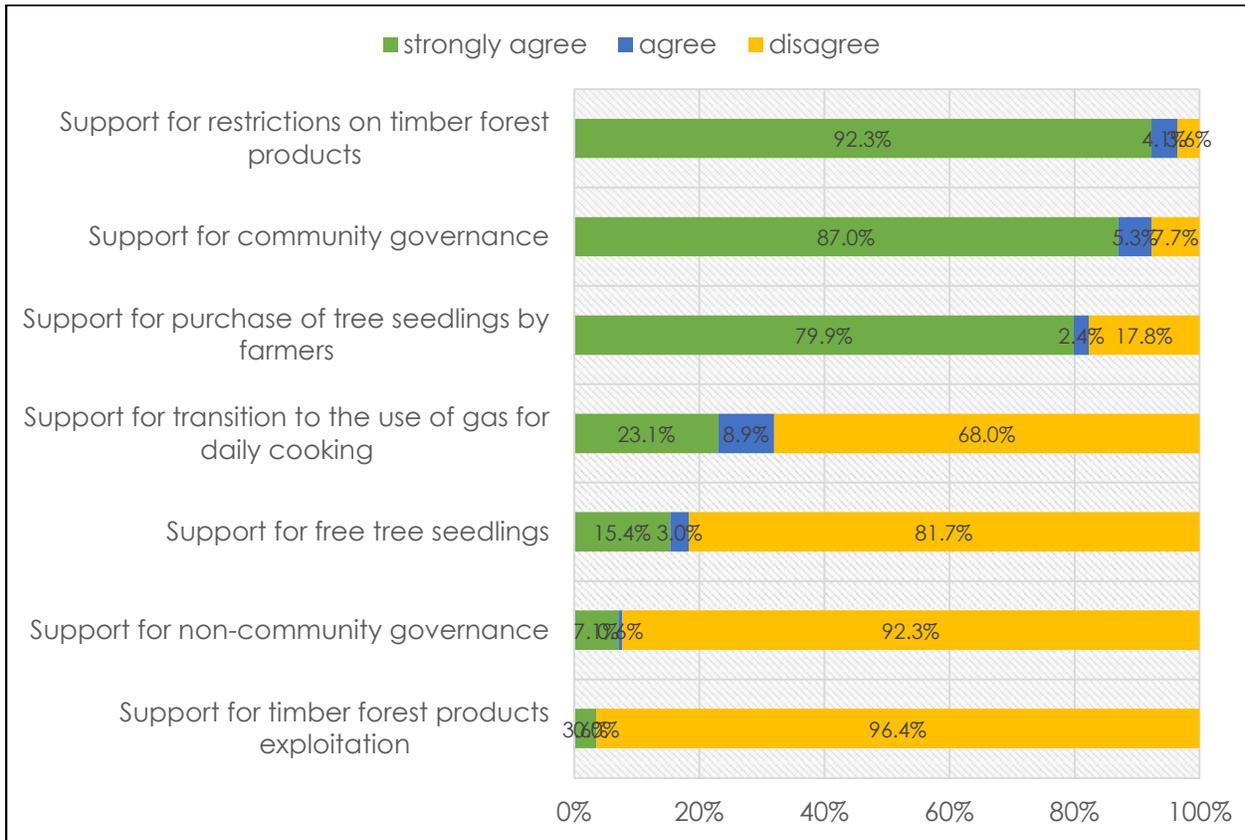
The study inquired into the views of the respondents regarding support for restrictions on timber forest products, support for non-restriction on timber forest products exploitation, support for transition to the use of gas for daily cooking, support for purchase of tree seedlings by farmers, support for free tree seedlings for farmers, support for non-community governance, support for community governance, support for payment of user fees, support for contract farming, likelihood of attending training for tree planting, likelihood of mobilizing others to join the Community Forest Association and the importance of forest conservation to them. The aim was to establish their attitude towards forest conservation. These are some of the interventions and strategies that have been laid out to ensure conservation of the forest resources (Ministry of Environment and Natural Resources, Kenya, 2016).

Different scales were used to find out the opinions of the respondents for different categories of questions, and, therefore, they will be discussed differently according to the respective scales. From the table below, there were overwhelming numbers of respondents who strongly agreed to

the restriction of timber forest products exploitation, community governance and purchase of tree seedlings by farmers as strategies for forest conservation. Regarding timber forest products exploitation, there were very few who supported this view and they had little regard for forest conservation. Those who supported non-community governance cited that familiarity within community members may compromise proper governance and it may be difficult to control others but the government is feared by all, so management by the government alone is more viable. Those who strongly agreed to the issue of free tree seedlings to farmers cited that some people may not be aware of the benefits of trees and, therefore, they may not consider spending on tree seedlings, but when given for free, it will ensure more tree cover.

Transition to the use of gas for daily cooking is an initiative to ensure reduced dependence on fuelwood and consequently less exploitation of forest resources. Most respondents disagreed with this strategy, but there was also a considerable number of respondents who agreed and strongly agreed. Those who disagreed mentioned that sourcing gas is expensive and most people's economic status cannot allow them to depend on gas for daily cooking and that fuelwood is easily accessible to both the rich and the poor; some cited fear claiming that it is not safe for the children. Those who strongly agreed confessed to being tired of smoke and aspired for improved living standards.

Figure 1.3 Respondents' Views on selected Forest Conservation Strategies



Source: Field Data, 2018

The study sought the respondent's view on payment of user fees to access forest products. It revealed that a majority of the community members strongly support payment of user fees. This is because they perceive that it will prevent those who are not sensitive about conservation of the forest from accessing it. There are those who support and somewhat support because of the same perception but suggest that low-valued products, for instance, fuelwood should not be charged. This is because even the poor fully depend on such products and at times they may not afford to pay.

Table 14.21 Opinion on Payment of User Fees

	Count	Percentage
Strongly support	130	76.9
Support	10	5.9
Somewhat support	6	3.6
Do not support	23	13.6
Total	169	100.0

Source: Field Data, 2018

The study sought the opinion of the respondents regarding allowing trained forest contractors to establish and manage tree plantations on their land. According to Mathu (2011), to increase Kenya's forest cover to 10% which is the international standard, there is a need for individuals to embrace farm and private forestry. The private forestry establishment should progress under out-grower plantation schemes. This is whereby landowners get into contract with companies for establishment and management of tree plantations for the production of commercial forest products. It has been noted that the dwindling and limited number of private forestry is as a cause of little involvement of strategic stakeholders in conserving and managing forests (Ministry of Environment and Natural Resources, Kenya, 2016).

From the analysis, most respondents were not supportive of this idea citing possible conflicts and small parcels of land as the main impediments. Those who hailed this strategy recognized the expected benefits in terms of income, fuelwood and also the environmental benefits that come with the existence of forests such as fresh air, rainfall among others.

Table 4.22 Opinion on Contract Tree Farming

	Count	Percentage
Strongly support	36	21.3
Support	9	5.3
Somewhat support	3	1.8
Do not support	121	71.6
Total	169	100.0

Source: Field Data, 2018

The study sought to obtain information on the likelihood of the community members to attend tree planting training and to mobilize others to join the Community Forest Association. Majority of the respondents (90.5%) asserted that they would, without failure, attend a tree planting training if organized within their reach. They demonstrated enthusiasm in regards to forestry training. Those who demonstrated a lack of interest, from the researcher’s observation, they did not have a high regard for knowledge of forestry and more specifically, tree planting. Some of them claimed to be knowledgeable enough not to spend any of their time in such activities.

Table 4.23 Likelihood of attending a Tree Planting Training

	Count	Percentage
Very likely	153	90.5
Somewhat likely	10	5.9
Not very likely	2	1.2
Not at all likely	4	2.4
Total	169	100.0

Source: Field Data, 2018

Management and conservation of forests, as common property resources (CPRs), require the participation of communities in decision-making to enable for initiation of acceptable behavioural standards for all to bolster proper management and conservation of the forests (Ostrom, 1990). Participatory forest management is a strategy that has been legally provided for in the various policy documents including the Forest Act of 2005, The Forest Management and Conservation Act among others. Community Forest Associations (CFA) were formed following this legal provision and its main aim is to allow for shared benefits from forest products among stakeholders, including the community members and at the same time ensuring that the beneficiaries participate in the conservation of the forest (Government of Kenya, 2016). Majority of the respondents (94.7%) affirmed that they would mobilize others to join CFA.

Table 4.24 Likelihood of mobilizing others to join CFA

	Count	Percentage
Very likely	160	94.7
Somewhat likely	5	3.0
Not very likely	2	1.2
Not at all likely	2	1.2
Total	169	100.0

Source: Field Data, 2018

To assess further the attitudes of forest-adjacent communities towards forest conservation, the respondents were asked of what importance is forest conservation to them. 97.6% asserted that forest conservation is very important to them because of the benefits they receive such as rainfall, timber, fuelwood, pasture for livestock and water.

Table 4.25 Views on the importance of Forest Conservation

	Count	Percentage
Very important	165	97.6
Important	2	1.2
Somewhat important	2	1.2
Total	169	100.0

Source: Field Data, 2018

4.3.4 Access to Forest Products, Household Characteristics and Support for Conservation

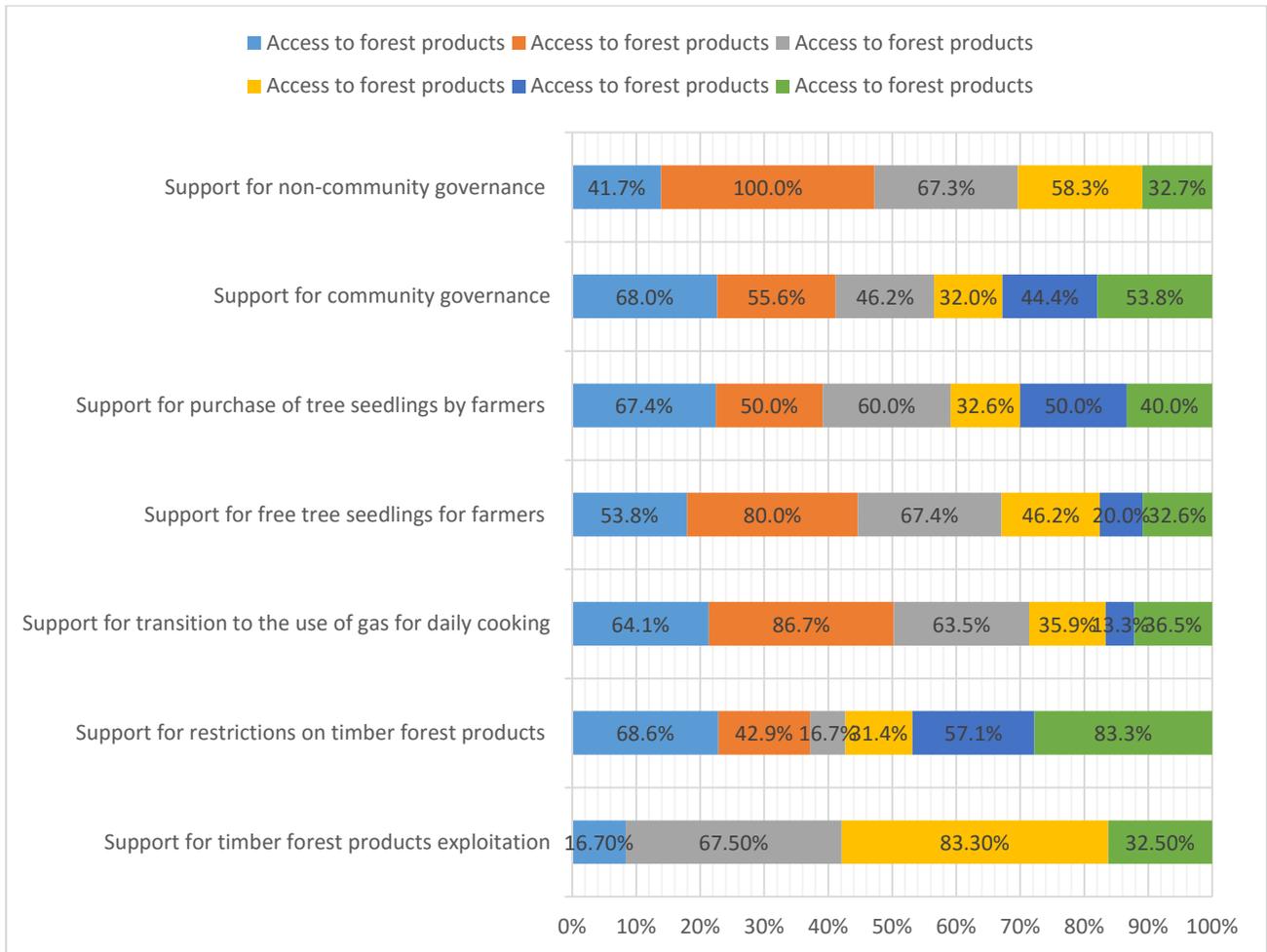
4.3.4.1 Access to Forest Products and Support for Conservation

The final objective of this study was to analyse how access to forest products influences attitude and behaviour towards support for conservation efforts. Attitude and behaviour towards support for conservation is seen through the communities' views on different strategies for promoting sustainable management and conservation of forest resources. These views are expected to be influenced by communities' access to forest products. Access to forest products also has been conceptualized to be moderated by various household characteristics and the policy environment.

The following analysis brings out the findings of this study in relation to the aforementioned variables.

From the graph below, the majority of the respondents from either case regarding access to forest products strongly agreed to community governance, purchase of tree seedlings by farmers, and restriction of timber forest products exploitation. In regards to the respondents' views on support for transition to the use of gas for daily cooking, the majority of the respondents who indicated to be accessing forest products (63.5%) and those who indicated not to be accessing forest products (36.5%) disagreed to this strategy. The same trend is witnessed in regards to support for free tree seedlings by farmers and support for non-community governance. These findings indicate that there is generally a positive attitude towards conservation among the community members living adjacent to or far from Malava forest. Note that most respondents living far from the forest indicated that they did not obtain any products from the forest but they consider the forest as important to attract rainfall to boost agricultural production.

Figure 4.4 Access to Forest Products and Opinion on selected Strategies for Forest Conservation



Source: Field Data, 2018

Regarding support for payment of user fees, the study revealed that those who access forest products are more supportive of payment of user fees as compared to those who do not access forest products. The results by Garekae et al. (2016) and Infield (1988) which found that beneficiaries from forest resources had a more positive attitude towards conservation are consistent with these results.

Table 4.26 Access to Forest Products and Support for Payment of User Fees

Support for Fees Payment	Access to Forest Products					
	Yes		No		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
Strongly support	93	71.5	37	28.5	130	100.0
Support	3	30.0	7	70.0	10	100.0
Somewhat support	4	66.7	2	33.3	6	100.0
Do not support	11	47.8	12	52.2	23	100.0
Total	111	65.7	58	34.3	169	100.0

Source: Field Data, 2018

Contract farming is a strategy to increase forest cover through private forestry. The private forests are strategized to be established in private farms through contracting stakeholders who are trained in forest establishment and management (Ministry of Environment and Natural Resources, Kenya, 2016). Majority of the respondents (79) who access forest products showed a negative attitude towards support of contract farming. It was perceived that engaging other stakeholders in their private lands may be a cause for conflicts and, therefore, could not consider the approach. Others cited minimal land and considered it uneconomical to establish forest on such lands. The few respondents who were positive about this strategy considered it viable and effective regarding forest conservation.

Table 4.27 Access to Forest Products and Support for Contract Farming

Support for contract farming	Access to Forest Products					
	Yes		No		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
Strongly support	27	75.0	9	25.0	36	100.0
Support	5	55.6	4	44.4	9	100.0
Somewhat support	0	0.0	3	100.0	3	100.0
Do not support	79	65.3	42	34.7	121	100.0
Total	111	65.7	58	34.3	169	100.0

Source: Field Data, 2018

To increase forest cover and ensure limited dependence on the natural forest, it is important that households embrace tree planting to be able to source fuelwood and logs for charcoal burning privately (Mathu, 2011). The knowledge of tree planting is crucial in enabling households to participate in establishment of tree nurseries and tree planting as well which goes a long way to ensure that individuals find it less costly to plant trees. On the inquiry of likelihood of attending a tree planting training, majority of the respondents who access forest products expressed enthusiasm on being trained on tree planting. They understood the value of trees and asserted that they would not fail to consider attending a tree planting training if organized.

Table 4.28 Access to Forest Products and Likelihood of attending a tree planting Training

Attending tree planting training	Access to Forest Products					
	Yes		No		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
Very likely	104	68.0	48	32.0	153	100.0
Somewhat likely	3	30.0	7	70.0	10	100.0
Not very likely	2	100.0	0	0.0	2	100.0
Not at all likely	2	50.0	2	50.0	4	100.0
Total	111	65.7	58	34.3	169	100.0

Source: Field Data, 2018

Community Forest Associations are essential in driving the forest conservation agenda among the communities living adjacent to forests. Ostrom (1990) outlines participation of communities as the proper approach in conserving properties that are commonly shared. The participating individuals are expected to lay out working rules which everyone is subject to. Through the association also, it becomes easy to enforce the rules. Besides, the main purpose for such an association is to ensure benefits from forest products trickle down to the members (Government of Kenya, 2016). Most respondents, understanding the purpose of Community Forest Association, mentioned that they would mobilize others to join the Community Forest Association.

Table 4.29 Access to Forest Products and Likelihood of mobilizing others to join CFA

Mobilizing others to join CFA	Access to Forest Products					
	Yes		No		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
Very likely	103	64.4	57	35.6	160	100.0
Somewhat likely	5	100.0	0	0.0	5	100.0
Not very likely	1	50.0	1	50.0	2	100.0
Not at all likely	2	100.0	0	0.0	2	100.0
Total	111	65.7	58	34.3	169	100.0

Source: Field Data, 2018

The analysis further narrowed down to the individual forest products mentioned by the respondents and cross-tabulated with the various strategies which ensures forest conservation. The analysis exclusively follows those who responded positively to the respective conservation strategies. The results indicate that despite the type of products, there is generally a positive attitude towards conservation of Malava forest among the respondents.

Note that in two of the conservation strategies mainly support for transition to the use of gas for daily cooking and support for contract farming, majority of the respondents did not give a positive response. Most of them value fuelwood for cooking because it is more affordable and readily available, and, therefore, inasmuch as they are positive about conservation of the forest, they would not consider abandoning the use of fuelwood. They recognize that its collection is not destructive as the management also allows for collection of dead wood only in the forest. Regarding support for contract farming, most of them who opposed this strategy cited that they do not have large tracts of land and also feared possible conflicts between them and the other party.

Table 4.30 Types of Forest Products accessed and Support for Conservation

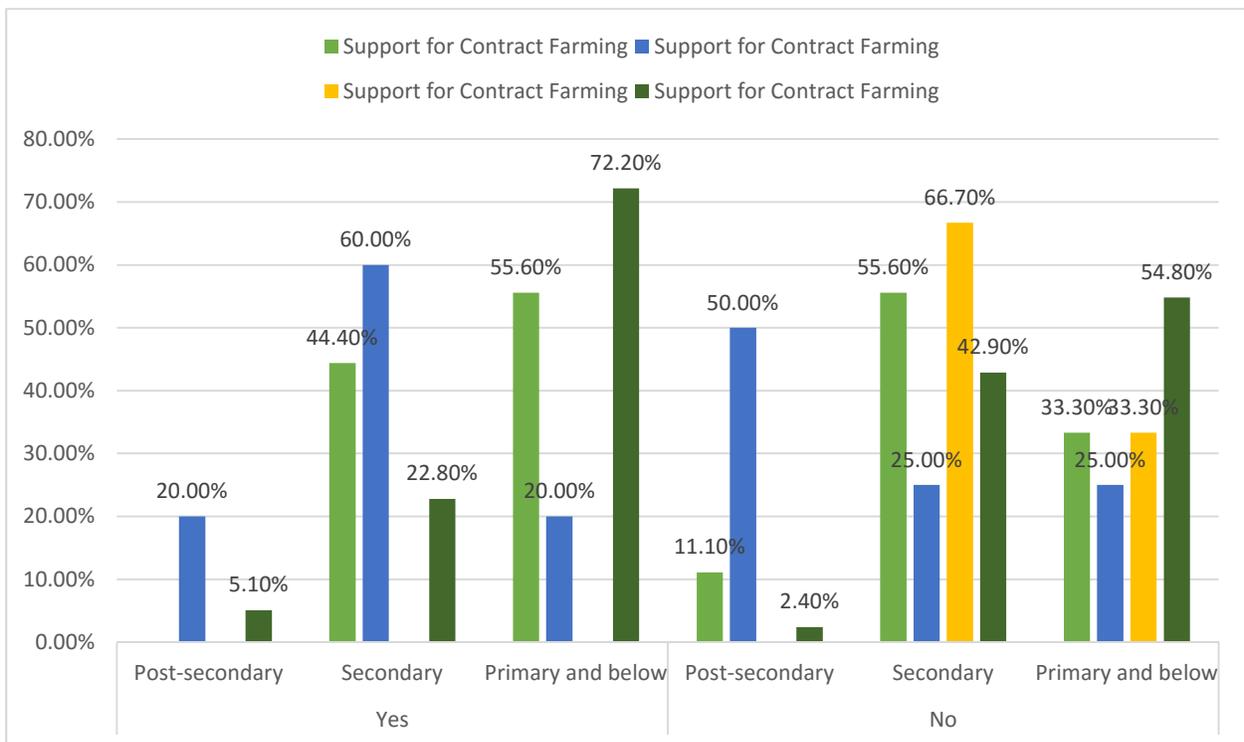
Forest Products	Conservation support						Total count
	Restrictions on timber exploitation	Transition to use of gas	Purchase of tree seedlings	Community governance	Payment of user fees	Contract farming	
Timber	2 (100%)	1 (50%)	1 (50%)	2 (100%)	2 (100%)	1 (50%)	2
Charcoal	3 (100%)	1 (33.3%)	3 (100%)	3 (100%)	3 (100%)	0 (0.0%)	3
Water	25 (100%)	11 (44.4%)	20 (80.0%)	24 (96.0%)	21 (84.0%)	11 (44.0%)	25
Pasture	36 (97.3%)	13 (35.1%)	32 (86.5%)	37 (100.0%)	30 (81.1%)	8 (21.6%)	37
Fuel wood	80 (100.0%)	29 (35.8%)	65 (79.0%)	75 (92.6%)	70 (86.4%)	24 (29.6%)	81
Soil	3 (100.0%)	1 (33.3%)	3 (100.0%)	3 (100.0%)	2 (66.7%)	2 (66.7%)	3
Termites	28 (100.0%)	4 (14.3%)	28 (100.0%)	28 (100.0%)	26 (92.9%)	0 (0.0%)	28
Mushrooms	33 (100.0%)	5 (15.1%)	32 (97.0%)	32 (97.0%)	31 (93.9%)	1 (3.0%)	33
Medicinal-valued plants	24 (100.0%)	8 (33.3%)	22 (91.7%)	24 (100.0%)	20 (83.4%)	7 (29.2%)	24
Honey	2 (100.0%)	0 (100.0%)	2 (100.0%)	2 (100.0%)	2 (100.0%)	0 (100.0%)	2
Others	34 (97.1%)	9 (25.7%)	30 (85.8%)	34 (97.1%)	30 (85.8%)	11 (31.5%)	35

4.3.4.2 Household characteristics and Support for Conservation

a) Level of Education and Support for Conservation

From the graph below, the percentage of those who do not support contract farming, whether they access forest products (72.2%) or not (54.8%) and attained primary level education only or are uneducated, is higher compared to those who have attained college or university level education, and whether they access forest products (5.1%) or not (2.4%). As literature points out, contract farming is important to encourage investment in the production of forest products for commercial use and at the same time ensure increased forest cover (Mathu, 2011; Ministry of Environment and Natural Resources, Kenya, 2016). This finding is similar to that of Shrestha and Alavalapati (2006) who established that educated respondents had a more positive attitude towards conservation.

Figure 4.5 Level of Education and Support for Contract Farming



Source: Field Data, 2018

Regarding support for community governance, the results point out that among those who had attained post-secondary education, none of them disagreed to the strategy. Inasmuch as the majority of the respondents from the other categories strongly agreed, secondary (88.1%) and primary and below (87.0%), there were a few others who disagreed. This analysis indicates that to some extent, education of communities plays an essential role in influencing positive attitude towards support for forest conservation efforts.

Table 4.31 Level of Education and Support for Community Governance

Level of education	Support for community governance						Total	
	Strongly agree		agree		disagree		Count	%
	Count	%	Count	%	Count	%		
Post-secondary	7	77.8	2	22.2	0	0.0	9	100.0
Secondary	52	88.1	3	5.1	4	6.8	59	100.0
Primary and below	88	87.1	4	4.0	9	8.9	101	100.0
Total	147	87.0	9	5.3	13	7.7	169	100.0

Source: Field Data, 2018

b) Distance to the Forest and Support for Conservation

From the table below, it is evident that the respondents who live near the forest and access forest products showed support for payment of user fees. As discussed in the previous section, the respondents who were supportive of this strategy mentioned that it will prevent those who do not mind about the conservation of the forest from accessing it freely and these respondents demonstrated positive attitude towards support for forest conservation. This finding is inconsistent with another study which reported that those who lived near the forest and depended on forest had a negative attitude towards conservation (Shrestha and Alavalapati, 2006). It is, however, similar with the studies which established that dependence on forest influenced positive attitude towards conservation (Garekae et al, 2016; Infield, 1988).

Table 4.32 Distance to the Forest and Support for Payment of User Fees

Access to Forest Products	Distance from the Forest (metres)	Support for User Fee Payment								Total	
		Strongly support		Support		Somewhat support		Do not support			
		count	%	count	%	count	%	count	%	count	%
Yes	Less than 1,000	87	93.5	2	66.7	3	75.0	10	90.9	102	91.9
	1,001-2,000	5	5.4	0	0.0	0	0.0	0	0.0	5	4.5
	2,001-3,000	0	0.0	0	0.0	0	0.0	1	9.1	1	0.9
	3,001-4,000	1	1.1	0	0.0	0	0.0	0	0.0	1	0.9
	4,001-5,000	0	0.0	1	33.3	1	25.0	0	0.0	2	1.8
Total		93	100.0	3	100.0	4	100.0	11	100.0	111	100.0
No	Less than 1,000	16	43.2	2	28.6	2	100.0	4	33.3	24	41.4
	1,001-2,000	9	24.3	2	28.6	0	0.0	0	0.0	11	19.0
	2,001-3,000	4	10.8	0	0.0	0	0.0	1	8.3	5	8.6
	3,001-4,000	5	13.5	1	14.3	0	0.0	2	16.7	8	13.8
	4,001-5,000	3	8.1	2	28.6	0	0.0	5	41.7	10	17.2
Total		37	100.0	7	100.0	2	100.0	12	100.0	58	100.0

Source: Field Data, 2018

c) Household Size and Support for Conservation

From the analysis, majority of the respondents with larger households responded negatively on the strategy regarding the use of gas for daily cooking and support for contract farming. The argument on high socio-economic costs spurring negative attitude (Shrestha and Alavalapati, 2006) becomes valid in this case. It is less costly to use fuelwood compared to other sources of energy especially when the household is large. From the study, nonetheless, the approaches to forest conservation are divergent and the two highlighted above elicited much of the negative responses. Majority of the respondents who did not support these strategies still portrayed a positive attitude towards forest conservation.

Table 4.33 Household Size and Support for Conservation on selected Strategies

Conservation Support		Household size						Total	
		Less than 5		6-10		Above 11			
		Count	%	Count	%	Count	%		
Use of gas for daily cooking	Strongly agree	18	26.9	19	20.2	2	25.0	39	23.1
	Agree	6	9.0	8	8.5	1	12.5	15	8.9
	Disagree	43	64.2	67	71.3	5	62.5	115	68.0
Total		67	100.0	94	100.0	8	100.0	169	100.0
Contract farming	Strongly support	20	29.9	16	17.0	0	0.0	36	21.3
	Support	6	9.0	3	3.2	0	0.0	9	5.3
	Somewhat support	2	3.0	1	1.1	0	0.0	3	1.8
	Do not support	39	58.2	74	78.7	8	100.0	121	71.6
Total		67	100.0	94	100.0	8	100.0	169	100.0

Source: Field Data, 2018

d) Income and Support for Conservation

The income variable, in a number of studies, has maintained a steady outcome in terms of influence of communities' attitude towards support for conservation. It has been shown to

influence positive attitudes among households that are well endowed and a negative attitude among poor households (Infield, 1988; Shrestha & Alavalapati, 2006). In this analysis, basing on support for payment of user fees, majority of respondents earning both high and low incomes support this strategy. However, a slightly higher number of low income earners stated that they do not support payment of user fees. Regarding support for purchase of tree seedlings, an overwhelming number of respondents from both low and high income earners strongly agreed. For this study, it cannot be concluded that low incomes influence negative attitude towards conservation because most respondents, benefitting from the Malava forest, demonstrated a positive attitude despite their economic backgrounds.

Table 4.34 Income and Support for Payment of User Fees

Income	Support for payment of user fees								Total	
	Strongly support		Support		Somewhat support		Do not support		Count	%
	Count	%	Count	%	Count	%	Count	%		
Less than 5000	96	81.4	6	5.1	3	2.5	13	11.0	118	100.0
5001-10000	11	61.1	2	11.1	2	11.1	3	16.7	18	100.0
10001-15000	3	75.0	0	0.0	0	0.0	1	25.0	4	100.0
15001-20000	4	80.0	0	0.0	0	0.0	1	20.0	5	100.0
20001-25000										
25001-30000	3	75.0	1	25.0	0	0.0	0	0.0	4	100.0
Did not disclose	13	65.0	1	5.0	1	5.0	5	25.0	20	100.0
Total	130	76.9	10	5.9	6	3.6	23	13.6	169	100.0

Source: Field Data; 2016

Regarding support for contract farming, a majority of the respondents who earn less income (76.3%) did not support. The same trend is witnessed in all the other income categories. From the researcher’s observation, those who supported contract farming recognized its likely positive impact to forest conservation and household welfare; and did not consider it as a possible cause for conflicts among the concerned stakeholders.

Table 4.35 Income and Support for Contract Farming

Income	Support for contract farming								Total	
	Strongly support		Support		Somewhat support		Do not support		Count	%
	Count	%	Count	%	Count	%	Count	%		
Less than 5000	22	18.6	4	3.4	2	1.7	90	76.3	118	100.0
5001-10000	4	22.2	1	5.6	1	5.6	12	66.7	18	100.0
10001-15000	1	25.0	1	25.0	0	0.0	2	50.0	4	100.0
15001-20000	2	40.0	1	20.0	0	0.0	2	40.0	5	100.0
20001-25000	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
25001-30000	1	25.0	1	25.0	0	0.0	2	50.0	4	100.0
Did not disclose	6	30.0	1	5.0	0	0.0	13	65.0	20	100.0
Total	36	21.3	9	5.3	3	1.8	121	71.6	169	100.0

Source: Field Data, 2018

4.4.5 The Policy Environment

The key informants recognized the Forest Conservation and Management Act of 2016 as the main policy document guiding their strategies regarding the management and conservation of Malava forest. To enhance conservation and sustainable management of the forest, KFS continue to establish plantation in the degraded areas, protecting the trees from any destruction, protecting the water catchment areas by planting appropriate species such as bamboo which minimizes on water consumption, planting trees along the streams and on hill tops in order to conserve soil and also creating awareness to the communities not to destroy the forest. The key informants mentioned that they conduct education and training on the communities around, sensitizing them on the importance of forests and forest conservation. They also give them technical advices on establishing tree nurseries and provide tree seedlings to the members. This is mainly done through the CFA. All these services are given for free provided one has attended the *barazas*.

Kenya Forest Service has also played a role in facilitating the setting up of bee-hives in the forest, and also controlling the harvesting of honey whereby it is restricted during dry seasons in order to avoid wildfires. The officials also mentioned that charcoal production is prohibited and collection of all non-wood products is permitted on payment. Timber harvesting is also done on an already assessed plantation by local qualified licensees who have made their payments which goes directly to the government. Although, at the moment, there is a ban on forest access for collection of products and issuing of licenses and permits will only resume once the ban is lifted.

The key informants also mentioned that plans to implement sustainable production of charcoal, as stipulated in the policy, are still underway. It is also important to mention that when it comes to collection of fuel wood, cut tools are not allowed and people can only collect the dead wood that is already fallen from the trees. The KFS has also managed to provide incentives to farmers who have been allowed to farm in the plantation side. As they farm, they are charged with the responsibility of protecting the growing trees but some of them fail to do so. Those who maintain the trees well are allowed to farm in consecutive years and those who do not are denied chances to continue farming. This kind of incentive motivates the farmers to protect the trees.

Most of the respondents demonstrated a good knowledge of the importance of forest and this can be attributed to the work of KFS. The key informants also mentioned that there are a number of NGOs and government institutions working with the communities such as KEFRI and WETPA

who give training once a year in topics such as; how to use trees and how to collect seeds. The county government also conducts training on nursery establishment and management. KARLO also conducts farmers' sensitization on agroforestry, it also encourages farmers on establishing fruit forests and also provides free seeds to them. The researcher observed tree plantations and tree nurseries in a number of households and in one specific household where the respondent had established fruit tree nursery under the sponsorship of KARLO.

The study found that access to forest products from a number of households had been minimized following the intervention by KFS and several other institutions. Besides restricting access and imposing punishment on offenders, the awareness created to the communities has enabled them appreciate the conservation of Malava forest. It was found out that community members, especially those who are members of CFA and those who have obtained forestry education through KFS, are very positive about conservation of Malava forest. Some of the respondents mentioned that they source for fuelwood from their own tree plantations and keep off from the forest. This is because of the awareness that has been created to them and the benefits that they receive from the organizations working closely with KFS such as KEFRI, WETPA, KARLO and Nature Kenya.

Finally, the study further inquired into the views of the respondents regarding the importance of forest conservation to them with the aim of establishing if despite their household characteristics, the policy environment (enforcement of rules, incentives) and access or no access to forest product, they could still demonstrate a positive attitude towards forest conservation. Majority of the respondents asserted that forest conservation is very important to them. One respondent who was living very close to the forest and mentioned not to be accessing the forest products demonstrated a very negative attitude towards forest conservation arguing that the existence of the forest perpetuates a lot of insecurities in the neighbourhood.

The negative attitude of the one respondent can be justified by her confession of the inimical environment brought about by the presence of the forest. This finding is consistent with the study by Wang (2006) who found that those who had been negatively affected by the presence of a park and were not allowed to obtain NTFPs had a negative attitude towards its conservation unlike those who were aware of the economic benefits of the park. Indeed behaviour is an outcome of a benefit as provided by a human or a non-human environment (Emerson, 1976).

From the study of Malava forest, the findings point to the fact that the communities obtain benefits from the forest and this has caused them to appreciate its existence and support its conservation.

Table 4.36 Opinion on the Importance of Forest Conservation

Importance of Forest Conservation	Count	Percentage
Very important	165	97.6
Important	2	1.2
Somewhat important	2	1.2
Not important	0	0.0
Total	169	100.0

Source: Field Data, 2018

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The main objective of the study was to analyse how access to forest products influences the attitude and behaviour of community members towards supporting forest conservation. This chapter gives a summary of the key data findings as underpinned by the objectives, the conclusions drawn from the findings, policy recommendations and suggestions for further research.

5.1 Summary of Key Findings

The study findings indicate that that Malava forest plays an important role in the lives of the surrounding communities, and as such, they are endeared to conserve it. The communities around the forest are mostly peasant farmers, engaged in mixed farming, growing mainly sugarcane, maize crops and horticultural crops in small scale; and they also keep livestock. Much of their production go into subsistence use and, therefore, low monthly incomes of less than ksh 5,000 on average accrue to most of the households. Majority of the household heads, whether male or female have education qualification of secondary and below. Very few have attained tertiary education and this scenario has played a part in many of them lacking formal employment. It was also established that the membership in Malava Community Forest Association which was formed in 2008 has not grown high. Majority of the respondents indicated that they had not joined the CFA.

The communities rely on the forest mainly for fuelwood, pasture for livestock, mushrooms, termites, water, medicinal-valued plants, and land for farming, honey, soil, charcoal, timber, poles, seeds, and seedlings. The most accessed product is fuelwood followed by pasture for livestock, mushrooms, termites, water, medicinal plants and others. The least accessed product is timber, followed by charcoal, soil and then honey. Access to these forest products by communities, as the study points out has also been influenced by the household characteristics and, to some extent, the policy governing the management and conservation of the forest.

In regards to the household characteristics of the respondents and their access to forest products, the study findings indicates that age, gender, occupation, level of education, wealth, distance from the forest and household size influence positively the household's dependence on forest resources. Poor households, who comprised of peasant farmers, casual labourers and the unemployed with less resources in terms of land and cash income, depended more on the forest, exploiting low-valued products mostly fuelwood, water, mushrooms, termites and pasture for livestock. Timber product could only be afforded by the wealthier households due to the amount of capital required for harvesting. More males compared to females accessed the forest for different products. Larger households demonstrated more account of participation compared to smaller households. Majority of the respondents living close to the forest agreed to be obtaining various kinds of products from the forest, especially fuelwood, water and pasture. Those living not in close proximity, specifically from three to five kilometres from the forest stated that they did not obtain products from the forest but recognized that the presence of Malava forest attracts rainfall which enables agricultural production which is their main economic activity. Increased level of education also showed less participation in forest products exploitation.

On how access to forest products influence attitude and behaviour towards support for conservation, the study findings show that the benefits that communities receive from the forest for sustenance of their livelihoods causes them to recognize the forest as a valuable resource. These benefits are both direct, incorporating the products such as fuelwood, timber, water, mushrooms, termites, medicine, pasture and charcoal and indirect incorporating attraction of rainfall which enables the communities to practice agriculture for both subsistence and commercial use. The value that the communities hold to Malava forest has endeared them to support its conservation.

The study findings also show that whether the respondents agreed to be accessing forest products or not, notwithstanding their distance from the forest, majority of them recognized the benefits of Malava forest and thus, are positive about its conservation. Majority of the respondents support the government's restriction on timber forest product exploitation on the natural side of the forest on the grounds that they do not wish for the forest to be destroyed. They also supported the purchase of tree seedlings by farmers as opposed to the farmers being given free seedlings so as to ensure that the sense of responsibility is entrenched and people are able to have their own tree

plantations for use and reduce dependence on the forest. Those who supported issuing of free tree seedlings to farmers, however, still had a positive attitude towards forest conservation. Their view stemmed from the fact that some individuals may not afford to purchase the seedlings and providing the seedlings for free will ensure greater achievement in increasing private forestry.

The findings also show that majority of the members were in support of payment of user fees and community governance, indicating that it will ensure proper management and conservation of the forest. Support for contract farming was, however, not welcomed by a majority of the respondents citing possible conflicts and small parcels of land.

Regarding household characteristics and support for conservation, the reports indicated insignificance of income in influencing attitudes towards support for payment of user fees, contract farming, and purchase of tree seedlings. These are approaches to conservation that have monetary implications, but the study reveals that majority of respondents from all the income categories supported these strategies. Majority of the respondents living near the forest also demonstrated a positive attitude towards support for conservation. Level of education was analysed with support for community governance and contract farming where the findings indicate that positive attitude increased with the increase in the education level.

Respondents with larger households demonstrated a negative attitude in regards to the support of contract farming and transition to the use of gas for daily cooking. The cost implications of such strategies for larger households could be the cause for the respondent's negative opinions. Support for conservation was determined by the respondent's opinion on various strategies and the study revealed that generally, those who benefit from the forest are positive about its conservation but some of their household characteristics as mentioned above also determine the extent of their involvement in upholding forest management and conservation practices.

The study further found that the policy environment, incorporating the enforcement rules and incentives has greatly influenced the communities' access to forest products and eventually the communities' attitude towards conservation. The Kenya Forest Services (KFS), a semi-autonomous government agency, in charge of the management and conservation of Malava forest in collaboration with other relevant organizations such as Nature Kenya, KARLO, and KEFRI conduct education and training for the community members, creating awareness on the importance of forest conservation and sensitizing the members on approaches to forest

conservation. Majority of the community members interviewed demonstrated the enthusiasm on matters concerning the protection of Malava forest.

Incentives, such as providing more farm for cultivation to farmers who ensure 80% protection of the trees on the plantation side of the forest where agroforestry is practiced, has ensured continued protection of the planted trees. The Kenya Forest Service allows community members to freely obtain fuelwood from the forest whenever they are hosting big functions such as funerals. The beneficiaries expressed great satisfaction and would not wish for the forest to be destroyed. Further, to ensure conservation of Malava forest, the Kenya Forest Service works to restore the degraded areas by establishing new plantations, establishing tree nurseries and protecting the planted trees from destruction.

5.2 Conclusion

The results from the study show that Malava forest is a common property resource whose access is open for community members living adjacent to it to obtain the timber and non-timber forest products from. These community members recognize the value that Malava forest holds to them and are, therefore, endeared to support its conservation. Incidences of illegal exploitation of certain products and livestock destruction of planted trees, as reported by relevant authorities have been as a result of negligence and insensitivity of just a few community members and the very poor who lack other alternatives for their livelihood sustenance.

Most of the products obtained from the forest by the participating households are appropriated for subsistence. There are no established markets within the communities' reach for some of the NTFPs that provide industrial raw materials. There are also no associations among the community members for commercial exploitation of the forest products and any participation is on an individual basis.

The divergent views on support for forest conservation strategies by respondents, who indicated that forest conservation is very important to them, demonstrate the crucial role that participation of community members in decision-making plays in the achievement of objectives for the common goal of conservation. For instance, respondents from larger households demonstrated lack of support for transition to the use of gas and analysis of the level of education and support for community governance indicated that higher levels of education had a greater influence in

positive attitude towards forest conservation strategies. The study also highlighted instances when a few respondents claimed to be concerned about the conservation of Malava forest yet confessed to being involved in illegal activities in the forest solely for their livelihood sustenance. It demonstrates the need for local communities' economic empowerment in order to curb such cases.

Finally, the concerted efforts of the Kenya Forest Service and other institutions in ensuring conservation of Malava forest, as observed, have immensely played a part in fortifying the local communities' awareness of forestry issues and acquisition of benefits from forest and the end result has been progressive achievements of conservation goals.

5.3 Recommendations

Based on the discussions and the conclusions drawn, the study recommends that every strategy for forest conservation should be arrived at with great consideration of the socio-economic status of the community members who are the beneficiaries, conducting education among the members on the various strategies and allowing them to participate in decision-making. Participation underlies much of the support for conservation in Malava forest.

Poverty as the main driver of continued dependence on forest resources and destruction of these forests resources must be addressed through providing income-generating opportunities for the forest-adjacent poor communities; ensuring that the community members, majority of them being high school and primary school drop-outs, acquire technical skills that would enable them to seek employment or be self-employed in sectors with better financial returns; and there is also need to establish bigger markets for sugarcane and maize and encourage more venture into agribusiness. Such initiatives would enable increased incomes, improved living standards and greater support for conservation strategies.

There is also a need to strengthen the Community Forest Association and diversify its mandate to realize a greater impact on the community members and forest conservation in general. The CFA is a good platform for the community members to utilize to come together and benefit from the various initiatives that are significant to their well-being and achievement of forest conservation goals.

The KFS officials decry understaffing, poor working environment, insufficient resources in terms of offices, and vehicles to move around. For them to effectively discharge their duties, they require more strengthening through provision of resources.

5.4 Area for Further Research

This study focused on access to forest products by communities living around Malava forest and the influence thereof in support for forest conservation. Membership in Community Forest Association, from the analysis, provided more privilege regarding access to the forest products by the respective households; notwithstanding, the membership is still very low. There is need to investigate the role played by the CFA in ensuring conservation of Malava forest; examining the impacts realized in terms of the benefits accruing to the participating members so far. The study should facilitate the realization of the challenges and opportunities of Community Forest Associations and give insights on the areas that need strengthening and reforms.

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APPENDICES

APPENDIX I: Household Questionnaire

Hello,

I am Linda Nabututu, a postgraduate student at the Institute for Development Studies, University of Nairobi. I am undertaking a study on the influence of livelihoods on support for forest conservation. You have been randomly selected to provide answers to several questions, and, therefore, your attention and cooperation for about 20 minutes will be eminently appreciated. Be assured of confidentiality for all the information you will provide. It will be used solely for academic purpose. Thanks in advance.

A: RESPONDENT'S PROFILE

Date	
1. Name	
2. Contact	
3. Age	
4. Sex	
5. Location	

B: HOUSEHOLD CHARACTERISTICS

6. Member of Community Forest Association	
7. Household position of the respondent	
Father	1
Mother	2
Other (specify)	3

8. Occupation/main source of income	
--	--

9. What is your average monthly income?	
--	--

10. What is your average monthly expenditure?	
--	--

11. Highest level of education	
Postgraduate degree	1
Undergraduate degree	2
College	3
Secondary	4
Primary	5
Other (specify)	6

12. What is your household size?

13. How many children do you have at present that are;	
Under 5	
Between 6 - 15	
Over 15	

14. What is the size of your land?

15. How long have you lived here?

16. How far is your home/farm from the forest?

18. Over the past year, how often, if ever, have you or anyone in your family gone without:

	Never	Just once or twice	Several times	Many times	Always	Don't Know [DNR]
a. Enough food to eat?	0	1	2	3	4	9
b. Enough clean water for home use?	0	1	2	3	4	9
c. Medicines or medical treatment?	0	1	2	3	4	9
d. Enough fuel to cook your food?	0	1	2	3	4	9
e. A cash income?	0	1	2	3	4	9

17. What agricultural activities are you engaged in?

19. During the past month, how often have you used the following energy sources for

cooking?		Always 1	Often 2	Sometimes 3	Never 4
a	Electricity				
b	Gas				
c	Charcoal				
d	Firewood				
e	Kerosene				

C. FOREST PRODUCTS

20. Do you visit the forest to obtain any product?		
Yes	No	Yes, but not anymore
1	2	3

21. What product(s) do you obtain from the forest and how frequently do you obtain the product(s)?					
	Product	Daily	Weekly	Monthly	Once in a while
		1	2	3	4
a	Timber				
b	Charcoal				
c	Water				
d	Firewood				
e	Soil				
f	Grass for livestock				
g	Termites				
h	Mushrooms				
i	Medicinal-valued plants				
j	Honey				
k	Others (specify)				

	Please rank
--	--------------------

a	Timber	
b	Charcoal	
c	Water	
d	Firewood	
e	Soil	
f	Grass for livestock	
g	Termites	
h	Mushrooms	
i	Medicinal-valued plants	
j	Honey	
k	Others (specify)	

23. How do you appropriate/use the products obtained from the forest?

		Subsistence 1	Commercial 2	Both 3
a	Timber			
b	Charcoal			
c	Water			
d	Firewood			
e	Soil			
f	Grass for livestock			
g	Termites			
h	Mushrooms			
i	Medicinal-valued plants			
j	Honey			
k	Others (specify)			

24. If ever you experience difficulties in accessing forest products, which of these is true

to your experience? YES-1 NO-2	
1	Distance to the forest
2	Lack of license and permits
3	Rules of access (restrictions)
4	Lack of awareness of the governing rules
5	Lack of skills
6	Lack of technology
7	Lack of capital (labour)
8	Others (specify)

D. ATTITUDE TOWARDS SUPPORT FOR CONSERVATION

25. Which of the following statements is closest to your view?			
	Strongly agree 1	Agree 2	Disagree 3
1. Timber forest products should be exploited freely, even if this risks destruction of forests.			
2. The government should restrict access to timber forest products and encourage commercial tree planting by farmers.			
3. The government should restrict use of firewood and facilitate transition to the use of gas for daily cooking			

26.	Strongly agree 1	Agree 2	Disagree 3
1. It is better to give free tree seedlings to farmers even if it creates a dependency syndrome and encourage improper seedlings planting			
2. It is better to sell seedlings to farmers, even if it may be costly but encourage proper planting and management			

27.	Strongly agree	Agree	Disagree

	1	2	3
1. As forest-adjacent communities, we should be more active in the management and conservation of the forest.			
2. Conservation and management of forest should be the work of the government only.			

28. If you are asked to pay user fees to access forest products, would you support this decision?	
Strongly support	1
Support	2
Somewhat support	3
Do not support	4

29. What is your view on allowing trained forest contractors to establish and manage tree plantations on people's farms on their behalf?	
Strongly support	1
Support	2
Somewhat support	3
Do not support	4

30. In your opinion, how likely is it that you:					
	Not at all Likely 4	Not very likely 3	Somewhat likely 2	Very likely 1	Don't know 0
A. Will attend training for tree planting					
B. Will mobilize others to actively participate in community forest associations					

31. How important is forest conservation to you?	
Very important	1
Important	2
Somewhat important	3
Not at all important	4

The end

Thank you for your time!

APPENDIX II: Key Informant Guide

Hello,

I am Linda Nabututu, a postgraduate student at the Institute for Development Studies, University of Nairobi. I am undertaking a study on the influence of livelihoods on support for forest conservation. You have been purposively selected to provide answers to several questions, and, therefore, your attention and cooperation for about 20 minutes will be eminently appreciated. Be assured of confidentiality for all the information you will provide. It will be used solely for academic purpose. Thanks in advance.

Date of interview _____

1. Name	
2. Contact	
3. Position	

4. How much of the forest is accessible to the communities?
5. How are you enhancing conservation and sustainable management and of the forest?
6. How do you sensitize the locals on the importance of forest conservation?
7. Are there organizations working with the locals to create awareness on forest conservation? If yes, which ones?
8. How often do you conduct forestry education and training?

9. What kind of incentives are you providing to people to ensure sustainable utilization of timber and non-timber products?

10. What challenges are you facing in executing your mandate as KFS?

APPENDIX III: Photos from the Forest



Photo 1: Extraction of medicine



Photo 2: Destruction of planted trees



Photo 3: Agroforestry



Photo 4: Established tree nursery



Photo 5: Bee-hives



Photo 6: Soil extraction



Photo 7: Rehabilitated degraded area



Photo 8: Cattle grazing



Photo 9: Forest cleared for road construction



Photo 10: Woman collecting fuelwood

