DETERMINANTS OF HOUSEHOLD PARTICIPATION IN COMMUNITY FOREST MANAGEMENT IN KENYA: A CASE STUDY OF GAZZETTED GOVERNMENT FORESTS IN KEIYO NORTH SUB COUNTY OF KEIYO /MARAKWET COUNTY

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A THESIS PRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT OF AWARD OF A MASTER OF SCIENCE IN FOREST ECONOMICS AND MANAGEMENT SCHOOL OF NATURAL RESOURCE MANAGEMENT

DEPARTMENT OF FORESTRY & WOOD SCIENCE

UNIVERSITY OF ELDORET, KENYA

MAY, 2015

DECLARATION

I, George Otieno Wara hereby declare that this thesis is my own original work towards the award of a Master of science in Forest economics and Management and that to the best of my Knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any degree of the university, except where due acknowledgement has been made in the text.

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DEDICATION

This work is dedicated to my family and friends

ABSTRACT

The devolution and decentralization of the management of state forests through the use of participatory forest management (PFM) has become a policy tool for many developing countries, Kenya included. Decentralization in the management of forests has come out of the realization that governments as the main stakeholders and owners of the forest lands play an important role in making policies and decisions that affect the livelihood of the forest adjacent communities. But these decisions never included views from the communities. Involving the forest adjacent communities in the day to day management of the forest and providing them with some assurance that they will continue to enjoy all the benefits they have been getting from the forest has in a way greatly helped in bringing down the rate of forest destruction to minimum levels. However, in spite of the significant role the forests in Keiyo North Sub County are playing to the environment they are faced with eminent decline which is a result of anthropogenic causes especially illegal logging, overgrazing, frequent forest fires, and receding waters levels from the springs and charcoal making. This study, therefore, was carried out to identify the determinants of household participation in community forest management in gazzetted forests of Keiyo North Sub County. Structured and open ended questionnaires were administered to forest adjacent households living within 5 km from the forest boundaries. Descriptive statistics was used to analyze the data. The logit regression model was used for further analysis. The SPSS version 17 was the package used in the analysis of the collected data. The results revealed that only (45.8%) of the households participated in PFM. Participation of men in PFM activities was higher than women though women tended to get more forest benefits than men. Households that were bigger in size were more involved in PFM than smaller households. The results showed that more than half (63.4%) of the respondents were not members of any social group found within the community

Results from the logistic regression showed that the factors that increased household participation in PFM were household membership in self-help groups, household ownership of livestock and the main type of food crop grown. It is recommended that the Kenya Forest Service (KFS) increase public awareness activities on PFM to increase understanding and make the forest adjacent communities to get more involved through the development of the self-help/social groups.

ACRONYMS AND ABBREVIATIONS

Af.D.B	African development bank
CFA	Community Forest Association
GZDSP	Green Zones Development Support Project
FAO	Food and Agricultural organization
FRA	Forest resources Associations
K.F.S	Kenya Forest Service
N.G.O	Non-government organization
PELIS	Plantation establishment and livelihood improvement scheme
P.F.M	Participatory forest management
S.P.S.S	Statistical Packages for Social Sciences
IUFRO	International union for forestry research organization
$\chi 2$	chi –square

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ACKNOWLEDGEMENT

This work would not have been achieved without the wisdom and the inspiration from the almighty upon whom I have always depended on as my source of hope to complete the tasks before me.

I wish to thank most sincerely my two supervisors Professor Samwel Mwakubo of the school of business and economics (Moi University) and Professor K Balozi of the department of forestry and Wood Science school of Natural resources (University of Eldoret). I owe them a debt of gratitude for providing technical suggestions and constructive criticisms. I thank them for their guidance, encouragement, confidence, patience and willingness to supervise this thesis. The supervisors provided incisive professional minds, and my understanding of the work tremendously improved from frequent discussions with my indefatigable supervisors.

I am also grateful to both the external and internal examiners who looked at the thesis and gave constructive comments which have tremendously shaped this work.

I am extremely thankful to the Green Zone Development Support project (G.Z.D.S.P) that through the African Development Bank (A.D.B) provided the required funds that enabled me to be able to pursue the studies to its completion. The funds were made available upon reasonable time which made it easy for me to be doing my studies without the worry of disruptions caused by delays in the releasing of funds to the university.

I am also grateful to the Ministry of Environment, water and natural resources for having granted me the mandatory study leave approval that ensured that I was able to complete my studies.

I am also thankful to the Director Kenya Forest Service for having nominated me to be one of the students to pursue this course.

My appreciation also goes to the Ecosystem conservator Elgeyo Marakwet County and his entire staff that provided me with the much needed support for my field work.They greatly helped me to link up with the local chiefs who were able to assist in the identification of the villages that I was planning to work in.

My special thanks go to my entire family who stood by me by providing the moral support and understanding even when the going was getting tough.

I would also wish to thank those individuals who in one or the other directly and indirectly contributed in their own small way brought to the success of this study.

CHAPTER ONE

INRODUCTION

This chapter discusses background information, objectives, justification, problem statement and the hypothesis for the study.

1.1 BACKGROUND OF THE STUDY

The devolution and decentralization of the management of state forests through the use of participatory forest management (P.F.M) has now become a policy tool for implementation for many developing countries Kenya included. They have been able to roll out the of use of PFM as a principal forest management strategy through the enacted of new forest laws to replace the existing old and archaic laws which gave very little room and attention for the forest adjacent communities to actively participate in forest management within the state forest management agencies.

The devolution and decentralization process started in the mid 80s in Asian countries particularly Nepal and India and gathered momentum at the turn of the new millennium when many countries Kenya included saw it as a new opportunity for local forest management and passed legislations that recognized the forest adjacent communities as important stakeholders in the management of forest which were under the management of the state. This was evident among the forest adjacent communities because they were recognized as the main users and beneficiaries of the forest goods and services that supported their livelihood so that any changes on these activities had a direct bearing and impacting on their welfare either negatively or positively , and also on the ecological and environmental condition of the forest.

Decentralization in the management of the forest with the inclusion of the forest adjacent communities in principle has come out of the realization that governments as the main stakeholder and the legal owners of large forest blocks in the country play an important and leading role in making and regulating laws and policy decisions that affect the livelihood of these forest adjacent communities. However to the dismay of the public some of these policy decisions made by the governments are at times unpopular and too

restrictive and out rightly not in tandem with the current practicable management thinking of the forest resource users who are the adjacent communities and this makes them alienated and become very unwilling to cooperate in the management of the forest. The decentralization policy has been built on the foundation that it will lead to increased efficiency, greater equity and high responsiveness of governments to citizen demands. This was going to be achieved through the involvement of the forest adjacent community at the lowest level of decision making which would lead to better access to information, lower organizational costs and a greater willingness for the communities to get involved in participation (Fizbein1997, Ribot2002)

The apparent paradigm shift in forest management policy by the governments from state managed top down approach to the community level has come out of the governments' inherent inabilities to bring down the rate of forest destruction with their own limited resources coupled with an ever decreasing staff workforce to a minimum and manageable level. This is despite having a forest adjacent community nearby with a huge pool of human resource base which with the right motivation and incentives would greatly help in managing the nearby forest resources and reduce the number of these illegal activities. At the same time the forest adjacent communities continue to suffer as they see their livelihoods getting disrupted negatively from the consequences of the destruction of the forest which if given the task to co-manage by the government will come up with viable options of managing it sustainably.

Since the new legislation has allowed for the formation of community institutions that can enter into management agreement with the forest management agency to manage the forest, there has been heightened effort by various stakeholders to help the forest adjacent communities to form these community forest Associations' (C.F.A). The institutions that these communities form on their own have a better chance of managing the forest well (Bromley1992).

In Kenya there are about 150 Forest Stations spread across the country and which are managed with the staff from the K.F.S. It is a requirement that all of them should by

now have had a community forest associations established that have been legally registered with the Attorney General and doing business of the management of the forest with forest agency the Kenya Forest Service (KFS) for and on behalf of the forest adjacent communities.

The coming into being of the community forest associations have had a positive impact with forest condition in that large forest areas that over the past years have remained degraded are now in the process of being rehabilitated with the full involvement and participation of the forest adjacent communities. Some of these areas include the cherangany hills and most forest blocks in Kiambu County.

The positive changes in the forest condition such as the improving water flows downstream from the nearby forests are being witnessed but the participation of the forest adjacent households who they provide bulk of the membership to the forest user groups which ultimately form the community forest associations is still very low. Some households have taken up participation in forest with vigor by contributing a lot of man hours in meetings and forest protection. However there is very little to show that these households have had improvements on their own welfare for participating and is a course of concern (Leach M 2001).

The positive changes have been achieved through the use of the C.F.A and the K.F.S has been remarkable and this has been because of the development of strong rules and regulations which are defined and are monitored and enforced by members of the institution.

The households are the important links to the institutions such as the C.F.A, KFS and C.B.O and as such their willingness to participate in participatory forest management have a direct bearing on the success of any forest conservation program

The households are aware that the forest is a public good and as such is presented with the challenge of sustainable management and because of the spatial scale and the externality involved in their use the forest cannot be meaningfully be managed at the household level.(Meinzen et al 1999).

The forests are also characterized by costly exclusions and typically there is rivalry in the use. The forest resource is a common resource to all the forest adjacent communities who want to use but the goods that are being produced by these forest are private in nature.

The existence of these very powerful community forest associations some with enforcement rights has in some in instances forced poor household not to access the forest goods and services that they have traditionally been entitled to leaving them with no alternative means of livelihood and consequently falling back into extreme poverty desperation.

1.2 Problem statement

The gazzetted government forests cover in Kenya has been declining over the last twenty years from a high of 3% to the current national figure which has now stood at less than 2 % (Draft Forest Policy 2007). The forests have majorly been found to have been located around mountain ecosystems surrounded by fertile lands and a large and increasing human population.

Although the area under gazzetted forest appears to be so small in comparison to the total land size of the country, the role they play in offering environmental services such as carbon sequestration and as major water catchment is so significant that any marginal changes as those witnessed in the recent past have led to serious negative environmental consequences such as the decreasing quantities of water in our major rivers. This has led to reduced water uptake from the rivers for domestic use in village and urban centers and also caused the disruption of electric power supply to industry and households since most of the electricity generated in this country is from the hydro-power dams located along these rivers. If these negative environmental changes are to be reversed then it will take a long period of time and at enormous costs which the nation as a whole with its current economic situation, has limited capacity to bear the burden.

The slow and progressive stoppage on the downward trend and eventual stabilization on the national figures on the actual size of the gazzetted forest in the country have largely been attributed to the forest act 2005. This has made it extremely difficult for parties and individuals to easily allocate themselves forest land without following the rigorous process of parliamentary approvals. The parliamentary process which because of its cumbersome and open nature has made many of these interest groups in forests land allocations to be legally and technically completely knocked out of the forest lands use equation. Frequent changes in the forest boundaries and the ever declining gazzetted forest cover in the country soon became a thing of the past through the actions and reactions of the citizens of this nation who through vigorous lobbying and advocacy lead to the national parliament to eventually make an enactment of the new forest bill.

However despite the existence of the new forest act that has clearly spelt out how the forests in the country are to be managed, the forests continue to suffer from the problems of mismanagement and degradation which have led to serious environmental, economic and social consequences such as soil erosions and loss of livelihoods for the forest adjacent communities who continue and will continue to depend on the accruing forest benefits for current and future generations unless alternative means of earning a living that has a an overall objective of lifting them out of their heavy dependence from income generating activities from the nearby forests is soon found.

The forests of Keiyo North Sub County are important sources of river Kerio which supports significant human, livestock, and wildlife populations that live downstream at the floor of the western side of the Great Rift Valley as it snakes its way into Lake Turkana. These forests also form part of the Cherangani hills forest ecosystem which is one of the countries five major water towers.

The forests have also been instrumental in helping to reducing the frequent landslides that occur at the escarpments of the valley which have occasionally led to loss of life and property and sometimes cutting off of key feeder roads serving the area.

However in spite of the significant role the forests in Keiyo North Sub County are playing to the environment they are also faced with eminent decline which is as a result of wanton and destructive nature of man and includes illegal logging, overgrazing,

frequent forest fires, receding waters levels from the springs and charcoal burning. It is estimated that 10% of the forest has been lost to illegal logging and forest fires in Keiyo North Sub County during the last fifteen years. (Source: Keiyo /Marakwet County Forest Office)

The forest adjacent communities in Keiyo North Sub County have to a large extent been blamed for being the root cause of the numerous environmental problems affecting their forests .The fact that they neighbor the forest allows them to easily get the forest goods and services at almost zero costs. It is in the process of getting the forest products that the forests get destroyed for some of the forest products such timbers from both exotic and indigenous tree species are exploited in a way that is not sustainable.

In the absence of a strong and active community group that can set rules and regulations to its members in the sustainable use of the forest the state agency finds it extremely hard to enforce the laws that will help in conserving and protecting the forest. This has been caused by the perceived low participation of the forest adjacent households in the management of the forest yet they continue to enjoy some of the forest benefits. It is in view of the above facts that the Forest Act 2005 recognizes the important role the forest adjacent communities can play in forest management and has made it as a requirement that they be involved through participatory forest management (P.F.M). The minimum condition for the households to participate in participatory forest management with the state agency KFS is by them becoming members of the local C.F.A which is a legal body which can transact business on behalf of the forest adjacent communities. The communities are involved in forest patrols, collecting of forest products and in tree planting activities to rehabilitate degraded forest areas.

It was therefore envisaged that through this kind of arrangement the forest adjacent households would effectively manage the forest and thereby greatly reduce the rate of forest destruction. This would be achieved when certain rights and privileges are partially or wholly granted to them to utilize and manage the forest without undue restrictions from the state agency charged with the responsibility of managing these forests. This would also result in the improvement of the rural livelihood of the

households just by them actively joining the C.F.A which is a one stop single and fully loaded packaged program which all individual forest adjacent households can benefit from (Bwalya 2004).

The formation of the CFA has been going on and many of the Forest Stations now have registered community associations which are busy engaged in the various participatory forest management activities.(source: Forest Management Plans unit KFS)

Nevertheless, the participation of households in the CFA in Keiyo North is still very low possibly below 30% and this has affected the pace at which forest conservation efforts can be achieved. The number of households that are directly involved in the conservation and protection of the forest through the efforts of PFM is dismally low. It is thus important to understand the determinants of household participation in community forest management with a view to increase the participation rate(Source: Keiyo /Marakwet County Forest Office).

This study therefore seeks to understand the forests in Keiyo North Sub Countys as a case study the determinants of household's decision to participate in the community forest associations within their forest areas. These determinants are not yet clearly understood and these have hampered the efforts in knowing the households willingness to choose forest participation as the best option to solve the problem of forest destruction in Keiyo North Sub County.

1.3 OBJECTIVES OF THE STUDY

The overall objective of the study is to investigate the determinants of households' participation in community forest management in the gazzetted government forests in Keiyo North Sub County of the Keiyo /Marakwet County.

1.3.1 THE SPECIFIC OBJECTIVES OF THE STUDY

The specific objectives of the study are:

(i) To describe the characteristics of participating households in community forest management.

(ii) To describe the characteristics of non-participating households in community forest management.

(iii) To determine the social factors influencing a household participation in community forest associations.

(iv) To investigate the economic factors that influence household participation in community forest management.

(v) To make viable recommendations on actions that encourage household participation in forest management

1.4 HYPOTHESES OF THE STUDY

(i).The null hypothesis is that the households in forest adjacent communities that are closer to the forest do not participate in forest management at the community level.

(ii).Poorer households that are living adjacent to the forest do not participate in community forest management.

(iii).Households with lower levels of education does not participate in forest management at community level.

(iv).Households participates in PFM in forests that are badly degraded.

1.5 JUSTIFICATION FOR THE STUDY

Following the operationalization of the new forest act in 2007, the gazzetted government forest in Keiyo North Sub County became among the first beneficiary of the PFM approach to forest management when it was inaugurated in Elgeyo Forest Station in the 2008and 2009. This was based on the premise that it was the largest forest block in the Sub County and was also surrounded by a forest adjacent community which has had an intricate and depended relationship with the forest which has persisted over the years. The forest is categorized as a high productive forest and as such is richly endowed with both exotic and indigenous tree species which the community living nearby it would wish to utilize the forest resources therein and at the same time wish to ensure that these resources are sustainably used through deliberate conservation efforts for their own current and future benefit.

It was expected that with the introduction of PFM opportunities for the forest adjacent communities to fully participate in forest management would be enhanced through the introduction of a number of incentives which both the community and the KFS had mutually agreed upon. This could be achieved by the forest adjacent communities partaking to improve the status of the forest condition and also their own socio-economic well being as they continue their interactions between the state agency and the forest.

Through the engagement of the local community in the patrolling of the forest, the KFS was hoping to save a lot of money that was being spent on the enforcement costs for their own forest rangers which they were incurring when doing regular forest patrols in their respective forest patrol beats. The service was willing to offload this burden to the local community forest association who were to be responsible for the management of the regular forest patrols.

It was expected that as a consequence of the foreseen improved management of the forest through participatory forest management the adjacent community would immensely benefit through a fair and efficient way of allocating the important forest products they are getting from the forest.

However the adjacent community routine interactions with the forest was bound to be affected both on a positive and negative way by the new forest management dispensation .It was assumed that by getting them to be fully involved and integrated in participatory forest management it would be the only sure way to go in reducing deforestation and alleviating poverty among the vulnerable groups in the households. As a consequence of this there is bound to be a marked improvement in the forests critical function of providing environmental services and achieving sustainable forest management.

It was hoped that through PFM the poor households' incomes would increase through their participation in forest income generating activities that are environmentally friendly and do not have adverse effects.

The new management approach has been in operation in Keiyo North Sub County for more than five years now with the KFS guiding the forest adjacent communities on the operations and activities that help in conserving the forest. However a cause of concern is that many households are not taking part in the activities of the community forest association and this has affected the pace at which forest conservation efforts for this critical forest are being achieved. There are still large open and bare spaces that are devoid of any standing trees which are not glades within the forest that need to be rehabilitated through replanting efforts with various tree seedlings. This exercise is expected to be achieved through collaborations between the KFS and the communities living adjacent to the forest.

It was hoped that the communities would greatly assisting in this noble and important venture by ensuring that all these open areas are replanted within a reasonable time. This study seeks to find out why many of the households despite living adjacent to a high potential forest are not participating in participatory forest management which should the ideal case in the government forests of Keiyo North Sub County.

1.6 THESIS STRUCTURE

The thesis is structured in the following ways: Chapter 1 is the introduction and under it the topics of where and why the study is being done is discussed. Chapter 2 gives an account of relevant literature reviewed in preparation for the study. Chapter 3 gives the description of the methodology used in carrying out the study. The methodology includes the description of the study area, the nature of the forest resources in the area and how the research was conducted. Chapter 4 covers a report of the study results and chapter five the discussions made from the results. The results included the finding of the household questionnaire, focus group discussions, and interviews with key informants. The discussions are supported by relevant literature where appropriate. Chapter six is the summary, conclusion of the report and recommendations that would help in the further understanding of the study.

CHAPTER TWO

LITERATURE REVIEW

This chapter reviews literature that is pertinent to this study. Section one presents the theoretical literature while section two presents the empirical literature. The conceptual framework for the study is in section three of this chapter.

2.1 THEORETICAL LITERATURE

2.1.1Meaning of participation

FAO (1982) defines participation as "the process by which the rural poor are able to organize themselves and, through their own organizations, are able to identify their own needs, share in the design, and implement action and evaluation of the participating action".

According to the World Bank, "participation is a process through which stakeholders Influence and share control over development initiatives and the decisions and resources which affect them" (World Bank 1996).

Participation in a group at its narrowest sense is defined in terms of nominal membership (Chopra et al 1990, murali 2003), and at broadest sense is defined as a dynamic process in which the disadvantaged have voice and influence in decision making (Narayan 1996, white 1996)

Participation has two dimensions (a) direct and (b) indirect. Direct includes activities like attending meetings concerning forest protection, taking active part in meetings concerning how the forest is to be planted with tree seedlings, and contributing labor towards forest management, and monitoring the process of implementation of decisions made in the meetings.

Indirect participation includes individual obedience for forest protection rules, motivating others and providing moral support among community members to forest protection.

Participation helps ensure that local people can share in the benefits of forestry and can take decisions about forestry matters that affect their lives. Its purpose is to ensure that forest management makes a real contribution to secure local livelihoods and that by doing so it also secures the future of a forest resource. The importance of participation in forestry management is in finding a better management option of forest resources which

further emanates from the fact that many of its services are irretrievably lost, once they are degraded by untoward human intervention.

Participation can be seen primarily as a means to achieve specific goals such as building a better management structure, obtaining improved goods and services, and getting natural resources into a 'good condition'. Participation to achieve specific purposes more efficiently requires that judgments be made about what represents 'better management', 'improved services' and 'good condition'. The efficiency argument draws attention to the fact that participation is all about negotiating goals.

The most important feature of participation can be seen as its potential to enhance the power of resource users to influence things (Nelson and Wright, 1995). In this case, the purpose of the participatory process is seen as increasing the skills, knowledge, confidence and self-reliance of resource users to collaborate and engage in sustainable development.

Participation becomes an end in itself rather than just a means to achieve other things

2.1.2 Types of participation

There are different types of participation (as can be seen from Table 2.1), ranging from complete outside control, token involvement of local people, to a collective action of local people where their own agenda is set and implemented without outside facilitation. There are also various forms of participation in-between the range. According to Petty *et al.* (1994) adapted in Fabricius (2004), seven types of participation are identified along the gradient of community involvement and empowerment. At the least end of the spectrum of participation, people are merely informed and do not contribute any views, while on the upper end of the spectrum community-based programmes are self-initiated.

In cases where the State lacks the capacity to manage and protect natural resources or where there is need to uplift livelihoods of local people, genuine participation of the local communities living around the resource is a key to sustainable management. Lise (2000) acknowledged that forests are better managed when people's participation is

secured. However, participation can also be a manipulative tool to manage people in predetermined process (Castrol and Nielsen, 2001).

The level of participation can also be vertical or horizontal. According to Dalal-Clayton *et al.* (2003), horizontal participation involves interactions on an issue across sectored interest groups. Conversely, vertical participation refers to interaction on an issue throughout the hierarchy of decision-making such as from national to local levels or from leaders to marginalized groups. Dalal-Clayton *et al.* (2003) further indicated that the deeper the vertical participation within a given institution, the better would be the understanding and support for the strategy.

Table 2:1 Types of community participation

Type	**Description**
Passive participation	People are informed of what is going to happen or what has already happened. The information being shared belongs only to the external people and no response is expected from the audience.
Manipulative participation	Participation is not as genuine as it seems to be or it is a deception
Participation in information giving	People answer questions, questionnaire survey or similar approaches. People do not have opportunity to influence proceedings. Findings are neither shared nor checked for accuracy
Participation by consultancy	People are consulted and external agents obtain their views. But external agents define the problems and solutions and may modify in light of the response from the people. The external agents do not concede any share in decision-making and are under no obligation

Functional participation	People provide resources such as labor or materials for a project in return for food, cash or other material incentives
Interactive participation	Joint analysis leading to action plan and formation of new local groups or strengthening existing ones. Involves interdisciplinary methodologies, multiple perspectives and learning processes. Groups take control over local decisions; people have a stake in maintenance of the structures
Self-mobilization	Initiatives taken independently of external institutions.

Source: Adapted from Fabricius (2004)

2.1.3 Meaning of forest management

The word 'management' is used here in its broadest sense to include management systems that are unstructured, simple and barely visible, all the way through to highly structured and technically complicated forms of administrative and operational control. Within this range, there are many different ways people go about managing natural resources such as water and land, and the stocks of plants and animals that inhabit such environments. Governments, private organizations, groups of resource users, families or individuals solely or cooperatively direct, control or regulate the use of natural resources under various formal and informal arrangements. In some cases, there may be no management at all and this might have direct negative effects on the sustainability of the natural resource.

Management of forests for sustainability is desirable when forest diversity is threatened by overuse, resource exploitation and very poor management. Forest ecosystems can be

disrupted and harmed beyond rehabilitation when very poorly sustained in terms of management.

Sustainability can be defined as a state or process that can be maintained indefinitely. Sustainability has three principles which are closely related elements and these are the environment, the economy and a social system that can be maintained indefinitely.

A sustained forest gives some assurance that the forest is managed to allow maximum diversity while satisfying the managers (both the KFS and the community) environmental and economic demands.

2.2 HOUSEHOLD CHARACTERISTICS

Individual household participation in participatory forest management is a product of the individual self-categorization with the organization, psychological attachment and identification as organizational citizen (Hasslam et al 2000).Any person will give higher preference to Organizational identity (social) over personal identity if the differences among members of the organization is low in terms of status, access to benefit and opportunity to share personal knowledge and experiences in decision making(Turner1985).

Participation in community forest association for households may be influenced by household specific which may include that is singles and houses are underprivileged.

Household that have some formal education have a better option to decide to participate in the community forest association which they derive indirect benefits as they are able to appreciate these non-quantifiable benefits such as ambience air, micro- climate modification or carbon sequestration (Muneet 2008).

Households with good social networks may have possibility in taking part in community forest association because they are able to get extension services from such networks (Muneet 2008)The households in which women are expected to take active participation

in P.F.M show that they don't farewell in the decisions taken(Jumbe and Angelson 2007)

Women continue to be disadvantaged in secure access and property rights and in the utilization of household tree resources (Place 1995) and male bias in the provision of Forest Services. Despite all these women are critical factors in the management of forest resources.

They are the ones who attend most of the community forest allocation meetings and are also heavy consumers of forest products especially firewood and fodder for their domestic animals.

2.3 Participating and non-participating households

There is now some evidence that formalized systems of common property regimes such as the participatory forest management may lead to gradual but systematic exclusion of households from participating (Adhikari et al 2004)

It has also been noted when the responsibility of allocating forest resources is delegated to local organization, communities are expected to consider socio-economic capacity of individual households resource use so as to determine their characteristics and usage.

When the forests are sufficiently large in size and in productivity they can take care of the different types of households that are able to use the forest ecosystem simultaneously (Varughese and Ostrom 2001)

These households that are involved in participatory forest management have also been marked by differences in their incomes and private endowment, inequalities in contribution and commitment to confronting common environmental challenges, differences in benefits denied from the forest use by the state forest protection agency and inequalities in earning opportunities rather than from the forest (Bardhan and Dayton –Johnstone 2000).

The sources of differences in the households participation to community ventures are diverse and include disparities in culture, gender, ethnicity, political ideology, preferences, appropriateness of the existing individual household skills and community human settlements patterns which might influence household incentives to take part in participatory forest management.

Kant(2000)says that characteristics of non-participating and participating households could be as a result of the differences the households may have over diverse preferences for the forest products from the forest hence prefer to harvest different mixtures of forest products.

Because of these differences, management objectives may become diverse and challenges for effective implementation since users may assign different priorities to various objectives of resource management. It can therefore be said that participating forest management can be treated as a function of product preferences which in turn can be treated as a function of cultural, economic and social inequalities. There has been a considerable amount of theoretical and empirical research on the differences in characteristics in household assets. The theoretical arguments say that the assets households some say that they could have positively or negatively impact on the use of the forest if not well regulated. These could include land that has recently been cleared and is devoid of any tree (Kant 2000, Bardhan and Dayton-Johnston 2000, Varghese and Ostrom2001, Kerapelitsure and Loret 2002, Adhikari et al 2004, Adhikari 2005)

The current empirical consensus is that inequality of assets can favor better management of forest resources when there are high fixed cost (effort, time and money) for the establishment of a community based regime or when each resource user's cooperative effort is proportional to the benefits derived from the participatory forest management (Baland and Plateau 1999, Bardhan and Dyaton-Johnstone 2000).

However, when these are not meet, assets differences in non participating and participatory households is generally detrimental to participatory forest management (Perez-cirera and Loret2005)

It is evidenced by Adhikari et al (2004) and Agrawal and Gupta (2005) that asset differences in households can provide opportunities for powerful minorities to impose management rules that serve their own interest, which ignores group incentives in the overall forest management.

The degree of direct dependence of the household on the forest is an important factor that determine the optimal management regimes (Kant 2000)

The degrees of direct dependence are defined as the share of direct returns from forest in the total utility bundle. Its range is also defined as 0 or 1 and may reasonably be measures by fraction of the user's group's gross local production contributed by the forests. The degree of directed dependence will depend upon the availability of substitutes and the capacity of the users group for substitution. The capacity of the user group will depend on the consumption of utility bundle

In the case of utility bundle being comprised of forest returns only, there is no possibility of substitution and hence, the degree of direct dependence will be very and equal to one.

The case of subsistence dependence of poor communities will fall in this category because there are no substitutes when certain forest activities from which they were previously getting some economic have now been banned from exploitation. Once that is done the households within that user group is unable to acquire it because of their low monetary income.

Due to greater dependence, poor people extract more resources and hence generate higher incomes from the forest (Jodha 1992, lyenger and Shukla 1999)

Based on quantitative assessment of households various income sources in Utta Pradesh India Peddy and Chakravarty (1999) found that a poor household generated more than 22% of their gross income from forests.

Due to shorter time horizons, poor households tend to adopt strategies which yield more immediate results rather than long term considerations in resource use moreover, if

poverty drives the marginal rate of time preferences to infinity, then future environment impact of the current strategy are optimally ignored (Holdne et al 1998)

Therefore it can be said that poverty is often blamed as primary reason for forest destruction because of high social discount rates and shorter time horizons of the poor households.

However, scholars conducting empirical analysis of participating forest management challenge this hypothesis arguing that compared to non-poor household, the poor households depend more on forest in relative terms, but in absolute terms their participation is lower particularly for resources with good market opportunities (Dasgupta 1993, Adhikari 2005). Poor households may attempt to minimize risk by using forest resources to mitigate shortfalls in consumption levels, which households may be interested in enhancing their earning by selling these resources, particularly when there are good market opportunities.

Household inequalities in private endowments (land and livestock) and income sources (occupation, employments, pensions) family size, location of settlements together create socio economic stratification of the households.

This stratification is often apparent in society differentiating households as either rich or poor, distant users or big users or small families within a community forest association

Understanding factors influencing community participation in forest management programs such as PFM may be critical to forest managers and decision makers.

Factors motivating participation of households in decision and activities for preservation of forest in protected areas may be also very important. This is because promoting People's participation in development is to ensure that households that are poor and marginalized are able to take decisions that favor them most (World Bank 1994)

Allocations of participatory labor by villagers are critical for successful establishment of PFM institutions. First, villagers need to invest their labor for forest guarding and

monitoring activities. Second, added labor may have to be spent for collecting fuel, food, fodder and other minor forest products from a larger area of the forest in response to restrained access to nearby specific patches of forest in conformity with PFM rules. Third, importance of participatory labor is perceived in plantation and regeneration of high value forest associated with generating increased economic gains on a long term sustained basis.

At the poor household level, there arises the problem of trading off participatory forest labor with that of agricultural operations. Since agricultural work is obtained on a seasonal basis, villagers are often confronted with the problem of deciding about the allocation of their endowed labor hours between agriculture-related work and forest participatory labor that help earn a substantial part of their livelihood.

A number of researchers have analyzed the common pool resources that consider the local community members as homogeneous following the same behavioral strategy in using the resources.

However the households in the communities who depend on the forest for their everyday needs have a variety of heterogeneity which leads to different behavior of the household member in using the forest resource.

This is because the behavior of a household member not only depend on the material gains but also on a set of non-material incentive from the resource (Crawford and ostrom 1995, ostrom 2000)

2.4 SOCIAL FACTORS THAT INFLUENCE HOUSEHOLD PARTICIPATION IN COMMUNITY FOREST ASSOCIATION

For successful participation of household in community forest association it is important to have an all inclusive social environment where collaboration between the state agency and the communities are likely to be achieved. In some areas communities are already protecting natural forest through local and informal management institutions of their own. In some areas households may be highly motivated to begin participation in forest management and will require information and encouragement from the state agency or local NGO. In contrast, some households may have little interest in forest management or may be too fractionalized to take effective action as a cohesive group. By identifying

and giving priority to social factors that determine household participation in forest management, the state agency progress in management will be greatly successful (Mark et al 1992)

The recognition of these factors will also allow the PFM programs to respond more naturally to community and household needs and help in reducing costs and accelerate expansion of the programs.

This is because the households living within the realms of a forest have the knowledge, information and incentive required to manage and conserve the resources on which they depend upon. White and Marti (2002)

2.4.1The CFA formation process

The PFM is a relatively new management dispensation of the state forest in Kenya having recently been legally recognized through the forest act of 2005.The pace of formation of most of the CFAs and their eventual registration was a hurried process in order to beat the deadline which had been set by the Kenya Forest Service for the registration of these organizations. As a result of this, sufficient time may not have been given to the household to fully participate in the social mobilization and the group formation within the community. Where there were already existing informal institutions managing the adjacent forest they were not given room to understand what this new arrangement was going to be all about together with their respective participating households.. The emergence of these informal institutions could have made the households to be a bit reluctant to take active participation in this new management outfit which was being superimposed on an already existing functional organization.

2.4.2 Framework of PFM in forest management

The PFM frame is based on the premise of a legal environment where issues will be addressed and resolved through the laws of the country.PFM also provides for an activity outline for which households are able to do. The various roles and

responsibilities of the households which form their obligations towards forest management are spelt out. The rewards towards participation in PFM are also fairly known by the households.

2.4.3 Conflict resolution in the CFA

In a given society Conflicts always arise in natural resource management over how the resources are used and who benefits. Different groups have values associated with forest, how the forest is allocated among them. They also have rules dealing with the regulation on how they are using the forest with ever changing climatic conditions; they also have rules regarding who bears the cost of rehabilitating areas that have been badly degraded as result of the households using the forest. In the process of trying to manage the forests among the household's conflicts could arise when some households are denied access to the forest use because of them failing to comply with the existing rules and regulations that have put by the organization. They might try to forcibly use the forest and in the end create a conflict which will take time to resolve. The disagreements are exaggerated by the rising human population, and the dwindling available forest resources.

In any given society conflicts are normal and common consequences of decision-making in governance and socio-political relations. They are common outcomes of inter-personal relations within and between community functions and their relations to outside interests and forces. In PFM practices, conflicts occur when two parties both claim rights of access to products of common interest or joint participation or ownership of a given forest or forest resources.

Many conflicts arise from changing social, environmental, economic, legal and political conditions, particularly when these factors create new interests and demands on natural resources. FAO (2002*)* has observed that conflicts can also have constructive and positive outcomes.

These conflicts unless resolved in good time will hinder households to actively participate in the forest resources(World Bank 2002). There is need for the

establishment of formal mechanisms for the resolving conflicts within the CFA. The establishment of such mechanism is heavily weighted in favor of the state agency since the management of the forest is bestowed to them and they have the power to enforce the decisions made on resolving the conflict however unpopular the decision might be with the households (World Bank 2006)

2.4.4 Tenure rights and ownership

Community based approaches provides alternative management strategies, through local empowerment and capacity building. They respond to immediate term problems of sustainable resource management (World Bank 1998). However, local empowerment, decentralization of decision making and increased involvement of various stakeholders in forest management should entail changes in forest ownership and tenure with support of appropriate legal provisions

Tenure rights for households over a protected forest would create a long-term interest and motivation among the people towards protection and sustainable use of the forest (Murali et al 2003)

But most of the forest have remained under public ownership despite policy changes towards participatory approach to resource management (FRA 2005) Unclear rights over tenure ownership and control create uncertainty among households (Murali et al 2003) and that affect their participation in CFA.

2.4.5 Peoples attitude towards new forest conservation approach

Through many studies on PFM focus on ecological and economic dimensions, behavioral dimensions are very important. Attitudes of households toward the state agency and the CFA organization are critical factors that can affect participation. It has been reported that households are likely to support PFM process if they have positive attitude towards the forestry personnel on the PFM program (Rish 2007)

The viability of the PFM practice will ultimately depend on the communities' perception that it has the ability to provide meaningful and sustainable economic, social, and environmental capital to the stakeholders and the society. However PFM is still grappling with establishment of viable avenues for sustainable production of multiple goods and services.

Experiences already show that the PFM practice is building noticeable momentum and gaining the confidence of communities as it moves from a simple arrangement providing access into the forests to arrangements providing communities with ownership rights and managerial roles. However PFM are also limiting community interests to product benefit sharing and ignores rights and elements which capture community's long-term commitment, such as ownership and management authority. This might also led PFM to suffer the same fate as the former old forest management systems which was not addressing the communities interest on equitable flow of incentives, supported by realistic market-based pricing mechanism.

2.5 ECONOMIC FACTORS THAT AFFECT HOUSEHOLD PARTICIPATION IN COMMUNITY FOREST MANAGAMENT

Community participation in forest management is a whole new concept that is visibly and fast moving from consultative and collaborative norms into those norms where partnership between state and community are being forged for the sole purpose of the communities to operate as effectively and efficiently in harnessing of the forest resources and forest management authorities. (Amanor 1997)

There are a number of economic factors that are considered when households make decisions to participate in community forest management that are taken to be necessary when attempting to gain an understanding of household engagements with the state agency in community forest management.

2.5.1 Household income and wealth status

Household income is an important factor in determining the level of household participation in the community forest management. Poor and marginalized household

with low income although may be attending meetings called by the community associations are in most cases having no capacity to influence the outcome of the decisions made in such meetings .

Therefore empowering the poor economically through such meetings would remain questionable if that is the criteria for achieving success in PFM. (Lise 2000)

Like most devolution and decentralized development programs, PFM has implicitly assumed that participatory and transaction processes in decision making in households are automatically ensured with devolution of power irrespective of the household income.

However from several studies on participatory forest management the above issue of automatic devolution of power on households might necessarily not be true (Engel 2004)

Aggrawal and Gupta (2005) found that the likelihood of participation for households is high for those that are better off (high incomes) than for those with less incomes (poor households).

One of the reasons for low participation of poorer households in community forest associations is that they have high opportunity cost which denies them the chance to engage in other activities outside forest programs. The enormous amount of the time these households spent on participation could be used as a labor for cash income initiatives but because of their low economic status they find it rather difficult to change (Engel 2004).

Weinberger and Jaunting (2001) suggests that middle income households are more likely to participate than the richer segments of the society because they have some limited but extra time that they can give to participation in community forest management.

2.5.2 Cost of participation

The cost of household to participate in community forest management will be measured by the employment opportunities in the farm and off farm ventures that are in the

vicinity of a state forest. When the opportunity cost of households increase due to availability of agricultural and non- agricultural non -forest activities in the region, the household is likely to show less interest in PFM.

Richer households that are having more land and livestock may not participate in meeting called by the community forest unless they have a common interest in the forest that is likely to affect them. However the probability of people being engaged in off-farm employment depends on the skills that they acquire through education.

Increasing evidence indicates that, while PFM has demonstrated efficiency in forest protection, its cost to communities, including opportunity cost on land under forest management, is extremely low. The irony of this fact is that despite a cost efficient arrangement for forest protection, the state continues to restrict communities to use low and degraded forests and narrow domains of product-sharing arrangements which only offer subsistence returns to the household despite their willingness to participate in PFM. Aggrawal and Gupta (2005).

2.5.3 Returns on Participation forest management (benefits/rewards)

Returns on participation in principle are of three types

a) Expected present and future forest value
b) Wages income by engaging in forest activities such as plantations
c) Other direct benefits from the program such as improvement of infrastructure conditions in the community and individual benefits.

In India landless laborers, marginalized small framers depend almost entirely on forest for their fuel and fodder suppliers and therefore have a personal interest in the regeneration of degraded forest areas under PFM.

Forest products are an important source of employment and income for rural poor especially where other opportunities are non-existent (Jodha 1997). The opportunity to

set casual work in the forest makes households to have a keen interest and participate in meetings.

The advantage of households being members in a PFM arrangement is that it allows them to be in a better position to negotiate and acquire the forests public goods and services more easily and this also encourages them to participate more in community forest management.

The households' decision on PFM participation depends on the current status of the environmental quality of the forest and also on the extent to which the household depends on the forest for its livelihood for survival.

Dependency on the forest for daily livelihood is one of the most important factors for a household to participate in CFA.

Rural households reduce their vulnerability by deriving food security and increase household income from forest(Olson 2007, Warner 2000) .Forest reduce the vulnerability of households by providing an alternative income safety net in time of needs(Warner 2000, Arnold 2001, Bwalya 2004,Olson 2007)

2.5.4 Proximity to the forest

Proximity of local community to the resource and to the forestry offices has been reported to have a positive effect on household participation and subsequent success of the program. Holmes (2007) says that during a similar study in the Eastern Cape of South Africa, observed that the further forestry offices are from the resources and the community, the less they interact with the local communities. Similarly, the further the communities are from the forest resource, the less they interact with the resources. Interaction is essential in PFM because it enhances sharing of information and creation of mutual relations, and builds trust and confidence among the concerned parties

2.5.5 Forest product market opportunities

Market opportunities for forest products can also influence community participation and eventual success of PFM. Areas with very high market opportunities, such as proximity to urban settlement, may cause proliferations of illegal and unsustainable activities such as timber harvesting and charcoal production among forest adjacent communities/households. On the other hand, areas with weak market opportunities, possibly due to poor road network or long distance to the market local forest adjacent communities may become discouraged although the forest products may be in abundance. Furthermore illegal harvesting of forest products from open areas near a PFM and at low cost, may discourage households to market forest produce from PFM at reasonable prices(Bloomley and Ramadhani 2006)This may subsequently affect their participation in PFM activities.

2.5.6 Benefit sharing mechanism

Benefits from the forest resource for the forest adjacent community whether it is in monetary or non-monetary form are critical factors that need to be considered when looking at the level of the communities to continue playing an active role PFM.

The accruing benefits from the PFM process ought to be shared out among the various stakeholders within the forest in a fair and transparent manner to avoid conflicts over unfair allocations that can lead to further depletion of the resource that PFM hopes to protect and improve on its ability to restock and recharge.

A proper benefit sharing mechanism should be put in place to ensure that the benefit flow reaches the intended target community and the distributional aspect of the benefit has taken care of all the category of the people living within the precincts of the forest.

However these factors should be tackled in parallel and distinct from each other so as to minimize the danger of having distributional inequalities and maximize poverty reduction potentials (Hobley 2005)

It is from the PFM process that it will be important to know and to consider whether these benefits created are sufficient enough to engage the forest adjacent communities fully and meaningfully in the longer term to achieve a sustainable resource management outcome.

2.6 FOREST CONDITION

The condition of the forest whether degraded or of high value will determine how the forest adjacent communities are willing to participate more or less in PFM .Forests that are able to offer watershed functions such as provision of sustainable and clean flow of water offer better incentives to the community to support the PFM activities. Highly degraded forests which do not provide little or no forest goods and services are less likely to encourage the adjacent communities to participate more in its conservation as they will be able to discount their opportunity costs which will not be in their favor. The adjacent community although they might have been partly responsible for the forest degradation that has reached such high levels, will be unwilling to participate in its restoration due to the high costs involved.

The topography of the forest has also some bearing on the forest adjacent households' ability to exploit the forest for their own benefit. Forest that are located on very steep valleys and hilltops and whose steepness begins just at the boundary between the households pieces of land and the forest are very difficult to exploit because of the strenuous efforts the households have to endure in order to assess the forest. This is in most cases beneficial to the environmental conservationist as the forest will most likely remain intact and unexploited for a very long time as very few household members will be willing to climb the steep slope in order to assess the forest products which are located at the hilltops of these hills.

On the other hand forests that are located on flat or on gentle slopes are easily exploited because of easy access and this can be a leading cause of accelerating the rate of forest degradation and deforestation unless there are stringent enforcement rules in place which prohibit excessive exploitation.

2.7 Empirical Literature

A PFM institution, whose dreams and aspirations are intended to be implemented sincerely, needs be preceded by nurturing community participation with a proper reckoning of the socio-economic, political, cultural and ecological variables that influence the PFM process (Mukherjee 1998). Participation by villagers across all income classes is conditioned by initiation, motivation and facilitating efforts on the part of forest public service officials and a community friendly attitude on their part; also prominent are tact, broad vision and long experience of work involving the different segments in the community. A household's willingness to effectively participate in forest management in the context of participation is analyzed through consideration of a multinomial choice model. Participation (or non–participation) in forest management is supposed to be influenced by different household characteristics, perceived security about land use-right and proximity to forest. The variables that emerge important are listed as membership in community based forest management institutions, security of land use right and training. Furthermore the results indicate that improving secured land resource use right would increase villager's willingness to participate in forest management activities such as community work and forest surveillance.

In a study analyzing the factors influencing villagers' motivation for participation in social forestry in west Mazandaran in Iran, Faham *et al.* (2008) observed that level of literacy, extent of participation in extension–education courses, use of mass communication media and attitude towards participation and social interaction have a significant correlation with motivation towards forest participation.

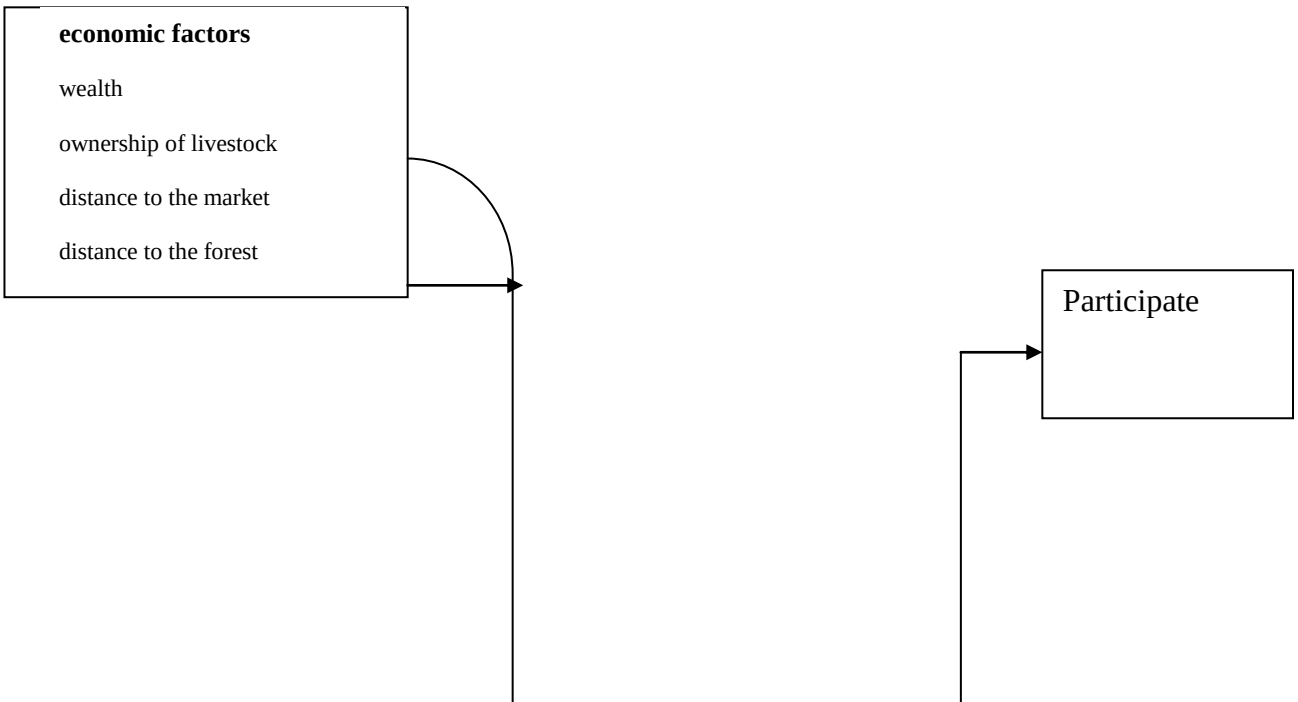
Empirical findings in the context of Ludhi-Damgade Sub County in Nepal reveal that participation in community forest management is influenced by socio-economic factors, which in turn determine the level of benefits obtained from forest resources (Maskey *et al.* 2005). Accordingly, disadvantaged groups who suffer from lack of participation remain basically excluded from decision making in product distribution and get less benefits.

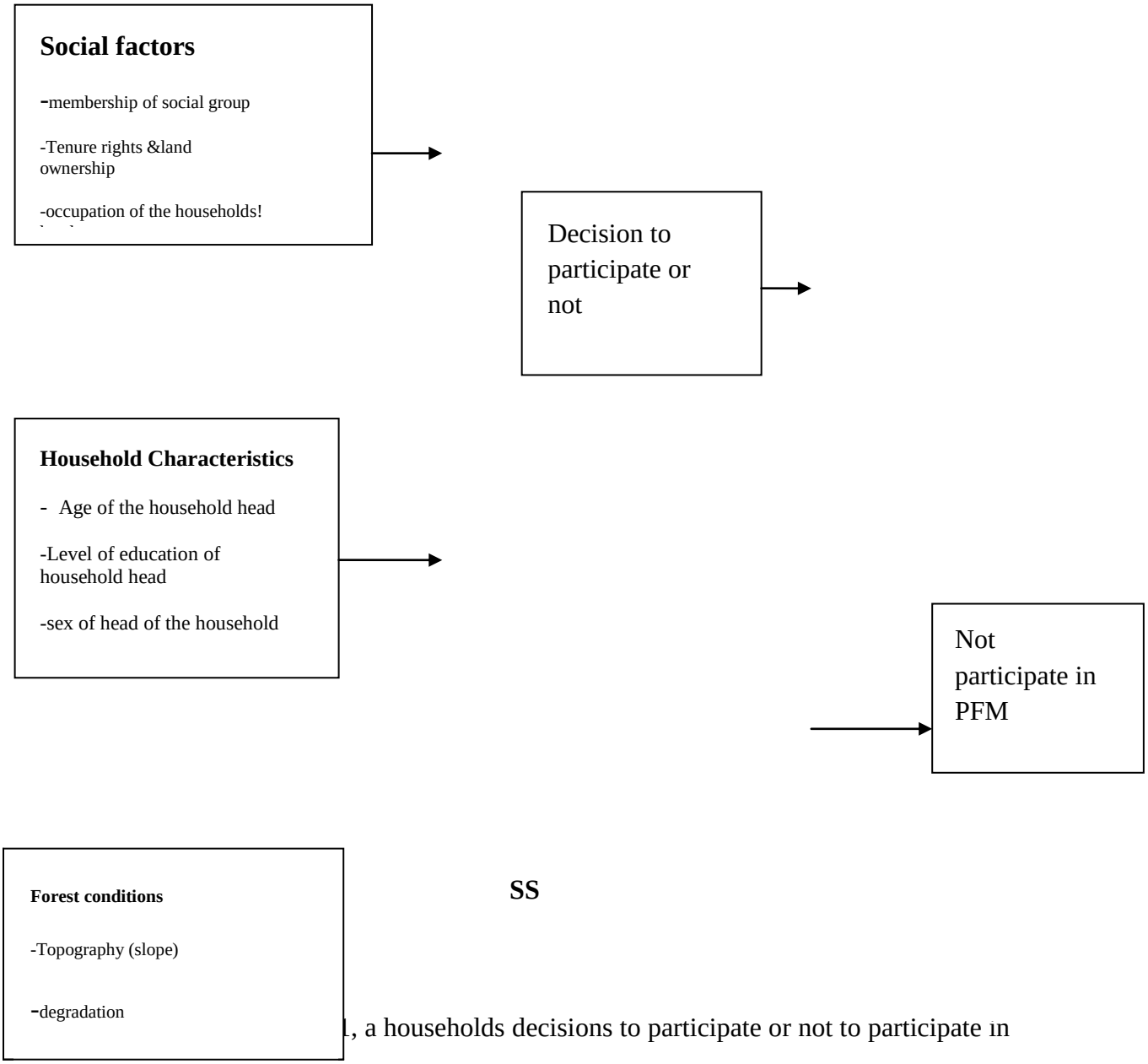
PFM will therefore at policy level focus on empowering lower strata people and promoting their participation so as to ensure equal distribution of community forest benefits to all without the fear of losing out the whole idea of inclusiveness.

2.8 Conceptual Framework for the Study

The empirical literature on participatory forest management can be summed up in a conceptual framework for the study. The conceptual framework adapted for this study is presented in figure 2.1.

The conceptual framework adapted for this study is presented in figure 2.1: below





l, a households decisions to participate or not to participate in participatory forest management can be decomposed into four important factors (i) the characteristics of the household which include the age of the member of the household, the marital status ,the level of education of the household head and gender.(ii)The forest condition of the forest which include how badly degraded or well conserved it is and the slope of the forest (iii) The social characteristics of the household which include whether it is aware of the existence of the PFM, the participation in other social groups

other than the CFA a conflict resolution mechanism within the social groups and how it is able to influence decisions in meetings called and the occupation of the household head (iv) The economic factors which include the distance the household is how far away it is from the forest resource, how easily can they offload the harvested forest products to a nearby market i.e. to an urban center.

The households' benefits from decisions made (i) depend on forest quality and on the extent to which the household depends on the forest for its livelihood.

Dependency on the forest for daily livelihood is one of the most important factors for a household to participate in PFM

When forest are of good quality and substantially contribute to household income households are expected to be more likely to participate in PFM

A household's membership in a social group makes it have the ability to influence decisions taken that are likely to determine the household expected returns. Household's ability to participate in decisions is likely to depend on the households bargaining power, the state of the community interaction and the household membership in the CFA.

Bargaining power is likely to depend on the relative strength of the household social group in the community and other household characteristics such as education, wealth, age and gender.

The attitude of the community towards conservation indirectly influences the household's ability to decide to participate in PFM by setting the scope to which decision making powers are devolved to households.

The benefits from participating do not only depend on the value of the decision but also depends on whether the household's interest would already be represented by others from the same socio-economic group.

In a heterogeneous community, the preference of people with respect to the PFM activities will vary according to their basic socio economic and cultural needs and strategic interest in the forest. The different groups or individuals that can potentially have different preferences in the PFM activities tend to have their socio-economic background more pronounced and can be classified on the basis of land holding and education

CHAPTER THREE

MATERIALS AND METHODS

This chapter discusses the location of the study area, the methodology adopted to help with the study, the theoretical framework developed for the study, sampling designs

used in the study, the various ways data collection was done and presented here also are the different methods used for the analysis of data that was collected.

3.1 THE STUDY AREA

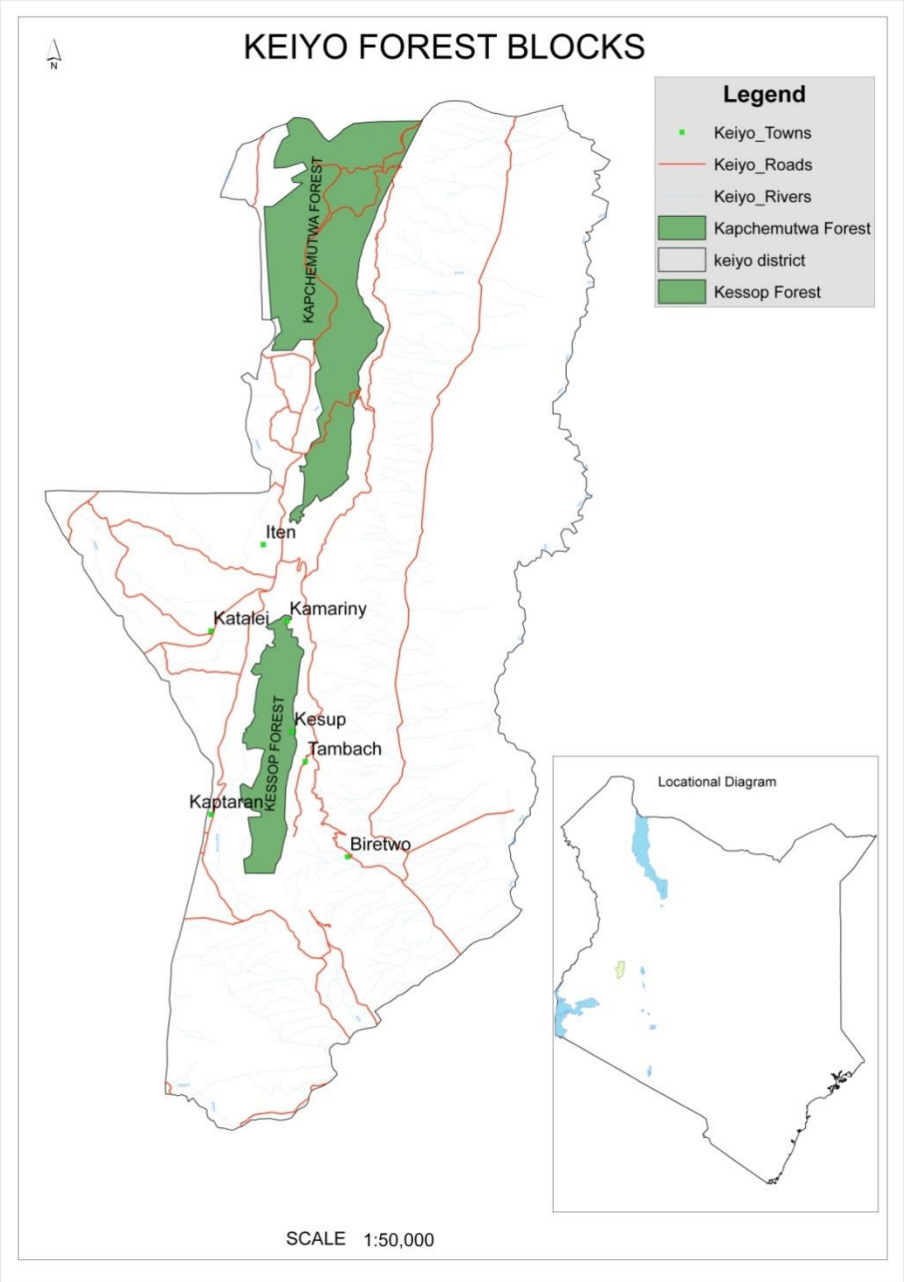
3.1.1 Location of the site

The study area was in the gazzetted government owned Forest Stations of Kessup and Egeyo respectively in Keiyo North Sub County of the Elgeyo /Marakwet County in the former defunct Rift Valley province (see Figure 3.1).Elgeyo forest forms part of the larger Kapchemutwa forest block. The Sub County borders Uasin Gishu County to the West, Marakwet Sub County to the North, Keiyo south Sub County to the south and Baringo County and kerio Valley to the East. The areas were identified for the study because they have been having PFM programs that having been running since the commencement of the Forest Act No.7 of 2005.Though there are ongoing undocumented PFM activities the local forest adjacent community and the Kenya Forest Service are yet to make formal management agreements on how to manage the two forest blocks. This has hindered the pace at which the communities are involving themselves with the PFM activities.

The two government forest of Elgeyo Forest Station and Kessup Forest Station are located adjacent to the western edge of the escarpment of the kerio valley and which is part of the Great Rift Valley. The two Forest Stations were declared to be gazzeted forests in the 1930s because of their strategic importance as critical water catchment areas and also to provide timber and fuel wood to upcoming forest industries that were being established in the area .The Elgeyo and Kessup Forest Stations occupy an area of 6470.8ha and 2,347.2ha of forest land respectively in the Sub County. Elgeyo forest is to the north of the Sub County while kessup forest is located to the south

The Kenya Forest Service is in the process of developing a management plan for the two Forest Stations which is a mandatory requirement in the management of the gazzetted forests as has been stipulated in the current Forest Act (2005). The two Forest Stations are separated by a 15km distance which also includes part of the Iten Township which is

the county headquarters. The Eldoret- Iten-Kabarnet highway bisects the town into two halves and this also the mid-distance between the boundaries of the two Forest Stations. In between the forest and Iten Township there are farmlands in which the households are occupying.



Map 3. 1: Keiyo North sub county forests block (Source: Survey Branch KFS)

The two Forest Stations are managed on behalf of the state by the Kenya Forest Service which was created in 2007 (gazette legal notice no 7). Each station is headed by a forest manager who reports to the Ecosystem forest conservator. Below the senior forester

there are forest rangers that assist him with the enforcement of the forest law. The forest is divided into forest patrol beats for ease of management. Each of the beats is managed by two or more forest rangers depending on the size of the forest patrol beat. The rangers should provide forest protection reports about their beats to the forester on a daily basis. There is also the local community forest association, a number of user groups, non-governmental organizations and private individuals whom the forester interacts with on a daily basis in the process of managing the forest.

The forests also fall within certain administrative locations and sub locations whose boundaries sometimes extent and overlap into those of the forest.

In Elgeyo Forest Station the locations whose boundaries are also in the forest include Kokwao, keu, kapchemutwa, kapkonga and kamongich.

In Kessup Forest Stations the locations are Kessup, Kapterik and Kiptulong.The study focused on the randomly selected seven villages scattered in these locations neighboring the forest.

3.1.2 Topography

Keiyo North Sub County can be divided into three main topographical zones which run parallel to each other in a north-south direction. These are the highlands plateau, the Elgeyo escarpment and the Kerio valley. The highland has the highest altitude of 2400m above sea level at the Chebiemit hills to the north of the Sub County.

The two Forest Stations (blocks) are to a small extent located just as you begin to descend the escarpment. They then spread towards the westwards direction to occupy a narrow belt in the highland plateau and the continued spread is only checked when contact is made into the fertile farms owned by the adjacent community bordering the forest. These two forests form a narrow and continuous strip of forest belt that run in a north-south direction along the highland zone which is only broken up by the existence fast expanding Iten Township. The Elgeyo escarpment has medium agricultural potential due

to its moderate rainfall and moisture availability while the valley floor has marginal agricultural potential but it is good for livestock rearing.

The highlands plateau is ideal for farming and residential settlements and has attracted many people. The crops grown in the farms are either food or cash crops. The crops include wheat, maize, beans, finger millets and passion fruits. There is also an extensive livestock rearing in the farms with the keeping of dairy cows for milk production providing the much needed income for the farmers.

3.1.3 Climate

The climate of the Sub County is hot and humid in the Kerio valley while the highlands are very cold. The coldest area is the Iten Township which during the cold season drops to 12^0C. The coldest months are June to August while the hottest months are between January to March. The escarpment has moderate temperatures and which are not very hot and also not very cold. The winds are blown from the floor of the rift valley and this brings cold temperatures as they approach the forest located in the highlands.

The rainfall pattern is bi-modal with long rains occurring from March to June and short rains occurring from September to October. The average rainfall in the wet season in the highlands is 1500mm.The escarpment and the valley receives less rain as compared to the highlands.

3.1.4 Population

The population of the area is approximately 50,000 people based on the 2009 census. The households are living around forest from both sides of the escarpment and the plateau The forests are located administratively in kamariny division. In the urban centre it is largely a multiethnic town with the Keiyos being the dominant ethnic group.Outside the township the farms are predominantly occupied by the Keiyos.The western sides of the forest are more populated than the more marginalized eastern side of the forest.

.3.1.5 Vegetation

The two forests can be described as high forest and as such the predominant vegetation type in the forest are the exotic trees which were mainly established as the forest plantations to supply round wood to the timber industry in the area. They were mainly planted in the 1950's and 1960's.They matured and having reached the mandatory rotation age were harvested and replaced with new tree crops that are various stages of maturing. The most exotic species planted in the area included cypress, eucalyptus and pine.

There are also pockets of indigenous forests which serve as important water catchment areas for the many rivers and springs going downstream. Under these natural forests the dominant tree species are cedar, rosewood, and croton species.

There is a high demand for forest products that can be found within the forests. The much needed products are firewood and timber for house construction.

3.1.6 Hydrology

The forest forms part of the two important water catchment basins which support the livelihoods of quite a huge section population in the area upon which they depend on for their daily needs. The waters from the two forests drain into the Lake Victoria Basin to the south and Lake Turkana Basin to the North. Rivers found near the escarpment drain into the Lake Turkana basin while rivers on the western drain into the lake Victoria basin.

3.2.0 THEORETICAL FRAMEWORK

The theoretical framework for the study is based on the utility theory which is also commonly used in the analysis of natural resource management projects to which PFM falls under.

3.2.1 The utility theory

This study borrows heavily from the utility theory which is simply a rational decision making for the households' to choose the option of either taking part in participatory forest management PFM through their respective CFA or not to participate. Utility can basically be defined as usefulness, the ability of something to satisfy needs or wants of a good or service to a person or a household.If the utility a household derives from PFM is greater than from non-participation, then a rational household will likely decide to participate in order to maximize welfare.

3.2.2 Discrete choice models

The study also uses the discrete choice models (Ben-Akira 1985) as the framework for analyzing the data.

In the model participation in forest management by the adjacent forest communities is a result of several decisions made by the households in these communities.

Participation is a complex human behavior and from this model it will allow for future prediction of factors determining how the households influence the level of optimizing the use of the adjacent forest resource. In order to have a relevant discrete choice model for this study a number of assumptions must be made.

1. There has to be a decision maker. The decision maker must be defined and his characteristics must be known. The decision maker for the purpose of this study is assumed to be the households'.

These decisions usually consist of a choice among a finite set of alternatives.

2. There has to be alternatives for the decision maker. The alternatives that determine what are the possible options available for the decision maker in view of the current situation in which he finds himself in. This therefore requires the knowledge of what the

households' has chosen and what it has not chosen. It is important to note that the set containing all these characteristics (the choice set) must be characterized.

3. There has to be attributes for the households' that will easily identify with alternative option for the household.

4. There has to be decision rules that will be used in describing how the final choice is arrived at.

In this theory a person or household has a desire **Y**, and if they believe that by doing act **X**, they can achieve **Y**, then assuming there is no barrier to doing **X** or some desire stronger than Y they will choose X.

Therefore a household *i* will participate in PFM if the expected utility from participation EU_i^{pt} is greater than expected utility from not participating EU_i^{npt}

i.e If

$$EU_i^{pt} > EU_i^{npt}$$

Further, the expected utility from the household's decision to participate in forest management in the community EU_i^{pt} is determined by the household's social characteristics (S) and other household characteristics (Z) economic factors (G) and the characteristics of the forest (F):

$$EU_i^{pt} = f(S_i, Z_i, G, F)$$

The expected utility from the households decisions on not to participate in PFM is essentially the households' opportunity cost, which also depends on the households' characteristics, the social characteristics and the forest characteristics.

$EU_i^{npt} = k(S_i, Z_i, G, F)$

Using the above equations we can say that the probability that a households decides to participate in PFM can be written as:

Prob $\{EU^{pt}_i > EU^{npt}_i\} = prob\{f(S_i, Z_i, G_{,,} F\} - k(Z_i, G, F\} > 0 = g(Si, Z, G, F)$

3.3 ECONOMETRIC MODEL SPECIFICATION

We use household participation in the PFM for the estimation.

We use (PARTICIPATE) participation as a dummy variable which takes the value of ;

1. if a household is participating in PFM and 0 otherwise.

Since the dependent variables are binary, we assume the following logit specification

$$In \frac{P_1}{1-P_1} = \alpha_{1+} \alpha_2 S_i + \alpha_3 Z_i + \alpha_4 G + \alpha_5 F$$

Where

P_1 = probability of household participating

= prob (PARTICIPATE= 1)

3.4 .0 RESEARCH DESIGN

Prior consent was obtained from participants and relevant authorities before the study was undertaken. As a requirement for social surveys, the local households were informed about the purpose of the study, type of data to be collected, and that their participation was voluntary. Safety of participants and confidentiality of the information collected about them was also guaranteed.

The sample frame consisted of all households close to the forests included in the study. For the purpose of this study, only households in the villages within a radius of (five) 5 kms were considered. The 5 km distance is considered to be the furthest walking distance that a household can assess Forest Services without having to subject it to the strains of hiring alternative means of transport to carry home the forest products. The households in the villages in the locations whose boundaries have extended into the forest were also considered. The identification of these locations and villages bordering the forest was done through review of the existing boundary maps and meetings with the staff from the Kenya Forestry Service (KFS).

The data collection was done in two phases. The first phase involved the household survey with the use of questionnaire. The second phase was the focus group discussion with some members of the community forest association (CFA) and interviews with selected Kenya Forest Service staff.

3.4.1 The sample size

In order to carry out the survey we needed to determine the sample size from the population which was relevant and convenient for this particular study.

From mugenda and mugenda (1999) formula

Sample Size = n / [1 + (n/population)]

In which n = Z * Z [P (1-P)/(D*D)]

P = True proportion of factor in the population, or the expected frequency value

D = Maximum difference between the sample mean and the population mean,

Or Expected Frequency Value minus (-) Worst AccepTable Value

Z = Area under normal curve corresponding to the desired confidence levelPopulation

Value = 30000

Expected Frequency of the Factor under Study = 10%

Worst AccepTable Frequency = 14% or 6%

P = Expected Frequency Value = 10%

D = (Expected Frequency - Worst AccepTable) = 14%-10%=4%, OR 10%-6%=4%

Z = 1.960 with Confidence Level of 95% .

Formula: Sample Size = n / [1 + (n/population)]

In which n = Z * Z [P (1-P)/(D*D)]

The sample size will be

S =216

The study adopted a multi-stage random sampling to obtain the sample to be surveyed. In the Sub County, locations close to the forest were randomly selected and from these locations, the seven villages were randomly selected. Households that were to be identified for the household survey within these villages were then randomly selected. There were a wide range of information collection tools that were employed.

Data collection for the study involved field survey and analysis of secondary information because they were considered most appropriate data collection method for the study.

3.4.2 Household Survey

The administration of the survey for the household was done through the use of a developed questionnaire specifically for the study (see Appendix II).

Prior to the actual household survey, the questionnaire was pre-tested by administering to a selected small number of people drawn from the local community. The pre-testing of the questionnaire was done in Elgeyo and Kessup communities.

Pre-testing is an important part of questionnaire administration because questionnaire must be clear to the respondents in order to collect information that is relevant to the study. Information obtained was used to clarify and also in question wording and question direction. Ambiguous sections of the questionnaire that were likely to cause confusion to the enumerators and household respondents were rectified.

Enumerators who earlier on had been hired and then trained on data collection skills specific to the study were then dispatched to the field to collect the data for a specified period of time under close supervision.

Survey data collection was conducted in the study area in the month of June and July 2013. Quantitative and qualitative data collection methods were used and involved the household survey using a household questionnaire, discussions with focus groups, and interviews with key informants. Reliability and validity of results of this study depended on the correctness and truthfulness of information obtained from respondents and the perception of the interviews.

The questionnaire included both open ended and close questions to elicit as much information that could help in the study. Existing secondary information was also used to increase reliability and validity of the data collected coming with findings for the study. The unit of measurement for the household survey was the house head or the most

senior adult incase the house head is not available. A total of 142 households in 7 villages surrounding the two Forest Reserves were recorded. The enumerators tried to reach the desired sample size but were unable especially among the households' found along the escarpments which were in remote and fairly inaccessible areas. Inclusion of all households and villages in the survey was not feasible due to inadequate time and funds. Probability sampling was used to randomly select sample of households to participate in the survey. The household survey generated primary data from the members of the local communities through their responses to the questionnaire. Men, women both old and young were involved in the interviews and supplied the answers although the questionnaire targeted the head of the household. The information collected included gender, age, and educational level of the respondent, household types, household size, and means of livelihoods.

3.4.3 Focus group discussions

The study also employed focused group discussions. This mostly targeted the selected members and non members of the community forest association who have influence over the community decisions. The discussion helped to assess progress in PFM programme implementation, impact of the programme on the forest and on the community, and sustainability of joint forest management approach to forest management. A list of broad questions was prepared before the interview. A check list was developed which guided the discussions with the groups. A discussion was also done with the staff from the KFS to seek for clarification on issues that might not have been captured well by the other set of questionnaire.

A transect walk through the two Forest Stations was also found necessary and was conducted in order to observe if there are any visible changes on the existing forest vegetation types..

3.4.4 Key Informant Interviews

The interviews were conducted with local community members and local County representatives Kenya Forest Service who are the implementers of the programme in order to obtain in-depth general view of the research problem. Semi-structured interviews were conducted with open-ended questions and the key informants included both men and women.

3.4.5 Secondary data analysis

A lot of secondary data had been collected prior to and after the household survey on participatory forest management. The use of secondary data involves extrapolation of information that already exists, but was collected for other purposes. The secondary data provide necessary background information, an in-depth understanding of underlying issues, and a framework in which to analyze primary data for the study. The secondary data, which were used for this study, were derived from reports, official records and other documents within the Kenya Forest Service offices and other institutions.

3.5 DATA PROCESSING AND ANALYSIS

The collected data was then coded and then entered into the computer for data analysis. Primary quantitative data were subjected to statistical analysis by interpreting the questionnaire responses, using computerized means of comparisons and descriptive statistics.

The data were processed and analyzed using SPSS version 17.0. The data were prepared in the version with all variables of interest to the study for statistical analysis procedure. Three kinds of variables for the data collected were recognized: the continuous variables or data on a ratio scale such as age of the respondents; ordinal variables representing scale of magnitude such as education status; and nominal or categorical variables, which indicate the categories into which the respondents fall such as gender. Data were categorized into classes because statistical analyses differ for each class of variables.

Two types of analysis were conducted: Descriptive and Empirical Analysis

3.5.1 Descriptive Analysis

In this study, descriptive statistics was used to describe the demographic characteristics of the respondents and to find out the distributions of respondents in the different categories and combinations of households' participation in PFM.

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For the purposes of this study, the frequencies for all the different demographic segments were computed together with their percentages. For variables such as age that consist of continuous data, minimum and maximum values were given.

Cross tabulations of selected variables were produced as a precursor to conducting tests of significant internal differences between different variables among the two categories of respondents and to search for association between the selected variables using chi-square where necessary (Bryman 1988; Siegel and Castellan 1988; Casely and Kumar 1998;Nieswiadomy (1998). The assumption for this test is that the level of one nominal variable did not influence the level of the other nominal variable. Therefore, to test whether the influence of one nominal variable on the other is sufficient to state that the two variables are not independent, a Maximum-Likelihood (ML) chi-square test, which is more robust, was used. The p-values of the tests were reported in the analysis and where the p-value was found to be less than 0.05, the result was regarded as significant.

3.5.2 Empirical Analysis

The discrete choice model of logit regression was used to carry out the analysis for some of the data that had been collected from the field.

The discrete choice problem involves choices between two or more discrete alternatives. Such choice contrast with standard consumption models in which the quantity of each

good consumed is assumed to be a continuous variable. Discrete choices are statistical procedures that model choice made by people among a finite set of alternatives.

Discrete choice models statistically relate the choice made by each person to the attributes of the person and to the attributes of the alternative available.

The logit choice model has the following choice. (Set of alternatives that is available to the person).

The set of alternatives must be exhaustive meaning that the set includes all possible alternatives. This requirement implies that the person necessarily does choose an alternative from the set.

The alternatives must be mutually exclusive meaning that choosing one alternative means not choosing any other alternatives.

This requirement implies that the person chooses only one alternative from the set.

3.5.3 Defining choice probabilities

A logit discrete choice model specifies the probability that a person chooses a particular alternative, with the probability expressed as a function of the observed variables that relate to the alternative and the person. In its general form, the probability that person *n* chooses alternative *i* is expressed as:

Pnr ≡ Prob(person n chooses alternative i) ≡$G(x_{ni},x_{nj},V_j \neq i, sn,\beta)$.

Where.

x_{ni} is a vector attributes of alternative faced person n.

x_{nj} Vj is a vector of attributes of the alternatives (other than i) faced by person n.

Sn is a vector of characteristics of person n and β is a set of parameter that relate variables to probabilities, which are estimated statistically.

p_{ni} is between o and 1.

Σ^{i}_{j}=1 pnj = $1V_n$ where j is the total number of alternatives.

Expected share choosing i≡ si =i/N Σ^{N}_{n}= Ip_{ni}

where N is the number of people making the choice.

The logit regression model can either be binary or multinomial.

Table 3.1 Descriptions and measurement of variables

VARIABLE	VARIABLE DESCRIPTION	MEASUREMENT OF THE VARIABLE	EXPECTED SIGN
PARTICIPATE	Participation in forest management	Whether participating or not(1 if participating 0 otherwise)	Dependable Variable
AGE	Age of household head	Number of years of the household head	+
EDUCATION	Years of schooling of household head	Number of years of formal schooling	+
SELFGRP	Membership in a self help group	Dummy variable of 1 if member ,0 otherwise	+
SEX	Sex of household head	Dummy variable of 1if male, otherwise 0	+
TENURE	Tenure of the land for the house head	Dummy variable of 1 if owned by household, 0 other.	+
MART	Marital status	Dummy variable of1 if married ,0 otherwise	+
DISTFOR	Distance to the forest	km	

DEGRADE	Degradation of the forest	Dummy variable of 1 if no degradation, 0 otherwise.	+
DISTURB	Distance to an urban centre	Distance in km	+
HHSIZE	Household size	Number of household members	+
INC	Household income	Kenya shillings	+
TOPG	Slope of the forest	Dummy Variable of 1 if flat, 0 otherwise.	+
WEALTH	Wealth status	Dummy variable of 1 if poor,0 otherwise	-

The hypothesized relationship from Table 3.1 between the independent variables with the dependant variable (participation and non-participation) is discussed below.

Age: It is hypothesized that as the age of the household head increases the level of participation in community forest management decreases. This is because older people do not have the physical strength to actively participate in PFM which in most cases doing manual work in which the ability to endure long periods of exposure to physical and strenuous work is a necessity.

Education: It is hypothesized that households with high levels of education will contribute more in forest conservation. This is because they are more likely to understand on the need to protect and conserve the adjacent forest.

Self- help group: It is hypothesized that membership of a household head in a self-help group increases the level of participation in community forest. This is because it allows the member to appreciate the need for coming together as a group and pool their resources in to achieve in having a well protected and conserved forest.

Sex: It is hypothesized that more male than females are likely to participate in community forest management. This is because of the very nature of the PFM actively which are bit challenging for the female counterparts to get involved in.

Tenure: It is hypothesized that household that own land with no tile deed are likely to participate in community forest. This is in anticipation to be considered for allocation of forest land for cultivation under the PELIS scheme.

Marital status: It is hypothesized that households that are headed by married couples are more likely to participate in community forest management. This is because they can find some time in their daily activities and allocate it to community activities unlike the single households who are so busy engaged in non forestry activities and may not find time for community activities.

Distance to the forest: It is hypothesized that households that are closer to the forest are more likely to participate in community forest management. This is because of the relatively short distance they take to reach the adjacent forest to extract its products.

Forest degradation: It is hypothesized that households that are living adjacent to a much degraded forest are unlikely to participate in community forest management. This is because they see no benefit they can get from a degraded forest.

Wealth status: It is hypothesized that wealthier households participate more in community forest management. This is because they are the heavy consumers of forest goods and services and strive to ensure through participation that there is a steady and uninterrupted supply of the commodities from the forest.

Household size: It is hypothesized that households that are smaller in size are not likely to participate in community forest. This is because their demand for forest products is negligible to the extent that they see themselves as not responsible for the forest destruction in the adjacent forest and therefore see no need to participate.

Household income: It is hypothesized that households with lower incomes tend to participate more in participatory forest management. This is because in order to cover for part of the income deficits from their low household incomes they to meet from the extraction and sale of the forest products they are getting from the nearby forest.

Slope of the forest: It is hypothesized that household that are living adjacent to a forest that has a very steep slope do not participate in community forest management. The steep gradient makes it extremely difficult for the households to easily access the forest.

CHAPTER FOUR

RESULTS OF THE STUDY

4.1 Socio-Economic Characteristics Of Sampled Households

Socio- economic characteristics of households' included sex of the respondent, age of the respondent, marital status, household size, level of education, membership in a social group, household involvement in PFM, main occupation of the household head, land tenure and rights, distance to the forest, distance to an urban center, ownership of livestock (cows), wealth status and income of the household and main food crops grown in the area.

4.1 .1 Sex of the respondents

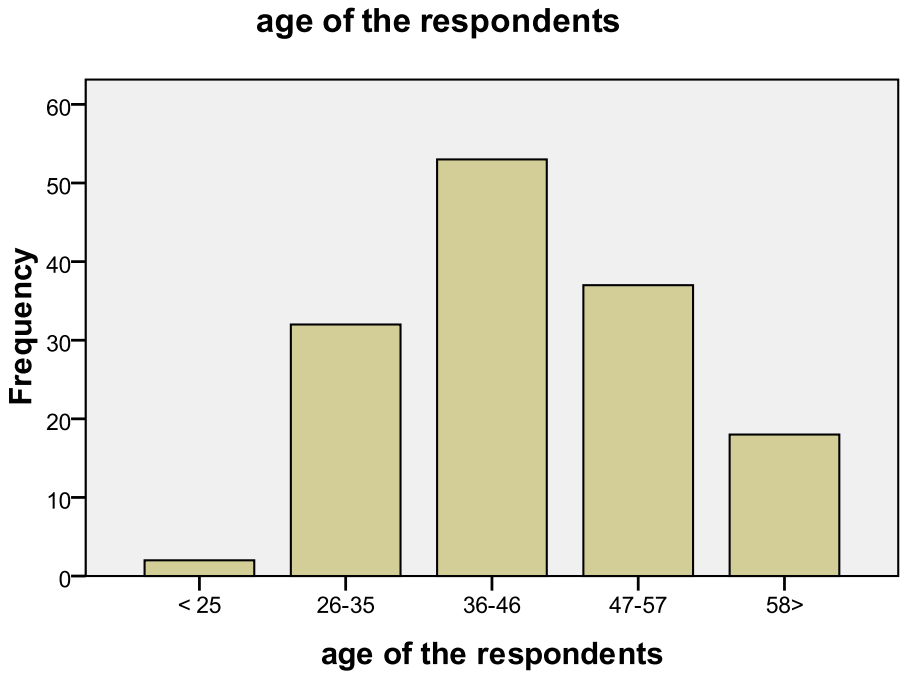
The study revealed that out of the 142 who were interviewed (114) 80.3% of the respondents in the survey were men while (28) 19.7% were female.

4.1.2 Age of the respondents

The study revealed(see figure 4.1) that the age of respondents ranged from 23 to 76, with the average age being 44.8 years .The majority of the respondents were in the age bracket of between 36 and 46 which was 37.3%.

This was followed by the age brackets 47 to 57 years. The age bracket which was heavily represented by the youth was of the bracket 26 to 35 years at 22.5%. The least presented age bracket was that of under 25years who only occupied 1.4% of the total respondents.

Fig 4.1



4.1.3 Marital Status

The study showed that (Table 4.2) that 5.6% of the households were headed by singles, 88.0% were having household heads from monogamous marriages while 3.5% were from widowed household heads while 0.7% were headed by people who had divorced. Households headed by polygamous respondents were represented 2.1%.

Table 4.2: Marital status of the households' head in the Survey

	Frequency	Percent
single	8	5.6
married monogamous	125	88.0
married polygamous	3	2.1
divorced	1	.7
widowed	5	3.5
Total	142	100.0

. **Source; Field survey June- July 2013**

4.1.4 Households' size

The household size ranged from one member to 13 members. The average members in a household were 5.3. Five categories of household sizes was developed for ease of capturing data. These were between 1-3 members,3-5,5-7,7-9.above 9. Households' size with a total membership of 5-7 was the most common at 30.3%followed by 3-5 at 28.2%. Households with a size of more than 9 members had the least representation at 9.9%. (Table 4.3)

Table 4.3: Size of members in a Household

Household size	Frequency	Percent
1-3	31	21.8
3-5	40	28.2
5-7	43	30.3
7-9	14	9.9
9 >	14	9.9
Total	142	100.0

Source: field survey June-July 2013

4.1.5 Level of education of a household head

The study revealed (Table: 4.4) that 5.6% of the household members never attended school,50% of the respondents completed primary level of education,26.8% completed secondary education,1.4% never completed secondary school ,while 7% either completed college, university or postgraduate degree .

Table 4.4: Level of education of the household head

	Level of education	Frequency	Percent
Valid	never attended	8	5.6
	primary complete	71	50.0
	primary incomplete	13	9.2
	secondary complete	38	26.8
	secondary incomplete	2	1.4
	university complete	1	.7
	postgraduate	2	1.4
	diploma college	7	4.9
	Total	142	100.0

Source: field data June-July 2013

4.1.6 Membership in a social group

The study revealed that 63.4% of the respondents were not members of any social group. 36.6% of the respondents said that they belonged to at least a self help group.

The study went further to reveal that 21.8% of the respondents who mentioned being members of a self-help group belonged to one group, 11.3% belonged to two groups while 2.8% belonged to four groups. They become members of those groups through

formal invitations or through attending meetings called by the officials of those groups (Table 4.5).

Table 4.5: Membership of the household head in social groups

	Membership in number of groups	Frequency	Percent
Valid	no group	88	62.0
	one group	31	21.8
	2 groups	16	11.3
	3 groups	4	2.8
	4 groups	1	.7
	5 groups	2	1.4
	Total	142	100.0

Source: Field survey June-July 2013

4.1.7 Household involvement in participatory forest management PFM

The results from the study show that 54.2% of the households were not participating in community forest management while 45.8% of the respondents in the household mentioned that they were involved in PFM.

4.1.8 Main occupation of the households' head

The study revealed that 69% of the household respondents were practicing farming as their main occupation, 2.8% were honey gatherers,10.6% were under permanent and

formal employment, 12% were involved in small scale business while less than one percent were having large scale businesses. Unemployed respondents were only 1.4%. Small scale trader's respondents occupied only 8.5%. (Table 4.6)

Table 4.6: Main occupation of the household head

Main occupation	Frequency	Percent
farmer	98	69.0
honey gatherer	4	2.8
permanent formal employment	15	10.6
temporary formal employment	10	7.0
Unemployed	2	1.4
small scale trader	12	8.5
business large scale	1	.7
Total	142	100.0

Source: Field survey data June-July 2013

4.1.9 Land tenure rights and ownership

The majority of the households' owned the average size of the land that was about 1Ha.

Table 4.7 size of the land in Ha owned by the households

		Frequency	Percent
Valid	0.0-0.8Ha	61	43.0
	01-3Ha	75	52.8
	3-5 Ha	4	2.8
	5-7Ha	1	.7
	7> Ha	1	.7
	Total	142	100.0

Source: Field survey data June-July 2013

However 75% of the respondents owned land that was between .8and 3 Hectares.

The study also revealed (Table 4.8) that 64.1% of the households were staying on land that they had inherited from their parents.

These parcels of land were also having private land titles.9.9% of the respondents were staying on land that they had purchased with money from their own savings. 8.5% of the respondents were staying on land that they had rented from the landowners. 4.9% were households that were squatting on land that was not legally theirs. 1.4% was households who had just recently moved in and settled in occupying those newly demarcated parcels of land.

Table: 4.8 **Status of the ownership of land.**

Status of land ownership	Frequency	Percent
Inherited	94	66.2
Purchased	17	12.0
Rented	13	9.2
Gift	7	4.9
newly occupied	2	1.4
Squatted	8	5.6
temporary free use	1	.7
Total	142	100.0

Source Field survey data: June-July 2013

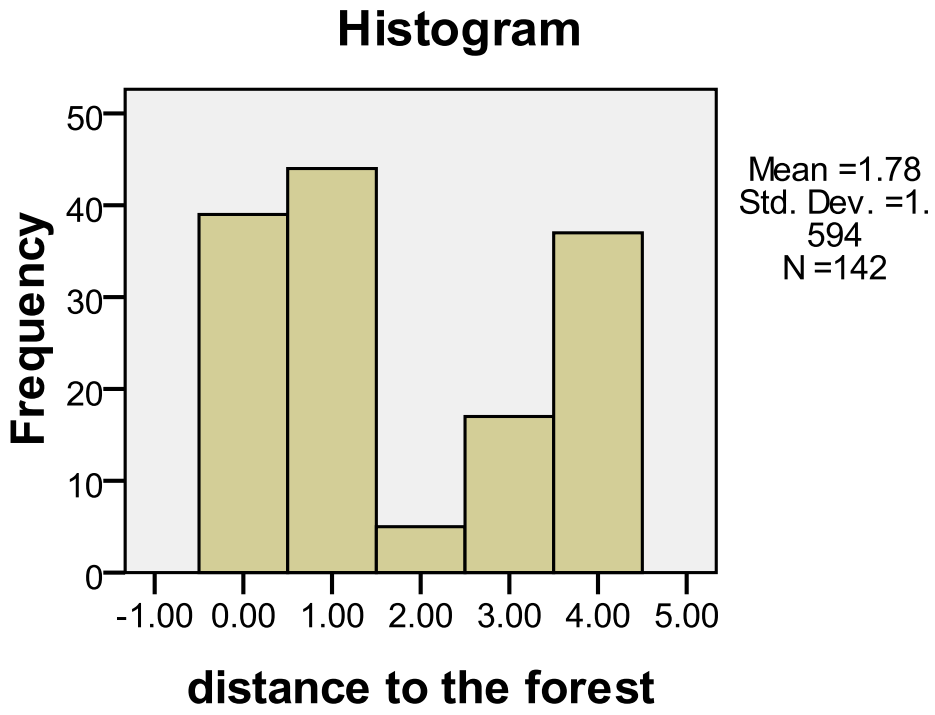
4.1.10 Distance covered by the households to reach the forest edge

The study revealed (Figure 4.2) that the mean distance from the centre of the village to the edge of the forest was 1.78km.

The minimum distance from the centre of the village was 0 km. It was revealed that 31% of the respondents were staying within a distance of 0.5km from the edge of the forest, while those households who were within a distance of 1.5km were the least represented at 3.5%.The standard deviation was plus or minus one.

The study revealed that there was a large concentration of households at between 0km and 1km which dropped significantly as we approach the 2km distance which eventually started to increase as you moved passed the 2km distance up to the 5km distance.

Figure: 4.2: Distance to the forest



Source: Field survey data June-July 2013

4.1.11 Distance covered by the households to go to an urban centre

The study showed that 24.8% of the households were staying within a distance of less than half a km from the centre of the village to an urban centre.40.1% were staying within a distance of one kilometer.4.9% were staying within a distance of 1.5 kilometer, 19% were staying within a distance of 2km and 10.6% were staying within a distance of between 2.5km and 5km. (Table 4.9)

Table: 4.9 Distance to an urban centre

Distance to an urban centre		Frequency	Percent
	less than .5km	**35**	**24.6**
	one kilometer	**57**	**40.1**
	1.5kilometre	**7**	**4.9**
	2kilometre	**28**	**19.7**
	2.5km>	**15**	**10.6**
	Total	**142**	**100.0**

Source: Field survey June –July 2013

4.1.12 Ownership of livestock (cows)

The results of the study showed that 25.4% of the households were not having any cows while 74.6% of the respondents were keeping at least one cow.

4.1.13The wealth status of the households'

The study revealed (Table 4.10) that 31% of the households were ranked as poor, 66.2% were ranked as middle income earners while 2.8% of the households were categorized as rich.

Table 4.10 wealth status of the forest adjacent households'

Wealth status	Frequency	Percent
poor(grass thatched house)	44	31.0
medium(timber walled house)	94	66.2
rich (permanent house)	4	2.8
Total	142	100.0

Source: Field survey data June-July 2013

4.1.14 Benefits from the forest

The study revealed that all the households in the survey in one way or the other have benefited from the forest adjacent to them. The benefit that had a lion's share among them that they were getting from the forest was having the adjacent household being able to be temporarily allocated forests parcels of land which (23.9%) they used for growing their own crops under the PELIS forest lands cultivation scheme. (Table: 4.11)

The households being able to get casual employment was at 18.3%, while improved infrastructure and reduced forest destruction tied at 12.7%. Those who were being allowed to extract the various forest products were at 19% and being allowed to graze their livestock in the forest was at 13.4%.

Table: 4:11 main household forest benefits

Forest Benefit		Frequency	Percent
	casual employment	**26**	**18.3**
	extraction of forest products	**27**	**19.0**
	improved infrastructure	**18**	**12.7**
	extra land for cultivation	**34**	**23.9**
	improved grazing areas	**19**	**13.4**
	reduced forest destruction	**18**	**12.7**
	Total	**142**	**100.0**

Source field data June-July 2013

4.1.15 Main food crops grown in the area

The study revealed (see Table 4.12) that the main food crop grown in the area was maize at 94.4%. Other food crops that were grown were beans at 4.9% and vegetables at less than one percent. The average yield of maize grown was twenty bags per acre. The crop was only grown in one season and there were no two crop seasons because of the cold climate which only allowed the slow maturity of the maize crop.

Table 4.12: Main food grown.

Food crop		Frequency	Valid Percent
	maize	**134**	**94.4**
	beans	**7**	**4.9**
	vegetables	**1**	**.7**
	Total	**142**	**100.0**

4.2.0 CHARACTERISTICS OF HOUSEHOLDS' PARTICIPATION IN PFM

It is important to understand the characteristics of households' that participate in community forest management. This will help policy makers came up with strategies that should be undertaken with a view to encouraging households' participation in PFM.

4.2.1 Participation and sex of the respondents

The study revealed that (Table 4.13) among the respondents who were not taking part in PFM 50% were male while 26% were females. It was also revealed that more men 87.7% than women 12.3% participated in PFM. The results from the study showed that $\chi 2=4.158, df=1, p=0.041$

Table 4.13: Participation in community forest management * sex of the households Cross tabulation

			sex of the households		
			male	female	Total
participation in community forest management	.00	Count	**57**	**20**	**77**
		% within participation in community forest management	**74.0%**	**26.0%**	**100.0%**
		% within sex of the households	**50.0%**	**71.4%**	**54.2%**
	participation	Count	**57**	**8**	**65**
		% within participation in community forest management	**87.7%**	**12.3%**	**100.0%**

Total	% within sex of the households	**50.0%**	**28.6%**	**45.8%**
	Count	**114**	**28**	**142**
	% within participation in community forest management	**80.3%**	**19.7%**	**100.0%**
	% within sex of the households	**100.0%**	**100.0%**	**100.0%**

Source: Field survey data June-July 2013

There was a significant difference between the male and female participation in PFM p=0.041 from 142 respondents.

The study also went further to reveal that out of the respondents who were taking part in PFM 50% were male while 12.3% were females.

4.2.2 Participation and Age of the respondents

The age grouping (Table 4.14) of the respondents was broken down into five categories to determine how the households responded to participatory forest management.

Table 4.14: participation in community forest management and age of the respondents Cross tabulation

			age of the respondents					Total
			< 25	26-35	36-46	47-57	58>	
participation in community forest management	.00	Count	**2**	**19**	**30**	**19**	**7**	**77**
		% within participation in community forest management	**2.6%**	**24.7%**	**39.0%**	**24.7%**	**9.1%**	**1.0E2%**
		% within age of the respondents	**1.0E2%**	**59.4%**	**56.6%**	**51.4%**	**38.9%**	**54.2%**
	participa	Count	**0**	**13**	**23**	**18**	**11**	**65**

tion	% within participation in community forest management	**.0%**	**20.0%**	**35.4%**	**27.7%**	**16.9%**	**1.0E2%**
	% within age of the respondents	**.0%**	**40.6%**	**43.4%**	**48.6%**	**61.1%**	**45.8%**
Total	Count	**2**	**32**	**53**	**37**	**18**	**142**
	% within participation in community forest management	**1.4%**	**22.5%**	**37.3%**	**26.1%**	**12.7%**	**1.0E2%**
	% within age of the respondents	**1.0E2%**	**1.0E2%**	**1.0E2%**	**1.0E2%**	**1.0E2%**	**1.0E2%**

Source Field survey data June-July 2013

The study revealed that out of the 54.2% of the households that were not taking part in PFM the age bracket <25 years was the leading at 100%. The age bracket that had the least members not participating in PFM was the 58> years which was at 38.9%.

When looked at in terms of participation in PFM the age bracket 36-46 was the leading at 35.4%. This was then followed by the 47-57 age brackets at 27.7%.from the analysis $\chi 2= 3.98$, df=4 , p = 0.315 was found. There was therefore were no significant differences in age when it came to households participating in PFM.

The study also revealed that those respondents who were 25 years and below had very low participation in PFM.

4.2.3 Participation and marital status

The study also showed that (Table 4.15) that out of the respondents who were non-participating in PFM, 87.5% were single, 52% were from monogamous marriages, while the polygamous marriages were at 33.3%.The widowed were presented at 75%.The separated were not represented in this category which was at 0%.

Out of the respondents who were active in PFM the study showed that 12.5% of the singles participated, 48% from the married monogamous, 25% from the widowed, and 66.7% were from the polygamous marriages.

However for the study there were no significant differences in participation in PFM for the various categories of marital status.$\chi 2=7.07$,df=5, P =0.216.

Table 4.15 participation in community forest management * marital status of the household head

			marital status of the household head						
			single	married monogamous	married polygamous	divorced	separated	widowed	Total
participation in community forest management	.00	Count	**7**	**65**	**1**	**1**	**0**	**3**	**77**
		% within participation in community forest management	**9.1%**	**84.4%**	**1.3%**	**1.3%**	**.0%**	**3.9%**	**100.0%**
		% within marital status of the household head	**87.5%**	**52.0%**	**33.3%**	**100.0%**	**.0%**	**75.0%**	**54.2%**
	participation	Count	**1**	**60**	**2**	**0**	**1**	**1**	**65**
		% within participation in community forest management	**1.5%**	**92.3%**	**3.1%**	**.0%**	**1.5%**	**1.5%**	**100.0%**

		% within marital status of the household head	**12.5%**	**48.0%**	**66.7%**	**.0%**	**100.0%**	**25.0%**	**45.8%**
Total		Count	**8**	**125**	**3**	**1**	**1**	**4**	**142**
		% within participation in community forest management	**5.6%**	**88.0%**	**2.1%**	**.7%**	**.7%**	**2.8%**	**100.0%**
		% within marital status of the household head	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: Field Survey June-July 2013

4.2.4 Participation and households' head Level of education

The level of education was compared to those households' that were non-participating and those who were participating (Table: 4.16). It was found that those who never attended school and those who completed university were not participating at 25% and 75% respectively. Those who had medium education from primary incomplete and secondary incomplete were also not participating and this ranged between 42.1% and 84.6

Table: 4.16 Level of education of the household head

participation in community forest management.			Level of education of the household head								
			never attended	primary complete	primary incomplete	secondary complete	secondary incomplete	university complete	postgraduate	diploma college	Total
participation in community forest	.00	Count	**2**	**42**	**11**	**16**	**1**	**1**	**0**	**4**	**77**
		% within participation in	**2.6%**	**54.5%**	**14.3%**	**20.8%**	**1.3%**	**1.3%**	**.0%**	**5.2%**	**100.0%**

management		community forest management									
		% within level of education of the household head	**25.0%**	**59.2%**	**84.6%**	**42.1%**	**50.0%**	**100.0%**	**.0%**	**57.1%**	**54.2%**
	participation	Count	**6**	**29**	**2**	**22**	**1**	**0**	**2**	**3**	**65**
		% within participation in community forest management	**9.2%**	**44.6%**	**3.1%**	**33.8%**	**1.5%**	**.0%**	**3.1%**	**4.6%**	**100.0%**
		% within level of education of the household head	**75.0%**	**40.8%**	**15.4%**	**57.9%**	**50.0%**	**.0%**	**100.0%**	**42.9%**	**45.8%**
		Count	**8**	**71**	**13**	**38**	**2**	**1**	**2**	**7**	**142**
		% within participation in community forest management	**5.6%**	**50.0%**	**9.2%**	**26.8%**	**1.4%**	**.7%**	**1.4%**	**4.9%**	**100.0%**

Total		% within level of education of the household head	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0 %**	**100.0 %**	**100.0 %**	**100.0 %**

Source: Field Survey June-July 2013

When analyzing households that were participating 9.2% of the households that never attended school were participating, 4.6% 0f those who never completed primary were also participating, 1.5% of those who never completed primary were also participating. Those who completed primary were participating at 44.6% while those who completed secondary were participating at 33.8%.

There was no significant difference between those who had lower levels of education and those who had higher levels of education when households were taking part in PFM.$\chi 2=13.78, df=7$, $p=0.055$.

The study revealed that the forest adjacent community of the Kessup and Elgeyo forest block was a fairly literate society with only 5.6% of the households having not attended any formal school and is therefore not able to read and write.

4.2.5 Participation and households' size

The household size was compared to those who were participating and those who were not participating (see Table 4.17). The study revealed that the household size of between 3-5 members was the leading in representation at those who were not participating at 32.5%.This was followed closely by the household size 5-7 at 31.2%The household size that was least represented was the 7-9 categories which were 9.1%. The household size category that was leading in active participation in PFM was the 5-7 at 29.2% .This was followed by the 1-3 at 27.7%.There was no significant differences between the households when participating in PFM as $\chi 2=3.18$, df=4.p=0.528.

Table: 4.17 showing participation in community forest management * household size cross tabulation

			household size					Total
			1-3	3-5	5-7	7-9	9 >	
participation in community forest management	.00	Count	**13**	**25**	**24**	**7**	**8**	**77**
		% within participation in community forest management	**16.9%**	**32.5%**	**31.2%**	**9.1%**	**10.4%**	**100.0%**
		% within household size	**41.9%**	**62.5%**	**55.8%**	**50.0%**	**57.1%**	**54.2%**
	participation	Count	**18**	**15**	**19**	**7**	**6**	**65**
		% within participation in community forest management	**27.7%**	**23.1%**	**29.2%**	**10.8%**	**9.2%**	**100.0%**
		% within household size	**58.1%**	**37.5%**	**44.2%**	**50.0%**	**42.9%**	**45.8%**
Total		Count	**31**	**40**	**43**	**14**	**14**	**142**

	% within participation in community forest management	**21.8%**	**28.2%**	**30.3%**	**9.9%**	**9.9%**	**100.0%**
	% within household size	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: Field Survey June-July 2013

4.2.6 Participation and membership in a social group

The respondents were then asked questions which would help in coming up with social factors that would help in making the household decide whether to participate in PFM or not.

Membership in a social group had some effects in the participation of households in PFM.

In the study (Table: 4.18)

4.18: participation in community forest management * membership in a number of groups crosstabulation

			membership in a number of groups						Total
			no group	one group	2 groups	3 groups	4 groups	5 groups	
participation in community forest management	.00	Count	**68**	**7**	**1**	**1**	**0**	**0**	**77**
		% within participation in community forest management	**88.3%**	**9.1%**	**1.3%**	**1.3%**	**.0%**	**.0%**	**100.0%**
		% within membership in a number of groups	**76.4%**	**23.3%**	**6.3%**	**25.0%**	**.0%**	**.0%**	**54.2%**
		% of Total	**47.9%**	**4.9%**	**.7%**	**.7%**	**.0%**	**.0%**	**54.2%**

	participation	Count	**21**	**23**	**15**	**3**	**1**	**2**	**65**
		% within participation in community forest management	**32.3%**	**35.4%**	**23.1%**	**4.6%**	**1.5%**	**3.1%**	**100.0%**
		% within membership in a number of groups	**23.6%**	**76.7%**	**93.8%**	**75.0%**	**100.0%**	**100.0%**	**45.8%**
		% of Total	**14.8%**	**16.2%**	**10.6%**	**2.1%**	**.7%**	**1.4%**	**45.8%**
Total		Count	**89**	**30**	**16**	**4**	**1**	**2**	**142**
		% within participation in community forest management	**62.7%**	**21.1%**	**11.3%**	**2.8%**	**.7%**	**1.4%**	**100.0%**
		% within membership in a number of groups	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
		% of Total	**62.7%**	**21.1%**	**11.3%**	**2.8%**	**.7%**	**1.4%**	**100.0%**

Source: Field Survey June-July 2013

Those households that were not participating and belonged to no group represented 88.3%. Also in the study 9.1% of the households belonged to one group, while those households that belonged to either one or two groups were represented at 1.3% respectively. There was 0% representation for those households that were belonging to either four or five groups.

In the households that were participating in PFM 32.3% of the households' belonged to no social group at all.35.4% belonged to one group, while 1.5% belonged to four groups. The study revealed that 63.4% of the household respondents did not belong to any community social group. The study went further to show that out of the households' that

were not participating in PFM, 88.3% were not members of any social group within that area.There was a significant difference in participation as the $\chi 2=40.478$,df=1 p=0.

4.2.7 Participation and households' head main occupation

The main occupation of the household head was analyzed against his response to making a decision to participation in PFM

Table 19:participation in community forest management * main occupation of the household head Crosstabulation

			main occupation of the household head							
			farmer	honey gathere	permanent formal employment	temporary formal employment	unemployed	small scale trader	bussiness large scale	Total
participation in community forest management	.00	Count	**52**	**2**	**6**	**5**	**0**	**11**	**1**	**77**
		% within participation in community forest management	**67.5%**	**2.6%**	**7.8%**	**6.5%**	**.0%**	**14.3%**	**1.3%**	**100.0%**
		% within main occupation of the household head	**53.1%**	**50.0%**	**40.0%**	**50.0%**	**.0%**	**91.7%**	**1.0E2%**	**54.2%**
	participation	Count	**46**	**2**	**9**	**5**	**2**	**1**	**0**	**65**
		% within participation in community forest management	**70.8%**	**3.1%**	**13.8%**	**7.7%**	**3.1%**	**1.5%**	**.0%**	**100.0%**
		% within main occupation of the household head	**46.9%**	**50.0%**	**60.0%**	**50.0%**	**1.0E2%**	**8.3%**	**.0%**	**45.8%**
Total		Count	**98**	**4**	**15**	**10**	**2**	**12**	**1**	**142**

	% within participation in community forest management	**69.0%**	**2.8%**	**10.6%**	**7.0%**	**1.4%**	**8.5%**	**.7%**	**100.0%**
	% within main occupation of the household head	**100.0%**	**100.0%**	**100.0 %**	**100.0%**	**1.0E2 %**	**1.0E2 %**	**1.0E2 %**	**100.0%**

Source: Field Survey June-July 2013

In the study for those households that were not participating 67.5% were found to be farmers, 2.6% were found to be honey gatherers, 7.8% were found to be in permanent and formal employment, while there was 0% of the unemployed in this category. 6.5% were found to be in the temporary employment. In the households that were participating, 46.9% were found to be farmers, 50% were found to be honey gatherers, 60% were in the formal and permanent employment, while 100% representation were from those household head who were unemployed (See Table: 4.19). Those who were in small businesses were participating at 8.3%, while those in large scale businesses were having 0% representation in this category .There was no significant difference between the farming households' that were participating and not participating in PFM as $\chi 2=11.37$,df=6, p=0.078.

4.2.8 Participation of the households', land size and tenure rights

The households that were having no land or 0.4Ha of land and were not participating in PFM were represented at 47.4%, those who were having land between 0.8 to 2 Ha and were not participating

Table: 4.20 participation in community forest management * size of the land in Ha

			size of the land in acres					
			0.0-0.4Ha	.8-2Ha	3.2-5.2Ha	5.6-7.6Ha	8> Ha	Total
participation in community forest management	.00	Count	**36**	**38**	**2**	**0**	**0**	**76**
		% within participation in community forest management	**47.4%**	**50.0%**	**2.6%**	**.0%**	**.0%**	**100.0%**
		% within size of the land in acres	**59.0%**	**51.4%**	**50.0%**	**.0%**	**.0%**	**53.9%**
	participation	Count	**25**	**36**	**2**	**1**	**1**	**65**
		% within participation in community forest management	**38.5%**	**55.4%**	**3.1%**	**1.5%**	**1.5%**	**100.0%**
		% within size of the land in acres	**41.0%**	**48.6%**	**50.0%**	**100.0%**	**100.0%**	**46.1%**
Total		Count	**61**	**74**	**4**	**1**	**1**	**141**
		% within participation in community forest management	**43.3%**	**52.5%**	**2.8%**	**.7%**	**.7%**	**100.0%**
		% within size of the land in acres	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: Field Survey June-July 2013

were represented at 50% of the household respondents, while those who were having between

3.2 and 5.2Ha were not participating were represented at 2.6%. The households that owned land which was 5.6Ha and above and were not participating in PFM were represented at 0%. Households that were active in PFM and had land size of less than 0.4Ha were represented at 38.5%. Those households that were active in PFM and were having larger parcels of land between 5.6-7.6 Ha and above 8Ha were representing the households at 1.5%. The land size that was more active in participation was households that were having between .8 and 3.5Ha of land which was at 55.4 %(Table 4.20).The $\chi 2=3.19, df=4, p=0.525$.There was no significant difference between those households' that were involved in PFM and those who were not.

The study also revealed (Table : 4.21) that those households currently owning the land which they are now occupying and was through inheritance represented 62.3% of the households that were not participating in PFM. Those households who have purchased the land they are now staying in and were not participating at 13%.It was also revealed that 7.8% of the respondent had just rented the land they were staying in and were also not participating in PFM. Those who had temporary use of the forest were not participating at 1.3%. Land was an important factor of production for the respondents in Keiyo North Sub County and they were using it extensively to achieve their aims.$\chi 2=5.3$, df=6, p=0.504.

The farms can also be managed technically through the use of mechanization, fertilizers and certified seeds which results in high crop yields

Table: 4.21 participation in community forest management * status of the land ownershi

	Status of the ownership							
	inherited	purchased	rented	gift	newly occupied	squatted	temporary free use	Total

participation in community forest management	.00	Count	**48**	**10**	**6**	**4**	**1**	**7**	**1**	**77**
		% within participation in community forest management	**62.3%**	**13.0%**	**7.8%**	**5.2%**	**1.3%**	**9.1%**	**1.3%**	**100.0%**
		% within statusof the ownership	**51.1%**	**58.8%**	**46.2%**	**57.1%**	**50.0%**	**87.5%**	**100.0%**	**54.2%**
	participation	Count	**46**	**7**	**7**	**3**	**1**	**1**	**0**	**65**
		% within participation in community forest management	**70.8%**	**10.8%**	**10.8%**	**4.6%**	**1.5%**	**1.5%**	**.0%**	**100.0%**
		% within statusof the ownership	**48.9%**	**41.2%**	**53.8%**	**42.9%**	**50.0%**	**12.5%**	**.0%**	**45.8%**
Total		Count	**94**	**17**	**13**	**7**	**2**	**8**	**1**	**142**
		% within participation in community forest management	**66.2%**	**12.0%**	**9.2%**	**4.9%**	**1.4%**	**5.6%**	**.7%**	**100.0%**
		% within statusof the ownership	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source field survey data June-July 2013

4.2.9 Participation and distance to the forest

The study showed that (Table: 4.22) out of the households that were not active in PFM, 28.6% were coming from a distance of less than ½ km from the centre of the village, 39% from a distance of one kilometer, 2.6% from a of 1.5km, 10.4% from a distance 2km, and 19.5% from a distance of over 2.5km.

Table: 4.22 participation in community forest management * distance to the forest

			distance to the forest					
			less than .5km	one kilometre	1.5km	2.0km	2.5km>	Total
participation in community forest management	.00	Count	**22**	**30**	**2**	**8**	**15**	**77**
		% within participation in community forest management	**28.6%**	**39.0%**	**2.6%**	**10.4%**	**19.5%**	**100.0%**
		% within distance to the forest	**56.4%**	**68.2%**	**40.0%**	**47.1%**	**40.5%**	**54.2%**
	participation	Count	**17**	**14**	**3**	**9**	**22**	**65**
		% within participation in community forest management	**26.2%**	**21.5%**	**4.6%**	**13.8%**	**33.8%**	**100.0%**
		% within distance to the forest	**43.6%**	**31.8%**	**60.0%**	**52.9%**	**59.5%**	**45.8%**
Total		Count	**39**	**44**	**5**	**17**	**37**	**142**
		% within participation in community forest management	**27.5%**	**31.0%**	**3.5%**	**12.0%**	**26.1%**	**100.0%**
		% within distance to the forest	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source field survey data June-July 2013

In households that were involved in PFM, 26.2% were from a distance of 500 m, 21.5% from a distance of one km, and 4.6% from a distance of 1.5km 13.8% from a distance of 2km and 33.8% from a distance of more than 2.5km.In the study,$\chi 2=7.079$,df=4,p=0.132.

4.2.10 Participation and distance to an urban centre

When the distance from the centre of the village was compared to those who were involved and not involved in PFM (See Table : 4.23), it was found that for those who were not participating 26% were within a distance of 1/2km, 44.2% within 1km, 3.9% within 1.5km and 10.5% within 2.5km.

4.23participation in community forest management * distance to an urban centre

			distance to an urban centre					
			less than .5km	one kilometre	1.5kilometre	2kilometre	2.5km >	Total
participation in community forest management	.00	Count	**20**	**34**	**3**	**12**	**8**	**77**
		% within participation in community forest management	**26.0%**	**44.2%**	**3.9%**	**15.6%**	**10.4%**	**100.0%**
		% within distance to an urban centre	**57.1%**	**59.6%**	**42.9%**	**42.9%**	**53.3%**	**54.2%**
	participation	Count	**15**	**23**	**4**	**16**	**7**	**65**
		% within participation in community forest management	**23.1%**	**35.4%**	**6.2%**	**24.6%**	**10.8%**	**100.0%**
		% within distance to an urban centre	**42.9%**	**40.4%**	**57.1%**	**57.1%**	**46.7%**	**45.8%**
Total		Count	**35**	**57**	**7**	**28**	**15**	**142**
		% within participation in community forest management	**24.6%**	**40.1%**	**4.9%**	**19.7%**	**10.6%**	**100.0%**
		% within distance to an urban centre	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source field survey data June-July 2013

For those households that were participating 23.4% were from a distance of 1/2km, 35.9% from 1km, 6.3% from 1.5km, 23.4% from 2km, 10.9% more 2.5km.

Distance the forest adjacent households were staying away from the centre of the village to an urban centre also played some important role in determining the level of participation in forest management. In the study it was revealed that 66.8% of the households that were staying between 0 and 1km were in the non-participating category .26% stayed between 1km and 2.5km.

For households that were participating 58.5% were staying between 0 and 1km from the centre of the village while 35.4% were staying between 2km and 2.5km.In the study $\chi 2=2.2,df=4,p=0.699$.There was no significant differences for the two categories of households when to distance to an urban centre.

4.2.11 Participation and ownership of livestock (cows)

Having or not having (livestock) cows (see Table: 4.24) was critical for the economic well being of the many of the forest adjacent households Out of the households who were not taking part in PFM, 39% were not having cows while 61% were having cows. In households that were participating 9.2% were not having cows while 90.8% owned cows. Keeping of cows is an integral part of economic and social life of the forest adjacent communities of kessup and Elgeyo Forest Stations. In the study $\chi 2=16.462,df=1,p=0$.There was a significant difference for the two categories.

Table: 4.24 participation in community forest management * ownership of livestock

			ownership of livestock		
			not having	having cows	Total
participation in community forest management	.00	Count	**30**	**47**	**77**
		% within participation in community forest management	**39.0%**	**61.0%**	**100.0%**
		% within ownership of cows	**83.3%**	**44.3%**	**54.2%**
	participation	Count	**6**	**59**	**65**
		% within participation in community forest management	**9.2%**	**90.8%**	**100.0%**
		% within ownership of cows	**16.7%**	**55.7%**	**45.8%**
Total		Count	**36**	**106**	**142**
		% within participation in community forest management	**25.4%**	**74.6%**	**100.0%**
		% within ownership of cows	**100.0%**	**100.0%**	**100.0%**

Source field survey data June-July 2013

4.2.12 Participation and wealth status

In non-participating households in PFM 36.4% were found to be poor, 62.3% were found to be middle income earners, while only 1.3% were found to be rich. In households that were participating 24.6% were found to be poor, 70.8% were found to be middle income earners, while 4.3% were found to be rich (see Table:4.25). The wealth status of the households was classified into poor, middle income and the rich.

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Table 4.25 participation in community forest management * wealth status of the household

			wealth status of the household			
			poor(grass thatched house)	medium(timber walled house)	rich permanent house	Total
participation in community forest management	.00	Count	**28**	**48**	**1**	**77**
		% within participation in community forest management	**36.4%**	**62.3%**	**1.3%**	**100.0%**
		% within wealth status of the household	**63.6%**	**51.1%**	**25.0%**	**54.2%**
	participation	Count	**16**	**46**	**3**	**65**
		% within participation in community forest management	**24.6%**	**70.8%**	**4.6%**	**100.0%**
		% within weailth status of the household	**36.4%**	**48.9%**	**75.0%**	**45.8%**
Total		Count	**44**	**94**	**4**	**142**
		% within participation in community forest management	**31.0%**	**66.2%**	**2.8%**	**100.0%**
		% within weailth status of the household	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source field survey data June-July 2013

Those who were said to be poor were identified as those who were staying in grass thatched houses, those who were middle income were noted by the fact they were staying in timber walled houses and the rich were identified by the permanent houses they had built and staying in.

In the study 36.4% of the households who were identified as poor were also non-participating in PFM, 62.3% of the respondents who were identified as middle income were also not participating in PFM and 1.3% of the respondents who were rich were also not participating. The study showed that 24.6% of the poor households were participating, 70.8% of the middle incomes were also participating and 4.6% of the rich were also participating in PFM.There was no significant difference in participation among the poor, middle and rich households ‘in the area. $\chi 2=3.325$, df=2, p=0.194.

4.2.13 Participation and forest benefits

Forest benefits (see Table: 4.26) remained a major incentive for the forest adjacent communities to continue taking an active role in participatory forest management. 16.9% 0f the households that were participating in PFM said they are benefitting by getting hired by the KFS whenever vacancies for casual employment for carrying various forest activities are announced for placement.13.8% said they were being allowed to extract numerous forest products the important ones being firewood and poles for house construction. 16.9% saw improved infrastructure such as roads and foot bridges as benefits from being in PFM.24.6% of the respondents said they were benefitting by getting additional open forest land to grow their own crops under the PELIS system of plantation establishment.

16.9% saw an improved grazing area for their domestic animals as there was better management of the pasture areas in the forest for their animals.10.8% of the participants said they saw reduced levels of forest destruction and this was quite encouraging for the sustainability of the forest.In the study results showed that $\chi 2=4$,df=4,p=0.394.

Table :4.26 participation in community forest management * main household forest benefits

			main household forest benefits						
			casual employment	extraction of forest products	improved infrastructure	extra land for cultivation	improved grazing areas	reduced forest destruction	Total
participation in community forest management	.00	Count	**15**	**18**	**7**	**18**	**8**	**11**	**77**
		% within participation in community forest management	**19.5%**	**23.4%**	**9.1%**	**23.4%**	**10.4%**	**14.3%**	**1.0E2 %**
		% within main household forest benefits	**57.7%**	**66.7%**	**38.9%**	**52.9%**	**42.1%**	**61.1%**	**54.2%**
	participation	Count	**11**	**9**	**11**	**16**	**11**	**7**	**65**
		% within participation in community forest management	**16.9%**	**13.8%**	**16.9%**	**24.6%**	**16.9%**	**10.8%**	**1.0E2 %**
		% within main household forest benefits	**42.3%**	**33.3%**	**61.1%**	**47.1%**	**57.9%**	**38.9%**	**45.8%**
Total		Count	**26**	**27**	**18**	**34**	**19**	**18**	**142**
		% within participation in community forest management	**18.3%**	**19.0%**	**12.7%**	**23.9%**	**13.4%**	**12.7%**	**1.0E2 %**
		% within main household forest benefits	**1.0E2%**	**1.0E2%**	**1.0E2 %**	**1.0E2%**	**1.0E2 %**	**1.0E2%**	**1.0E2 %**

4.2.14 Participation and main food crop grown in the area

The main food crop grown for those households that are participating and those who are non-participating is maize which is grown in 93.8% of the households and 94.8% of the households respectively. Households that are not participating are also not growing any vegetables while 1.5% of the households that are participating are vegetables to supplement the growing of the main food crop which is maize (see Table 4.27).

Table 4.27 participation in community forest management * main food crop grown

			main food crop grown			
			maize	beans	vegeTables	Total
participation in community forest management	.00	Count	**73**	**4**	**0**	**77**
		% within participation in community forest management	**94.8%**	**5.2%**	**.0%**	**100.0%**
		% within main food grown	**54.5%**	**57.1%**	**.0%**	**54.2%**
	participation	Count	**61**	**3**	**1**	**65**
		% within participation in community forest management	**93.8%**	**4.6%**	**1.5%**	**100.0%**
		% within main food grown	**45.5%**	**42.9%**	**100.0%**	**45.8%**
Total		Count	**134**	**7**	**1**	**142**
		% within participation in community forest management	**94.4%**	**4.9%**	**.7%**	**100.0%**
		% within main food grown	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source field survey data June-July 2013

4.3 FOREST CONDITIONS AND PARTICIPATION

Forest conditions are important they to some extend influence the benefits households receive from participating in forest management. The forest conditions discussed here are the forest degradation and the slope of the forest.

4.3.1 Forest degradation

The results of the study (Table 4.28) showed that 65.5% of the respondents confirmed that there was little degradation of the forest 28.2% confirmed that there was moderate degradation, 6.3% of the respondents said there was extensive degradation of the forest.

In the study 67.5% of the non-participating households mentioned little degradation of the forest, 26% said there was moderate degradation while 6.5% mentioned there was extensive degradation of the forest. In participating households 63.1% of the households mentioned little degradation, 30.8% mentioned moderate degradation while 6.2% mentioned extensive degradation (see Table: 4.29).

Table: 4.28 Showing Perception of the respondents on the level of forest degradation.

Forest degradation	Frequency	Percent
little degradation	94	65.5
moderate degradation	38	93.7
extensive degradation	10	6.3
Total	142	100.0

Source Field survey data June –July 2013

Forest degradation was observed when there was a visible and indiscriminate felling of stands of trees through legal and illegal means without deliberate efforts to replenish the stocks and this has remained so over a long period of time.

Table: 4.29 participation in community forest management * Perception of forest degradation.

			level of forest degradation			
			little degradation	moderate degradation	extensive degradation	Total
participation in community forest management	.00	Count	**52**	**20**	**5**	**77**
		% within participation in community forest management	**67.5%**	**26.0%**	**6.5%**	**100.0%**
		% within level of forest degradation	**55.9%**	**50.0%**	**55.6%**	**54.2%**
	participation	Count	**41**	**20**	**4**	**65**
		% within participation in community forest management	**63.1%**	**30.8%**	**6.2%**	**100.0%**
		% within level of forest degradation	**44.1%**	**50.0%**	**44.4%**	**45.8%**
Total		Count	**93**	**40**	**9**	**142**
		% within participation in community forest management	**65.5%**	**28.2%**	**6.3%**	**100.0%**
		% within level of forest degradation	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source field survey data June-July 2013

In the study only 3.6% of the households' respondents said that the two forest blocks was degraded. While 68.1% of the respondents said that they saw little degradation. The study revealed that $\chi 2=0.401$, df=2,p=0.818.There was no significant differences for the two categories.

4.3.2 Slope of the forest

The results from the study (see Table 4.30) showed that 4.3% of the respondents said that the forest was flat, 15.5% said the forest was slightly flat, 62.7% said the forest had medium slope while 16.9% of the respondents said the forest had a very steep slope

Table 4.30: Perception of the respondents on the Slope of the forest

Slope of the forest	Frequency	Percent
flat	6	4.2
slightly flat	22	15.5
medium	89	62.7
steep slope	24	16.9
very steep slope	1	.7
Total	142	100.0

Source field survey data June-July 2013

When the different categories of the slopes the forests (see Table : 4.31) was compared to those households that either participating or not in PFM, the study revealed the following information.

In the study among the non-participating households 6.5% said the forest was flat, 58.4% said that the forest had a medium gradient and 0% said the forest had a very steep gradient. For participating households 1.5% said that the forest was flat, 67.7% said the forest was medium in gradient while 1.5% said the forest was very steep.

In the study $\chi 2=4.08, df=4, p=0.394$ and therefore no significant differencesfor the two categories.

Table: 4.31 showing participation in community forest management * topography of the forest .

			topography of the forest					
			flat	slightly flat	medium	steep slope	very steep slope	Total
participation in community forest management	.00	Count	**5**	**13**	**45**	**14**	**0**	**77**
		% within participation in community forest management	**6.5%**	**16.9%**	**58.4%**	**18.2%**	**.0%**	**100.0 %**
		% within topography of the forest	**83.3%**	**59.1%**	**50.6%**	**58.3%**	**.0%**	**54.2%**
	participation	Count	**1**	**9**	**44**	**10**	**1**	**65**
		% within participation in community forest management	**1.5%**	**13.8%**	**67.7%**	**15.4%**	**1.5%**	**100.0 %**
		% within topography of the forest	**16.7%**	**40.9%**	**49.4%**	**41.7%**	**100.0%**	**45.8%**
Total		Count	**6**	**22**	**89**	**24**	**1**	**142**
		% within participation in community forest management	**4.2%**	**15.5%**	**62.7%**	**16.9%**	**.7%**	**100.0 %**
		% within topography of the forest	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0 %**

Source field survey data June-July 2013

4.4 Determinants of households' participation in forestry management

The data collected from the survey was then subjected to a binary logistic regression model to help come up with determinants that determine the decisions households make when it came to participatory forest management.). To participate or not to participate was the dependent variable and from it a number of other independent variables listed were run in the binary regression analysis.

Table 4.32 Binary regression model on households' in Participatory forest management

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	numbgrop	1.989	.383	26.938	1	.000	7.308
	owncow	2.319	.669	12.007	1	.001	10.163
	Constant	-2.994	.677	19.578	1	.000	.050

a. Variable(s) entered on step 1: numbgrop, owncow.

Source field survey data: June-July 2013

The Logistic regression shows that there are only 2 significant variables i.e. numbgrop and owncow.

CHAPTER FIVE

DISCUSSIONS OF THE STUDY

5.1 Characteristics of Participating Households

5. 1 .1 Participation and Sex of the respondents

This study has shown that more men than women were active in PFM. This confirm the traditional role of male dominance in the heading of the households. The respondent was usually the senior most individual (man) in the house. These findings were found to be consistent with the studies done by (Phiri 2009) who found more men than women to being involved in PFM in Zambia. Forestry activities by their very nature are at times located in remote and far flung areas yet it is expected that they have implemented and supervised by a community. Therefore in order to carry out these activities it is the men are the ones who are recommended by the communities to go such areas leaving behind the women and children to take of their homesteads. This also confirms the traditionally role in many African societies where there has been a tendency for men to dominate in all spheres of live and Keiyo North Sub County is no exception.

5.1.2 Participation and Age of the respondents

The age bracket 36-46 years was the most active in PFM. This was the age bracket that was burdened with the heavy responsibility of taking care of their families and also their aging parents. They therefore were looking for possible economic avenues that could improve on their incomes as well as in food security and in the process have something to take home and will be used in supporting their families. They saw PFM as an avenue where they could benefit greatly hence their active involvement in many of the PFM programs.

The age group 26- 35 was also fairly active but not as the 36-46 years this could be explained by the age bracket not having yet attained the burdensome age bracket in

terms many social and economic responsibilities. By voluntarily joining the PFM initiatives they are just preparing in anticipation for the added household responsibilities.

5.1.3 Participation and Marital status

The married from both the polygamous and monogamous marriages participated in PFM. However from the study households from monogamous marriages participated more than from polygamous marriages. The monogamous marriages were more cohesive with a unity of purpose and therefore participated in PFM knowing full well what their objectives for being in the PFM for their families back at home were. This was to bring extra income and food that they hoped to get from engaging in PFM.

. In traditional African context the marital status of households has some value in a society and influences how they are able to exploit the natural resource that is found within their environment (Fisher *et al* 2010). Households that appear to have stable marriages are treated with respect and are generally allowed to harness the existing natural resource. Marital status also creates household specific needs and this also has an influence on how they are going to be involved in PFM. The study has however not been able to establish as noted elsewhere that the women who are characterized as poor (singles and widowed) are more dependent than other community members on average on the local forest resource (FAO 2002).

5.1.4 Participation and households' head Level of education

The study revealed that the forest adjacent community of the Kessup and Elgeyo forest block was a fairly literate society with only 5.6% of the households having not attended any formal school and is therefore not able to read and write. The study also revealed that it is this small percentage that was also very active in PFM. The fact that they have not been able to receive good education has denied them the opportunity to look for employment that requires skilled labour.However they are making up for lack of education through participating in conservation efforts which have lasting impacts to mankind since they have time and the motivation through forest benefits.

However those households' where the household head had tertiary level of education also showed high levels of participation in PFM. This shows how the impact of education has had on participation for it allows them to see the need to conserve a forest for them to continue enjoying the goods and services it is continuing to provide them with.

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5.1.5 Participation and household size

The study revealed that those households' with large numbers of occupants could afford to participate more in forestry activities(Adhikari 2004). As family size increases, the probability of being high level participant in PFM also increases. This is occasioned by the fact that large family members have a greater demand for forest products such as firewood, cutting grass and timber. The larger household size means that they have extra pool of labor which can be committed to PFM and which cannot compromise the overall labor demand for other households' activities. This result is in line with Ogada (2012) that households with large family size have labour time to devote to the activities of community forest management

5.2 Characteristics of Non-Participating Households in PFM

5.2.1 Non participation and sex of the households

The study has shown that women are less active as compared to Men in PFM. This could be revealed by the fact that Women are in a subordinate position in terms of decision making within the household and even on many issues that are affecting them.

Women are mainly responsible for household work, particularly if there are young children in the family who needed more care and attention. Apart from the domestic chores which are their main occupation, women also participate in agricultural activities, gathering and collection of firewood and in petty business that support incomes from other activities which are done by their male counterparts. However in spite of the

females being actively involved in farming very few of them hold titles to those parcels of land (Phiri 2009). This may also be true to women who may be in formal employment who will still have to rely on their husbands to make final decisions on major purchases with heavy capital outlay they may wish to make from their earnings.

There could be a number of reasons that have limited the progress of women in decision making (Agarwal 2009). They could be the existing laws which do not say explicitly what should be the ratio of representation of the women in the CFA management committees, the traditional culture which provides no room for a woman to make decisions and the absence or weak community institutions which do not likely to encourage women to participate in community activities.
Women because of their busy domestic chores did not find time and therefore left it to their husbands to attend to PFM activities.

It has also been observed that participation of women in community-based programme activities is low, letting men dominate the decision-making processes (Godbole, 2002).

5.2.2 Nonparticipation and Age of the respondents

The study also revealed that those respondents who were 25 years and below had very low participation in PFM. This could be explained by the fact that they could be still in college or in school. They could also not be available in the area because as they may have moved to major towns in search of better employment opportunities that the villages are not able to offer.

The other reason that made the under 25 to be discouraged in PFM is that the older persons involved in PFM made unilateral decisions and this alienated the age group who felt that their inputs were seen to be of no consequence and therefore decided to keep off from engaging further in any activities .

This study also revealed that the age of the respondents has important bearing on the households' decision to be involved in PFM (Coulibaly et al 2011). The results of this

study confirm to the factor of age where the generally younger respondents were less involved in PFM.

The age group 47-57 years is also not very active in PFM as can be revealed from the study.The age group 58 years and above is lowly represented in PFM this is because they are old and have less energy and strength to take the strenuous works that are the hallmarks of many PFM activities.

5.2.3 Non Participation and Marital status

The widowed and the separated households were less active in PFM yet this is a vulnerable group that is disadvantaged when it comes to access of the forest benefits that is being provided in a more structured way under the PFM initiatives. They may have lost their loved ones and partners who could have encouraged them to take a more active role in PFM. They may also not have sufficient time to be involved with PFM as they could be involved with activities that they may find to be more beneficial and rewarding as compared to returns they are getting when having them to devote their spent time in the PFM activities.

The singles who are mostly the unmarried youth may also not be active as they could be more involved with other non-forest activities elsewhere or they could be in school and colleges.

5.2.4 Non Participation and households' level of education

The study revealed that the forest adjacent community of the Kessup and Elgeyo forest block was a fairly literate society with only 5.6% of the households having not attended any formal school and is therefore not able to read and write. However in spite of the households' in the area having attained high literacy levels which would translate to increased awareness on forest conservation their participation in PFM is still low at 45.8% for participating households.

The study also revealed that there was low participation for households where the households' head either never completed primary or secondary level of education.

Even though there is low participation in PFM in Keiyo North Sub County, earlier studies confirm the fact that the product of education is to equip the members of the households' with the necessary tools to become effective in harnessing the socio-economic opportunity available. Once they have acquired new skills they can very easily adapt to the ever fast changing environmental and economic circumstances (Sudarmadi et al 2001). Investment in education widens the horizons making it easier for people to take advantage of new opportunities and helping them to participate in social and economic life. This confirms the state in keiyo where the educated in Keiyo North Sub County have participated in activities that have offered far much better returns than those in forestry such as farming and in business

5.2.5 Nonparticipation and household size

It was revealed that households with less than 5 members did not participate fully in PFM compared to households with more than five occupants. .

Among the rural communities, the top priority is food security. Households with fewer occupants therefore will prioritize food security as a key issue rather than spending time and resources to PFM activities(Adhikari2004).

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5.3 Social factors influencing household participation in PFM

5.3.1 Participation and membership in a social group

The study went further to show that out of the households' that were not participating in PFM, 88.3% were not members of any social group within that area.

Being a member of a social group becomes more beneficial to households' as it will it lawfully and rightfully lay claim to any forest resources opportunities that may be offered from different stakeholders Gootaet(2001). No other person or group of bodies can attempt and succeed in denying it access to what it considers to shares of benefits that are within the structures of the social group. By deliberately or unknowingly failing to become members of social group households' miserably and regrettably fail to take advantage of the many opportunities offered through the social schemes. They are fairly cheap for the unit of purchase of bundles of the benefit for the members in a social group in comparison to households operating individually and not being members of a recognized social group. The members in a social group as such say they enjoy economies of scale. These non-participating households in any social group therefore end up incurring higher costs in order to get benefits which they could have easily benefitted from had they been members of a social group.

Being in a social group is therefore an asset which each household should endeavor to belong to with the hope that they reap from the relations of trust, reciprocity and exchanges, common rules. There are also norms and sanctions, and connections and networks that are known to exist in a social group.

The low households participation in social groups and also in the PFM can be explained by the fact that the government agencies responsible for community mobilization have not done enough awareness campaigns for the households to become recruited and active as members building that the development agencies can achieve high levels of cooperation from the forest adjacent households'.

Once the cooperation has been achieved it will become very easy for the communities and the forest agency to protect the natural resource (forest) at much reduced operational costs.

The study also observed that there was a similar trend in community participation in PFM and also in being members of a social group in Keiyo North Sub County. Both were facing the challenges of low community involvement in participation from the forest adjacent communities.

5.3.2 Households' level of participation in PFM

In the study households that were not participating were found to be more than the households that were participating in PFM. This large number of non-participating households' that are adjacent to a forest that was categorized as a high productive forest rich in vast forest resources was indeed quite contrary to the normal thinking in forest management and conservation. This is a forest that has for many years has been used in many ways by the forest adjacent community to which they have and continue to enjoy a considerable amount of benefits. Because of this, it was to be the expected that the results from this study were to have found more members of the forest adjacent households' participation in PFM. They were getting so much benefit from the forest and its products and this was seen a key element for the households to have a fulcrum for them to be more actively engaged and participate in PFM. Apparently this was not the case and there were perceptions of low levels households' participation in PFM.

A number of reasons have been put forward to explain why the households are not participating in PFM as should be expected of them.

The guidelines for the implementation of the PFM in a Forest Stations were released by the K.F.S through a publication of a handbook which a forest manager in a given forest blocks are supposed to use when working on PFM initiatives with the forest adjacent communities. However the released guidelines are seemingly not being keenly followed by the forest mangers because they seem not to understand the management content and practice that is required to have a successful PFM in their respective Forest Stations. As a result of this lack of understanding that is inherent among the forest officers, they could not effectively be in a very strong position whenever they are taken to task in community forums to explain a very simple clear language be able to disseminate the information

about it to other stakeholders including the forest adjacent households whom they are supposed to be implementing PFM with.

This had a negative effect in terms of PFM social appeals rankings in the community resulting in lower levels on the rate of uptake of implementation of PFM as the forest adjacent community are known to associate themselves with and follow community institutions that have visible, vibrant programs that are able to positively empathize with them and are up and running interaction with the community from household to household.PFM because of not being fully understood by the forest mangers has had a low penetration rate among the households' at the grassroots level.PFM has not reached the level where it can be appreciated by the community as one of the very important local institutions that can exert impact and influence decisions in the households'. The forest officers at the county level should therefore try to ensure that there is general awareness among its staff at the station and patrol beats that they have acquired the necessary skills such as public relations and resource utilization to implement the PFM programs. This kind of interaction would help in narrowing down the gap that exists between the theoretical understanding of PFM and the practice on the ground.

There is also a lack of active engagement between the local communities and the community PFM officials who hold the key responsibility of ensuring that they have fully brought the forest adjacent communities on board and are walking with them side by side in order for them to successfully implement the strategies and work plans that have been developed by the various stakeholders.

Although the forest managers have skills in forest extension, the content of the training was mainly to be used towards targeting households' whose neighborhoods had no or close proximity to a given gazzetted government forest. The orientation and thinking of these forest managers was therefore on how to meet the immediate needs of a conventional farmer through the tree planting efforts in his farm. This made them to be poorly equipped when it came to matters of handling an adjacent community living close to a forest. It was therefore a challenge for the forest manager to take note of the forest

concerns of households that was bordering a forest block since he was deficient in the necessary skills required to address such kind of a scenario. Managing the forest adjacent communities effectively under PFM requires acquisition of new skills which the forest managers are currently struggling to get through learning and action.

The new forest extension skills would promote participatory and multi-stakeholder approaches to enhance contribution of forest resources to sustain land use and livelihood securities. (Anyonge 2002)

5.3.3 Composition of the local CFA

A significant factor leading to the low community participation in PFM is the composition of the local community forest association (CFA).

Much as the officials of C.F.A were duly elected at the inception of the PFM process they do not seem to enjoy the full support of the forest adjacent communities and in some occasions they are faced with resistance from the locals. They therefore in most occasions do not go out of their way to explain to them on the on goings at the PFM front. They do not seem to have ready and convincing answers to the hard and difficult questions that the forest adjacent households are bound to ask them. The information is therefore disseminated to a select few loyal members of the group who may not have the patience and patriotism to pass it on to the rest of the locals. As a result large sections of the community remain to great extent uninformed causing serious consequences for the implemented of PFM. The uninformed group can easily hinder any PFM initiative created by the officials however good its intentions could be Grootaet (2001).

5.4 Economic factors that influence households participation in PFM

5.4.1 Participation and households' head main occupation

The major occupation of the households' head that was common to most of the communities living around Elgeyo and Kessup forest blocks where they could at least earn a living and sustain their livelihood was farming. The other occupations for the forest

adjacent households' were involved in included formal and permanent employment, temporal formal employment, honey gatherers and the rest were generally unemployed.

Farming was ranked high among the community because it guaranteed them some cash income for the better part of the year and it also helped them in providing food security at household level which was the real objective of many of the respondents (Blufftone et al 2014).

The good soils coupled with a good climate which guaranteed adequate rainfall throughout the year and an enterprising forest adjacent community with ready markets for the commodities key incentive for the locals to choose farming as an occupation. This encouraged farming as it allowed farmers not to incur huge farming costs and yet at the end of the day still make a tidy sum of profit from their farming efforts.

The study revealed that there were very few people who were unemployed in the study area. This could be because most of the households were gainfully involved in farming which pre-occupied them most for the better part of the year. The percentage of households who depended on the forest for honey was small and this could be explained by the fact that many of the households could have shifted their attention to farming which was offering better returns. Honey gathering was also a seasonal activity and it was only being undertaken by those households' who had the skills and knowledge in honey collection in the forest. The forests maybe was also not rich in a colony of bees and therefore the potential to produce honey dropped significantly with time making the households to shift to other occupations that are having higher yields with reasonable returns for all the efforts they are making.

The households that were involved in small trade could be doing it not as the only the occupation they depend on but to either to support incomes they are getting from formal employment or from farming activities.

The study revealed that out of the non-participating households in PFM 67.5% were farmers while for the participating households 70.8% were farmers. There was therefore no significant difference for those farmers who were participating and not participating in PFM. This could be explained by the fact there were weak institutions which could impose effective and efficient rules and regulations which could bound the households' to have eagerness and urge to continue taking an active and leading roles in PFM.

5.4.2 Participation of the households', land size and tenure rights

Land was an important factor of production for the respondents in Keiyo North Sub County and they were using it extensively to achieve their aims.

Because of its proximity to the former white highlands which were demarcated before independence and there has been an existing lands office since then, most of the residents living in the Sub County have made use of it and have been able to acquire individual freehold titles for the parcels of the land they are staying in. The farmers are therefore permanently settled in their farms doing their own businesses without the worry of being told to move out because of an ongoing land adjudication process. There are also a few households that were staying on a customary land and this was mainly on the eastern side of the two forest blocks which partially borders the Elgeyo escarpment which is an extension of the Great Rift Valley. A nearly secured land tenure for the forest adjacent households ensured that they participated in farming and livestock rearing activities in totality within their own farms in order to achieve maximum profits from their initial investments (Adhikari 2004) .This is also supported with easily access to credit borrowed from the local financial institutions to buy the seasonal farm inputs. They can easily access seasonal loans from the financial institutions by presenting the land titles certificates which are then used as collateral to secure the loans. The loans can be repaid from the proceeds they will be making from the farming ventures.

The farms can also be managed technically through the use of mechanization, fertilizers and certified seeds which results in high crop yields

However much as the lands have individual free titles most of the occupants are people who have inherited it from either their parents or relatives as the land has been to second or third generations. As the population increases this is bound to exert pressure on existing land for subdivisions as it gets small in size. The effects of these land subdivisions are likely to spill over to the neighboring forest in search of the forest goods and services. The pressures will be in the form of seeking for extra land to grow the food crops and additional areas for grazing their livestock.

The fact that there are very few individuals who have bought land from their own savings explains that currently there are very few pressures on the existing land but this is likely to change soon as the land that is being inherited gets reducing in size for the younger generation who are more numerical in numbers and not all of them would be able to inherit the land as a result of the huge increase in population.

Customary land tenure is seen as an impediment of the households in development as they have limited rights to the land and as one household can be made to move out of the land they are now settled and relocate elsewhere when deemed necessary by an ongoing land adjudication process

The security of ownerships of the lands settled on by the forest adjacent communities has had a positive impact on tree growing among the forest adjacent communities. A casual check on the existing farms indicate that quite a number of farmers have embraced tree farming with the dominant tree species being eucalyptus, cypress and grevellea robusta. Tree farming is a long term investment in which the waiting period is quite long with no immediate returns but because of the secure land tenure and with the prospects of better payment in the end the households are patient enough and are willing to wait for that long before they can reap their profits. The trees are being planted either along the boundaries or farmers are setting aside part of their parcels of and establishing commercial woodlots.

The study revealed that 70.8% of the households that were involved in PFM were from those who had inherited land from their parents and had individual land titles transferred to them. The fact they have very fertile lands from which they can cultivate and earn a

decent living yet they are still very active in PFM is an indication that they know and understand how significant is the environmental and ecological services that the forest is offering them and that they will endeavor to do all the necessary activities that will be aimed at ensuring that the adjacent forest is protected for their own present and future prosperity of their society.

Only 10.8% of those who had purchased land were active in PFM. Being that they are still new and still getting used to the environment they need to spend more time with the older inhabitants of the area for them to know about the opportunities that PFM is likely to offer them as they go about doing their own businesses. Having only moved to the area in the recent past, they have not yet fully integrated with the locals whom they have found to be living in the area and are still trying to understand what activities they are involved in participatory forest management.

Those households that were on temporary occupation of the land did not participate in PFM as was revealed by the study. They seemed not interested in PFM as their occupation and use of the parcels of land was extremely short term to such an extent that it would cause to have any meaningful interaction with the PFM activities (Blufftone 2014). And since their continued stay in those parcels of land which they are now occupying was not guaranteed of further extensions of stay by the land owners they saw no need to be fully involved in PFM. This made them to focus on only what had brought them to do with the land without committing themselves with the PFM process. This could be either farming or looking for grass to graze their animals on. They then proceeded to maximize their time in those lands and recover part of the cost from the initial investment within the shortest time possible without having to participate in PFM.

5.4.3 Participation and distance to the forest

The study also revealed there were still some households who were staying closer to the forest and yet still were not participating in PFM. These are the households who still view the forest as open access resource where communal free grazing and collection of fuel wood is to be taken as the norm

The study also showed that even though there are some households who are staying very far away from the forest they still have an interest in forest conservation and are therefore actively participating in PFM. However as you moved further away from the forest the number of households that were participating in PFM was also reducing. This was also confirmed by (Josephine K. et al 2012)

This study shows that when the forests are of great value to the households that are living around it and despite some of them coming far away and need to travel long distances in order to reach its edge and get its benefits, they still see the need for them to be involved with the PFM initiatives. These households clearly understand the consequences of not being in PFM and just leaving the management of the forest to the very close and adjacent households' who in some instances will not take their interest into consideration when negotiating in any PFM agreements with the Kenya Forest Service.

5.4.4 Participation and distance to an urban centre

The households that are nearer the urban centre was taking advantage of it as it has market opportunity where they could easily sell their forest products like firewood and timber. As a consequence of the existence of the urban centre households created opportunities to make investments in the forestry sector with the hope that they will get maximum profits. In order for the households to make a more informed choice on participation they had to take a critical look at the costs involved: the cost (in terms of the distance covered in accessing the forest and extracting the forest products).

When the distances to an urban center were short (J .K Musyoki *et al* 2012) it greatly reduced the amount of time taken by the households to travel and to quickly reach the urban centre to sell their forest products. And this therefore allowed the households to make huge savings on time usage which could then be committed to other important activities. They also ended up incurring less expenses when transporting their forest products as the distances involved are fairly short. There was no significant difference

between participating and non-participating households with regard to the distance to an urban centre.(p value=.623)

The non-participating households that are staying closer to the urban markets have busy occupations that are located within the urban centre. They therefore do not have that extra time that they can use to participate in PFM. In some occasions because of their households' strategic location they find it easier to wait for the forest products to be brought to them rather than venture into the forest in order to process them and bring them to the urban centre. The existence of an urban centre located very close to a forest has the potential to increasing the rate of deforestation and degradation of the forest. This is because of the reducing supply and at the same time rising demand for the products which in most cases fetches higher prices. As a consequence of this two opposing factors, it will be forcing the forest adjacent households to resort to illegal means of extracting the forest products which result in impacting negatively on the forest very existence.

In the mean time the town will experience some short time economic growth which will reduce significantly once the forest resources gets completed depleted. The rate of forest degradation can be accelerated to a worse situation particular if the urban center near the forest is experiencing high levels of households' unemployment and the on-farm activities are offering poor returns as a result of drought and infertile soils.

5.4.5 Participation and ownership of livestock (cows)

This is a community which has traditionally and culturally has been both farmers as well as being pastoralist where the cow is extremely regarded as a status symbol of wealth. They keep the animals for dung to be used as farm manure, milk, meat and as a fast selling commodity that can easily be converted to cash to cope with emergencies such as abrupt illnesses. The animals also play an important role in addressing the nutrients recycling needs of the households' (J.K.Musyoki 2012 *et al*). In the study most of the sources of fodder for the cows was found to be through grazing in the forests which was being done through legal and illegal means by the households owning these animals. Since it was fairly

easy to find fodder for their cows and at very low costs the farmers continued to keep and even to acquire more of them

. However for those farmers who owned large tracts of land they were practicing pad-docking method of grazing animals and it was only during periods of severe drought that they could take their animals into the forest for grazing

There were a large number of households who were participating in PFM simply because it offered them the only reliable place where their cows could graze freely without undue interference and restrictions from the forest protection agency all the year round.

Because of the rising demand for forest lands for free areas for grazing of their animals which has been occasioned by the ever reducing farm sizes as a result of land subdivisions it was bound to be source of potential conflicts among the households as each try to wrestle control part of the forest to set aside for their animals. It is through participation by all the stakeholders that such conflicts can be averted and resolved amicably (Rishi 2007).

Through participation some households were not taking their animals to the forest for grazing and this was in a way helping the forest to regenerate and allow the young plantations to grow without the danger of them being wiped out through grazing.

In as much the communities participated in grazing there was also the potential of soil erosions caused by overgrazing in the forest. This compromised the quality of the water as they tend to have large quantities of soil particles which were coming from the loose and bare soils.

The risks of forest fires were also greatly reduced as there was very little forest litter which was highly combustible especially during the dry season. Much of the forest litter had been consumed by grazing cows and reduced to very low levels that are not a threat to causing a forest fire.

5.4.6 Participation and wealth status

The fact there is quite a proportion of non-participation in PFM in these different categories of households wealth can be explained by Kant and Beryl (2001) who said that when there is a significant heterogeneity in wealth status in a community and that is less dependent on the forest for their sustainability the forest is best left to a state agency (KFS) to manage.

The study showed that 24.6% of the poor households were participating, 70.8% of the middle incomes were also participating and 4.6% of the rich were also participating in PFM.

Generally majority of the households in the area were classified as middle income earners and they did not necessarily have to depend on the forest for their means of sustaining themselves. Though their houses are built of timber which is a major forest product, they sourced it from the local saw millers who were licensed by the Kenya Forest Service to operate in Kessup and Elgeyo Forest Stations.

It is also the middle income households who were participating more in PFM as compared to the other category of households. This is because they formed the bulk of the village elites and because of having attained some level of education they have a better understanding of the importance of forest conservation efforts. They can sway to the advantage of forest conservation efforts the outcome of important natural resources decisions in the village social groups. It also appears that the rich and the poor have not been fully integrated in the PFM process. This has been confirmed by (Kotey et al 1998, Amanor 1999, Obwubah et al 2001) who said that they are uncertain that the prevailing participatory approaches have been able to bring all the people into PFM.

5.4.7 Participation and forest benefits

Participatory Forest Management, when implemented effectively with the forest adjacent community, has delivered livelihood enhancing benefits as well as positive environmental outcomes(A.Agrawal and A.Angelson 2009) But its full potential is often hampered by the failure to devolve true authority to communities and by regulatory

environments that often discriminate against small producers with most community organizations falling in this category. Where this is the case, the benefits enjoyed by communities may be too limited to provide sufficient incentives for them to ensure that they are in a very organizational capacity to have sustainable forest management.
The households' that were non-participating and those that were participating in PFM were in agreement that they were in one way or the other benefiting from the adjacent forest resources that could be found in the two Forest Stations. They were also indirectly benefiting through having a clean air, good climate, and reduced soil erosions.

It was these benefits from the forests that were key elements for the households to have an active role in PFM(Warner K 2000). It offered them the leeway to increase their household incomes and in the end securing their livelihood which is critical in sustaining the PFM momentum among the forest adjacent communities. Through PFM, structured attempts have been made so that households could receive maximum benefits from the forests.

However the study revealed that despite being in the position of reaping maximum economic benefits from the forest household participation was still low. These forest benefits are majorly concentrated at supporting the subsistence level of income which includes the collecting firewood for women and honey collection for men. These activities have the net result of offering low returns on the cost of getting involved in PFM which therefore discourages households to hope to continue to expand and grow these activities. If the communities hope to get an increase of shares for their returns on their initial investment in PFM, then they need to venture into other highly benefiting forestry ventures such sawmilling. However because of the large capital outlay required coupled with the stringent rules for establishing such enterprises the households have been kept off from them and continued to receive little benefits. It was reported by (Schakleton et al 2002) that the expected benefits from PFM have not been achieved.

5.4.8 Participation and main food crop grown in the area

Maize was the main food crop grown among the forest adjacent communities. The crop was grown to provide food for the households thereby improving on the household food security. Farmers who owned sizeable parcels of land were growing the crop to provide food and also cash income by selling surplus harvest in the local market. The money they earned from the sale of the surplus would be used to meet household expenditures such as paying school fees and for paying medical costs in case one of the household members falls sick.

Since most of the households were meeting most of their basic needs from farming, they so no need for them to go to the forest to extract forest products to sell in order to meet their daily needs. These contributed significantly to the conservation of the forest as there were low levels of forest destruction by the households' (FAO 2011)

The small plots of land inside the forests that the households had been allocated to them to cultivate under the PELIS scheme was also an incentive for them to participate in PFM. The households' hoped that from farming inside the forest they were likely to increase the amount of food crop that they would be producing for sale and for consumption at household level beyond what they could have harvested without the scheme.

5.4.9 Participation and forest degradation

It was also observed that water sources like springs coming from the forest which are now having low quantities of water or have dried up completely courtesy of the felling down of trees especially from the natural indigenous forests

It was expected that with a forest blocks in the study were experiencing little degradation the forest adjacent communities would double up their efforts in conservation it by participating more in PFM. This has not been the case and a lot of forest conservation and protection activities have to a great extent been left to KFS to implement while the forest

adjacent community was being seen to be spectators. This seems to be a worrying trend bearing in mind that PFM had just not been in operation the area for long enough for the community to have come up with a conclusion that its main objective of conserving forest and improving of the rural livelihoods had been met and therefore there was no more need for the continuation of the PFM programs in the area.

The two forest blocks are high 'public good' value forests(Schreckensberg et al 2007) which serve both local and national interests and therefore the communities cannot just be left alone without being engaged in PFM simply because there is little degradation that is evidently not being seen for now.

5.4.10 Participation and Slope of the forest

The topography of a given forest is important in determining the ease with which households are able to access the forest products. In the study there was a general agreement between the non-participating and participating households that the forest was medium in gradient which made it easily accessible to extract forest products without much difficulty. The accessibility could be estimated by the amount of time they spent to reach the forest and also through the quantities of forest products especially they were able to carry in a given trip to the forest. It was seen that the households were spending less time to collect the forest products and they were also carrying a much heavier load of the products.

It was only in the eastern side of the forest where because of their proximity to the Kerio valley escarpment that they were having difficulties reaching the forest because of the rugged terrain.

The fact the forest is fairly accessible could cause the problem of common pool resources where anybody can get in and extract any amount of forest goods without due regard to other users(FAO 2011).

Towards this end this has not been observed for in spite of the easy to ascend and decent gradient the households have not to a very large extent made environmentally threatening and negative economic activities inside the forest.

This can be explained by the fact there exist a special relationship between the forest adjacent households and the forests. The households adjacent to the forest have been living with the forest for a very long time so they have a better knowledge of how much of the resources can be sustainably be extracted from the forest even though they are fully aware that it is not difficult to enter the forest.

The households may not be destroying the existing trees in the forest since they also have the same type of mature plantation trees in their farms which they can harvest and use without having to go to the forest.

The demand for specific forest products especially firewood which they are commonly using for cooking does not go beyond the consumption at the household level and nearly all households are able to get it in an easy way. This therefore offers no incentive for them to start engaging in the trade by selling in the neighboring urban centers where there could be demand for the forest products.

5.5 Recommendations and actions that encourage household participation in forest management

5.5.1 Actions that encourage household participation in PFM

The study reveals that women are fewer and under the dominance of men and as such are influenced by the work load and other cultural influences, which restricted them in many participatory activities in general and participatory forest management in particular. Therefore, concerned bodies should design strategies to enhance their level of participation in community forest management.

The study shows that singles ,widowed and divorced are not very active in PFM yet they are a vulnerable and disadvantaged group that should assisted so that they may feel to be

part of the larger society. Therefore concerned agencies should come up with actions that would encourage their participation.

Education is Key to successful forest conservation programs .The stakeholders should therefore take advantage of the high literacy levels that is prevalent in the study area and enlist the households' that the level of household participation is increased to beyond the current percentages.

The main occupation of the adjacent households is farming which preoccupies most of the time leaving them with time to get engaged in forest conservation issues. The forest agency should critical look the seasonality of the farming in the area so that they can find appropriate periods when they can succeed in bringing on board all the adjacent farming households'.

The topography of the forest as perceived by households' is not very hilly in most parts and therefore should be fairly accessible for them to take part in PFM. The households' should be encouraged to take a keen interest through regular meetings in PFM.

The family size per household is fairly large and this has been confirmed from the study to begin to have negative impacts that would not encourage households' participation to PFM. Though not a lot of forest degradation has been observed in the area the rising population is likely to increase on existing forest resources and urgent measures like massive campaigns need to put in place that would manage the household size.

The result of the study also shows that there is a lower spectrum of forest benefits that are being derived that would encourage the participation level of households to increase. To increase benefit from forest and achieve the objectives of community based forest management, households' participation in nursery, and plantation activities need to be encouraged. Plantation both at community and individual level particularly inside and outside the forest is paramount, which encourage users to establish their own woodlots at convenient places.

The land tenure system in the area is fairly established and the forest boundaries have been clearly marked. This has resulted in secure land system in the area which has to some extent lead to low participation in PFM. The state agency is encouraged to maintain the prevailing harmony between them and the households by inviting them to open public forums periodically where issues of forest boundaries are discussed.

5.5.2 Recommendations that would encourage household participation in PFM

The general population around the two forest blocks is categorized as a middle income group which to large extent can sustain itself economically without having to depend so much on the adjacent forest for their daily subsistence. The lower middle and upper middle aged group are the most productive and active members in any given human society. They are therefore recommended to be responsible for driving the PFM process by participating in forest patrols and monitoring and enforcing the rules set up by the CFA.

Moreover, promotion of people's participation in forest management requires concentrated efforts from the government, non-governmental organizations, academic institutions and business sectors. These may be through providing different subsidies like tax holidays, lease- free land, technical support and providing tree seeds and seedlings. The strengthening of these social groups through supporting the creation of good governance structures is recommended.

The ownership of livestock's especially dairy cows and the type of main food crops grown have positive signs and this indicate that the forest adjacent have livelihoods which they can depend on more than the forest. This two factors help to confirm that most of the forest adjacent households are in the middle income bracket. These two factors together with the number of social groups that a household belongs to are the

important determinants for the households to make a decision as whether they participate in PFM or not. They were all significant with all of them having positive coefficients.

This argument is consistent with the notion that the degree to which a diversity of association and population segments may participate in long-term conservation tends to be associated with higher income and low rates of poverty and income inequality. This is consistent with observations by others scholars like *Rainey et al (2003*) that structural pluralism influences the kind of economic organizations that locate and stay in a community, the diversified employment structure that it encourages and the types of poverty-oriented programs that the community can do **.**

The distance to the forest is fairly short for most of the forest adjacent households' and this means they easily get most of the forest products they may need with little difficulties. This encourages them to be part of PFM initiatives. The state should therefore take advantage and strive to bring all the households' to PFM through initiation of programs such ecotourism whose collected revenues will go a long way in supporting other PFM social programs such as offering bursaries to the needy.

CHAPTER SIX

SUMMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of the findings

There are a number of findings that arise from the study. First 80.3% of the households' respondents were men while 19.7% were female. This showed the traditional role of male dominance in the headship of the households. Second the majority of the respondents were in the age bracket of between 36 and 46 which was 37.3%. This was then followed by the age brackets 47 to 57.Thirdly a household size of 5-7 members was the most common at 30.3% followed by the membership of 3-5 members at 28.2%.Fourth when it came to households,' head level of education it was revealed that 50% of the respondents completed primary education, 26.8% completed secondary education,7% completed secondary education while 1.4% never completed secondary education. Fifth the study showed that 36.6% of the households were members of a social group. It was also revealed that 45.8% of the respondents were participating in PFM while 54.2% were not taking part in PFM. Sixth the findings from the study showed that 69% of the households' were practicing farming as their main occupation, 2.8% were honey gatherers, and 10.6% were in permanent and formal employment while 12% were operating as small business people in the area. Farming was also being undertaken by the households whose land size averaged 2 acres.

Seventh the study showed that the average distance from the center of the village to the edge of the forest was 1.78km. About 31% of the respondents were staying within a distance of 0.5km from the edge of the forest, while those households who were within a distance of 1.5km were the least represented at 3.5%.that 24.8% of the households were staying within a distance of less than half a kilometer from the centre of the village to an urban centre. About 40.1% were staying within a distance of one kilometer.4.9% were staying within a distance of 1.5 kilometer. Eighth about 31% of the households were ranked as poor, 66.2% were ranked as middle income earners while 2.8% of the

households were categorized as rich. 25.4% of the households were not having any cows while 74.6% of the respondents were keeping at least one cow .This suggests that the households have highly valued cows as a means of supporting their livelihoods. Ninth the study showed that the households benefited mostly from being able to be allocated forests parcels of land which (23.9%) in which they used for growing their own crops under the PELIS Land cultivation scheme. the main food crop grown in the area was maize at 94.4%. Other food crops that were grown were beans at 4.9% and vegetables at less than one percent.

For non-participating households58.4% said the slope of the forest was medium, 6.5% said the slope of the adjacent forest was flat, 16.9% said the slope was slightly flat, , 18.2% said the slope was steep, while 0% said it was too steep. In participating households, 67.7% of the respondents said the slope of the forest was medium 1.5% said the slope of the forest was flat, 13.8% said it was slightly flat, 15.4% said it was medium while 1.5% said it was a very steep slope. In the study 67.5% of the non-participating households mentioned little degradation of the forest, 26% said there was moderate degradation while 6.5% mentioned there was extensive degradation of the forest. In participating households 63.1% of the households mentioned little degradation, 30.8% mentioned moderate degradation while 6.2% mentioned extensive degradation.

Finally the determinants of participation depend on a number of household socio-economic characteristics. The results showed that age, a household member belonging to a social group; marital status, and wealth status of the household have all positive impacts to household participation in forest management.

6.2 Conclusions

Several conclusions have been made from this study. First, the households within the forest adjacent communities are the ones mainly involved in participatory forest management. Secondly, the household's demographic factors had some bearing on the way the households were making the decision to either participate or not participate in PFM. Members of the households who were middle aged (35 to 55 years of age) were

mostly involved in the PFM. The young people in the households were not very involved in participating in PFM as compared to the medium aged households who were the leading in terms of participation. The elderly were also not very active this was due the fact that the strenuous works in PFM demanded an energetic body to sustain it which they did not have.

Third, education level of the households head was also a key factor for the households' participation in PFM. Those households whose household heads never completed primary, secondary or university education participate less in PFM as compared to those who completed their education at whatever level.

Fourth, the study also revealed that households that were larger in size participated more in PFM in comparison to their counter parts that were fewer in number and could not have additional free labor which could be committed to PFM activities.

Fifth, it was shown from the study that PFM as it is dominated by the men .Women are mainly involved in small time activities like collection of firewood. The whole decision as to whether participate or not was made by men.

Finally, the factors that help increase household participation in PFM are household membership in a self-help group, household ownership of a cow (livestock) and the main type of food crop grown in an area.

6.3 Recommendations

Several recommendations follow from the study:

The Kenya Forest Service should continue with and increase the level of dissemination of information on a participatory forest management in Keiyo North Sub County. The Kenya Forest Service should continue with its efforts of protecting and conserving the forest as they hope to bring more community members into PFM. The KFS should take a more active role and encourage the formation of the self-help/social groups in the area as way of developing the necessary skills for household involvement in PFM.

NGO’s will be urged to come forward and support the involvement of the local communities in PFM and to lobby and advocate for community access, user rights and benefits.

REFERENCES

Adhikari,B 2005." *Poverty, Property Rights and collective action: Understanding the Distributive Aspects of common property Resource Management Environmental and Development Economics 10: 7-31*.

Adhikari, B,Di Falco,S,Loret J.C 2004. *"Household characteristics and forest Dependency. Evidence from common property forest management in Nepal" Ecological Economics 48(2), 245-259*

Agarwal Bina 2009 " *Gender and Forest conservation .The impact of womens participation in community forest governance" Ecological economicsVol 68 pg 2285-2795*

Agrawal Arun and Angelson Arild (2009) '*Using community forest management to achieve REDD+ goals" National forest policy bk chap 16 pg201to 203*.

Aggrawal&gupta 2005" *Decentralization and participation; The governance of common pool resources in Nepal's Terai" World development 33(7) 11101-1114*

Amanor K.S 1997 *Collaborative forest management of forest resources tenure and the domestic economy in Ghana. IRDC currents No. 15:10-16 Uppsala*

Amanor, K. S. (1999) "*Restructuring Land Relations in Ghana: Forest food chains, timber and rural livelihoods. Uppsala: Research Report 108, Nordiska Afrika institute*

Arnold JEM (*Can non-timber forest products match tropical forest conservation and development objectives? ecological economics Elsevier publications*

Anyonge C.H 2002, Forest extension: Equitable partnerships for sustainable multifunctional forestry. Paper prepared for IUFRO Division meeting valdina chile, 11th-17th November 2002

Baland J.M, Platteau J.P 1999" *The ambiguous impact of inequality on local resource management "World Development 27(5).773-778*.

Bardhan and Dayton-Johnson 2000.Heterogenity and commons management. Berkeley USA, University of California

.Behera, B., and Engel, S., 2006. *Who Forms Local Institutions? Levels of Household Participation in India's Joint Forest Management Program, ZEF – Discussion Papers On Development Policy No. 103, Center for Development Research, Bonn*

Belcher, B. (2005). *Forest product markets, forests and poverty reduction. International Forestry Review 7(2): 82-89.*

Ben-Akira M.E and lerman S.R(1985) *Discrete choice analysis: Theory and application to travel demand. MIT press, Cambridge ma.*

Bloomley T and Ramadhani H (2006) Going to Scale with participatory Forest Management early lesson from Tanzania. International review volume 8(1) 2006) pp93-100.

Blufftone R,Robinson E,2014 *"Forest Tenure Reform in Asia and Africa, local control for improved forest Management pg 200.Routledge books*.

Bryman, A.1988. *Combining quantitative and qualitative research. In: Bryman, A. (ed.) Quantity and quality in social research. pp. 125-156.*

Bromley, D.W. 1992 "The commons, Property and Common Property Regimes"pp.3-15.In: making the commons Work Theory, Pratice and Policy.D.W.Bromley(ed), Institute of Contemporary Studies, San Francisco.

Bwalya S. M(2004) "Rural livelihood and collective action in Joint forest management in Zambia" Ist draft master Thesis ,Department of environment and Natural resource economics: University of Rhodes Island U.S.A

Casely, D. J. & Kumar, K. 1998. *The collection, analysis and use of monitoring and evaluation data. The International Bank of Reconstruction and Development. Washington D.C. pp. 37-38.*

. Castrol, A. P. and Nielsen, E., 2001**.** *Indigenous People and Co-management: Implementations for Conflict Management. Environmental Science and Policy (4): 229-239.*

Census 2009, The Kenya national housing and population census. The Kenya bureau of statistics Volume 1.

Chakravarty, S.; Shukla, G.; Malla, S. and Suresh, C. P. 2008. *Farmer's rights in conserving plant biodiversity with special reference to North-east India. Journal Intellectual Property Rights13: 225-233.*

Chopra K.Kadekodi G.K&Murty N.N "Participatory Development People and Common Property resource New Delhi sage.

Coulibaly P,Savadogo P,Tigabu M 2011*"Factors influencing participation in forest management program in Burkina Faso(West Africa)" Elsevier Forest Policy and Economics*.

Crawford S.E.S and Ostrom E 1995. A grammar of institutions. American political science review 89(3), 582-600

. Dalal-Clayton, B., Dent, D., and Dubois, O., 2003. *Rural Planning in Developing Countries. Supporting Natural Resource Management and Sustainable Livelihoods. International Institute for Environment and Development (IIED), Earth scan Publications Ltd, London*

Dasgupta,p 1993. *An enquiry of into well-being and Destitution. Oxford Clarendon press.*

Draft Forest policy 2007, A Ministry of Environment and Natural resources Kenya publication.

Engels 2004. Designing institutions for sustainable resource management and environmental protection. Habilitation thesis. Faculty of Agriculture, University of Bonn

FAO 2011. The state of the Worlds land and Water for food and Agriculture: Managing systems at risk .EarthScan.

FAO, 2002. Forests and people. Twenty-five years of community forestry by J.E.M. Arnold. Rome.

FAO 1982. Conservation and development of tropical forest resources. FAO Forestry Paper No.37. FAO, Rome. 122.

Fabricius, C., 2004. The Fundamentals of Community-Based Natural Resource Management. *In* Fabricius, C., Koch, E., Magome, H. and Turner, S. (ed.). Rights, Resources and Rural Development: Community-Based Natural Resources Management in Southern Africa. Earth scan, London. pp 3-43

Faham, E., Rezvanfar, A. and Shamekhi, T. 2008*, "Analysis of factors influencing motivation of villagers' participation in activities of social forestry (the case of west Mazandaran)," American Journal of Agricultural and Biological Sciences 3(2).*
Fiszbein, A. (1997*). The emergence of local capacity: Lessons from Colombia. World Development, 25(7), 1029–1043*

Fischer M,Chaudbury M,Mccusker B 2010 *"Do Forests help rural households Adaopt to climate variability ".Evidence from southern Malawi. World development vl 38(p9 1241-1250).*

Forest act 2005 (legal gazette notice number 7) The Kenya government official gazette notices .Government printers' publication.

Godbole G. (2002) Joint forest Management and Gender, Working Paper No. 4 for the Engendering Eden Project, International Famine Centre, University College Cork, Ireland

Grootaet Christian 2001 *Social capital and participation in Everyday life.Routledge Amazon sellers.*

. Hasslam S.A Powell C7 turner J.C (2000).*Social identity, self-categorization and work motivation: Rethinking the contribution of the group to positive and sustainable organizational outcomes. Applied Psychology. An International review 2000,49(3) ,319-339.*

. Holde, S.Shiferaw,B Wik.M 1998 *"Property market imperfections and time preferences of relevance for environmental policy?" Environmental and Developmental Economics 3(1) 105-130*

Hobley M. 2005 "Where in the world is there pro-Poor forest policy and Tenure reform"Draft report to the World Bank Washington DC

. Holmes T.N 2007 Contribution of participatory Forest Management (PFM) Intervention to the Socio-economic development in the Southern Cape Forest. A retrospective approach Masters of Philosophy thesis (Social Science Methods) University of Stellen bosch South Africa.

Iyenger S, Shukla N.1999. Common property and land resources in India. Some issues on regeneration and management. Ahmedabad.India GIDR

. Jodha, N.S 1992 "Common property resources. A missing dimension of Development strategies "A Discussion paper 169.Washington D.C The World Bank.

Jodha N.S (1997) *Management of common property resources in selected dry areas of India In natural resource economic-theory and application in India edited by J.M Ker, D.K Marothis, K Sing C. Ramasany and W.B Bentley 339-361 New Delhi and Calculata. Oxford and IBH publishing companies.*

Josephine K.Musyoki,Kennedy K.Mutundu,Jayne Mugwe and Mbae Muchiri 2012, (Determinants of household deccisiom to join community forest associations : A case study of Kenya) IUFRO-FORNESSA congress 25-29 June 2012 Nairobi Kenya.

. Jumbe C.B.L and A.Angelson 2007. *Has forest co-management benefited the poor? Pages 171-199 in N .Dimello and the very poor editors, Political institutions and development failed expectations and renewed hope. Edward Edgar Chestaham U.K.*

. Kant S 2000 "A Dynamic Approach to forest regimes in Developing Economies" Ecological Economics 32(2): 287-300.

. Kant S and A. Berry .2001. *"A theoretical model of optimal forest resource regimes in developing countries." Journal of institutional and theoretical economics, (157), 331-55.*

. Kate Schreckenberg, Cecilia Luttrell, Pelin Zorlu and Catherine Moss Overseas Development Institute, 111 Westminster Bridge Road, London SE1 7JD,UK(.2007) A way out of poverty? A review of the impacts of PFM on livelihoods. 1st National Participatory Forest Management Conference, 6-8 June 2007 Kenya Forestry Research Institute (KEFRI) HQ, Muguga, Kenya

Kerapeletswe, C.K lorret, J.C 2002.'The likely effects of inequality and Globalization on sustainable management of common pool Resources". The case of Basarwa (Bushman) 0f Botswana. A paper presented at the Ninth biennial conference of the international association of the study of common property (I ASCP), Victoria Falls Zimbabwe

Kotey E. N. A., Francois J., Owusu J. G. K., Yeboah R., Amanor K. S., and Antwi, L. (1998) Falling into place. Ghana policy that works for forests and people series no 4, IIED, London, UK.

Leach M and Fairhead J (2001).*Plural perspectives and institutional Dynamics: Challenges for local Forest management.Int.J.Agricultural, Resources, Governance and Ecology1 (3) pp(223-242).*

. Lise W (2000) *Factors influencing people's participation in forest management India, Sociological economics 34,379-392.*

Mark P, Bettsy M, N.H Raridranth,M Gadgil1992" Field methods Manual Volume II Diagnostic Tools for supporting Joint forest management systems. University of California Berkely.

. Maskey, V., Gebremedhin, T.G. and Dalton, T.J. 2005. *"Social and Cultural Determinants of Collective Management of Community Forest in Nepal." Journal of Forest Economics, Vol 11, No 4 , pp 261- 274.*

Meinzen-Dick,R,Knox, A. 1999" collective Action,Property Rights And Devolution of Natural Resource Management: A conceptual Framework".Paper presented in international workshop on collective action, Property rights and devolution of Natural resource management.

Mugendi and Mugendi (1999*).Quantitative and Qualitative approaches to research Methodology*

Mukherjee, N. 1998. "Forest Management and Survival Needs: Community Experience in West Bengal." Economic and Political Weekly, Dec 9.

. Muneet S.E.T (2008) .Factors affecting adoption of Agro forestry farming system as a means of sustainable agricultural development and environmental conservation in arid areas of northern Koran state, Sudan. Saudi journal of biological sciences 15(1) 137-145

. Murali, R.S, Rao R.J Sudha, P. Sangetha, G Murthy, L. Kana Parindramath N.H 2003. *Evaluation studies of joint forest management in India social and Institution implications. International journal of environment and sustainable development vol 2 No. pp-35*

. Narazan-D (1996). *The contribution of peoples participation. Evidence from rural water supply projects. Environmental sustainable development, World Bank occasional paper series no1.*

Niewssiadomy, R.M 1998 .*Foundations of research,Appleton and Stranford Connecticut 269p.*

Ogada, M. (2012*). Forest Management Decentralization in Kenya: Effects on Household Farm Forestry Decisions in Kakamega; International Livestock Research Institute,*

Selected paper prepared for presentation at the International Association of Agricultural Economists (IAAE) Triennial Conference, Foz do Iguacu, Brazil, 2012.

. Olson G.K 2007. Forest and farming: an analysis of rural livelihood programs for poverty reduction in eastern Zambia M MSC Thesis University of Montana, Missoula Montana USA. Unpublished

Ostrom .E 2000. *Collective action and the evolution of social norms. Journal of economic perspective 14(3), 137-158*.

Owubah, C.E., Le Master, D.C., Bower, J.M., Lee J. G. (2001). *Forest Tenure Systems and Sustainable Forest Management: the case of Ghana. Forest Ecology and Management 149(2001), pp. 253-264*

Perez-Cirera v,Loret J.C 2005*." Power distribution, the external environment and common property forest Governance. A local user group model". Ecological Economics 59(3): 341-352*

Maxwell Phiri 2009 "Evaluation of the Performance of Joint Forest Management (JFM) Programme: Case of Dambwa Forest Reserve in Livingstone Sub County, Zambia " An Msc Thesis Stellenbosch University.

Pretty, J., & Ward, H. (1994*). Social Capital and the Environment. World Development, 29(2), 209-227.*

. Place F.1995. The role of land and tree tenure on adoption of agro forestry technologies in Zambia, Burundi, Uganda and Malawi, a summary and synthesis of land tenure, university of Wisconsin Madison USA

Rainy D.V; K.LRobinson; R.I Allen and R.D Christy (2003) *"Essential form of capital for sustainable community development" American journal of agricultural economics.85(3):pp708-715.*

. Reddy SRC, Chakravarty, S.P 199 "*Forest dependence and income distribution in a sustainable economy: Evidence from India. World Development 27(7); 1141-1149*

. Ribot, J. C. (2002). Democratic decentralization of natural resources: Institutionalizing popular participation. Washington, DC: World Resources Institute.

. Rishi P 2007 Joint Forest Management in India and attitudinal analysis of stakeholders resource conservation and recycling 51:345

Siegel, S. & Castellan, N. J. 1988. *Non-parametric statistics for the behavioural sciences. McGraw-Hill Book Company, New York. 400 p*.

Shackleton, S., Campbell, B., Wollenberg, E. and Edmounds, D., 2002. Devolution and Community Based Natural Resource Management: Creating Space for Local People to Participate and Benefit. Natural Resource Perspective. No. 76. Overseas Development Institute (ODI). London. UK.

. Sudarmadi, S., Suzuki, S., Kawada, T., Netti, H., Soemantri, S. & Tugaswati, A. T. 2001. A survey of perception, knowledge, awareness and attitude in regard to environmental problems in a sample of two different social groups in Jekarta, Indonesia. Environment, Development and Sustainability. 3:169-183.

Turner (1985).Social categorization and self concept: A social cognitive theory of group behavior

Varughese, G, Ostrom E 2001 *,"The contested role of heterogeneity in collective action. Some Evidence from community forestry in Nepal" World Development 29(5);747-765*

Warner K 2000. Forestry and sustainable livelihood. *Unasylva* 51:3–12.

Weinberger and Juthing J. (2001*) women participation in local organizations: conditions and constraints 29(8), 1391-1404.*

White, Andy and Martin, Alejandra (2002).Who owns Worlds forest? Forest Tenure and Public forests in Transition. Washington D.C Forest trends and center for international environmental Law.

White S (1996) Depoliticizing development: The uses and abuses of participation. Development in practice 6(c) 6-15.

World Bank *2006 "unlocking opportunities for forest dependant people in India" Main report; Volume 1 Agriculture and rural Development sector unit South Asia region.*

World Bank 1994, *The world Bank and Participation, operations policy development Washington D.C The World Bank.27. World Bank 1998 findings African region West Region West Africa COMMUNITY Based Natural resource Management. Findings report no.107.*

World Bank 1996. *The World Bank participation sourcebook. Washington, DC.*

World Bank 1998 *The World Bank participation sourcebook. Washington DC.*

World Bank 2002 *Sustaining forests, A Development strategy. Washington DC*

APPENDIX I:Questionnaire

Questionnaire for the study of determinants of households' participation in forest management in government forest in Keiyo North Sub County in Keiyo/ Marakwet County.

SECTION A: HOUSEHOLD CHARACTERISTICS

INTERVIEW DATE…….. FOREST STATION……VILLAGE/LOCT……..

No	Name of Household member	Relation to household Head (see Code)-A1	Sex: 1=male Female=2	Age (Years)	Years lived in the Village	Marital status-A2	Religion (see code A3)	Ever attended School 1=yes 0=no	Education-A4	Main Occupation (see code A5)	Secondary Occupation (see code)-A5
1											
2											
3											
4											
5.											
6.											

List all members of households and provide the relevant information on each

CODES

A1	A2	A3	A4	A5
1=head	1=single	1=catholic	1=none	1=Farmer
2= spouse	2=married monogamous	2=protestant	2=primary complete	2=honey gatherer
3=son	3=married polygamous	3=muslim	3=primary incomplete	3=permanent formal employment
4=daughter	4=divorced	4=SDA	4=Secondary complete	4=temporary formal employment
5=brother	5=separated	5= Anglican	5=secondary incomplete	5=unemployed
6=sister	6=widow	6=others (specify)	6=university complete	6=small scale trader
7=father			7=university incomplete	7=primary school pupil
8=mother			8=postgraduate	8=secondary school student
9=other farmily			9=Diploma college	9=businessman (large scale)
10=housemate			10=others specify	10=others specify

SECTION B: SOCIAL CHARACTERISTICS OF A GROUP

QEUSTION	RESPONSE		CODE
B1;Are you a member of any community based group?	Yes		
	no		
B2: If yes in B1 above How many?choose only one	1		
	2		
	3		
	4		
B3: What position do you hold in your community (choose only one)	Ordinary community member of a user group		
	Village elder		
	Committee member		
	Village elite		
B4: Are you participating in community forest management PFM?	yes		
	No		
B5: If yes what do you understand by PFM?	Community protecting forest		
	Joint management of forest		
	Community getting forest benefit		
	It is a project		
	I don't Know		
B6: How did you become aware of the existence of PFM	Through formal invitation from PFM members		
	Attending meetings called by KFS		
	My own interest in forest conservation		
	Heard community talking about PFM		
	I dint Know		

SECTION C: EXTRACTION OF NATURAL RESOURCES FROM THE FOREST

Now I would like to ask you some questions about your household collection of wood and other products from the forest

During the past year, did your household ever collect any [...] From the forest?		How often did members of your household make a trip to collect [..] in the past year	On an average trip how much [..] did your household collect?			On average how much[..] did your household sell of the total collected			How much [..]Did your household buy from other households or from the market?		
products	Yes=1 ,No=0	Numb of trips	Amount(use codes)	Value		Amount (use codes)	Value		Amount	Value	
				Unit price	total		Unit price	total		Unit price	total
Wood for firewood											
Wood for charcoal making											
Wood for construction e.g poles											
Medicine											
Indigenous Fruits/spices/nuts											
Cosmetics											
Poisons											
Stimulants											
Essential oils											
Withies											

Papyrus											
Honey											
Sand											
Murrum											
soils											
Moses/ferns											
mushrooms											
grass											
Water											

Quantity unit codes

1=kilograms 2=90kgs sack 3=50kgs sack 4=tractor trailer 5=pickup trailer 6=cart 7= Wheelbarrow 8=pieces9=headload

10=tones 11=stacks 13=litres

SECTION D: FOOD CONSUMPTION AND OTHER EXPENDITURE

Probe whether this is the general trend for the last one week

Did your household consume[..] during the last 7days	**Own production**		**purchased**		**Gift**		**Payment in kind**		**transfer**	
	Quantity	kshs	Quantiy	Kshs	Quantity	kshs	quantity	kshs	quantity	kshs
Maize grain										
Maize floor										
Wheat floor										
Bread										
Beans										
Sorghum										
Millet										
potatoes										
All fruits										
All vegeTables										
Meat										

Milk										
Eggs										
Sugar										
Oils & fat										
Tea &coffee										
Beer/alcohol										
Firewood										
Charcoal										
Kerosene										
Electricity										
Biogas										
Other specify										

CODES

1=Kilogram 2=100kg sack 3=50kgsack 4=Crates 5=debes 6=crates 7=trays 8=litres 9=bottles 10=loaves 11=bundles 12=headload 13=kilowatts

SECTION E: DISTANCE TO THE FACILITY

	What is the average distance between the centre of the village and {..}	What is the typical means of transport between the centre of the village and the [..]	How much time does it typically take to travel one-way by this typical means of transportation between the centre of the village and the [..] 1=foot,2=boda boda 3=bicycle 4=other(specify)		What, if any was the average monetary charge for a one-way trip on this typical means of transportation between the center of the village and the […] during the last year	Where is this facility located?
FACILITY NAME	**KILOMETRE**		**HOURS**	**MINUTES**	**KSHS**	**NAME OF PLACE**
Forest						
Food market						
Primary school						
Secondary school						
Health centre						
Dispensary						

SECTION F: HOUSEHOLD BENEFITS FROM TAKING PART IN PARTICIPATORY FOREST MANAGEMENT

During the past one year has any of your household member benefited from […] from the forest	
benefit	Yes=1, No=0

H1.	Casual employment	
H2	Increased Extraction of forest products	
H3	Getting forest land for cultivation under PELLIS	
H4	Increased social groups	
H5	Reduced soil erosions	
H6	Reduced levels of forest destruction	
H7	Improved road network in the village	
H8	Improved ecotourism	
H9	Increased grazing areas	
H10	Improved land tenure	
H11	Reduced time spent patrolling the forest	

SECTION H: LAND TENURE

During the last rainy season did your household own and farm any land? 1=YES 2=NO

PLOT CODE	What is the area of each plot in acres?	What is the tenure of each type plot. A	How did you acquire it?(B) .tenure during acquisition(A)

CODES

A	B
1=Private title deed	1= inherited
2=still obtaining title deed/demarcated	2=purchased
3=traditional private rights/non-demarcated	3=rented
4=Communal rights	4=gift
5= squatter	5=newly occupied
6=rented in	6=squatted
7=rented out	7=Temporary free use
8=others specify	

SECTION I; OWNERSHIP OF HOUSEHOLD ASSETS AND HOUSEHOLD WEALTH STATUS

Now l would like to ask you some questions about the assets your household own.

HOUSEHOLD ASSET	Do you own the following assets [..] 1=yes,0=no	How many do you own ?	Were you to sell how much would each of the items fetch?
ASSET		NUMBER	KSH
Television set			
Power saw			
Farm tractor			
Bicycle			
Motorbike			

Mobile phone			
Grain store			
Sofa set			
Did you own a car			
Water tank			
wheelbarrow			

Wealth indicators (please tick √)

Type of roofing material used	Colored iron sheets	Normal iron sheets	grass	tiles
Type of material used for wall construction	Mud burned bricks	Quarry stones	timber	Mud smeared
Type of materials used on the floor	Ceramic tiles	cement	mud	Wooden floor tiles
Type of seats in the household	plastic	Sofa set	wooden	hide skin
Others specify				

SECTION J: FOREST CHARACTERISTICS

1: TOPOGRAPHY

I would like to ask some questions about the topography of the forest and the degradation your household may be aware of.

How is the topography of the forest(please tick √)	How long did it take climb the slope		Were you able to get the forest products despite the slope 1=YES,0=NO	Is the forest degraded?(please tick √)
TOPOGRAPHY	Hrs	Min		No degradation
Flat				Little degradation
Slightly flat				Moderate degradation

Medium				Extensive degradation
Steep slope				
Very steep slope				

SECTION K: LIVESTOCK AND OTHER FARM ANIMALS

Now I would like to ask you some questions about some livestock and other farm animals you cou

Type	Do you own a […] ? 1=yes 2=No	How many do you currently own?	How many have you sold over the past 12 months	Sale price	Where is your source of grazing for your animals?K1	How much does it cost you to graze your animal in the forest per month?
Dairy cows						
Cattle for meat						
rabbits						
Dairy goat						
Goat						
Sheep						
Donkey						
pigs						
horse						

CODES FOR: **K1**

1=the forest 2=own land 3=cut and carry

SECTION L: CROP PRODUCTION

Crop Name		Area	How much did you harvest		How much did you sell		How much was consumed by household	
Season 1		Acres	Amount	UNIT CODE	Amount	UNIT CODE	Amount	UNIT CODE
	Maize							
	Beans							
	Cassava							
	Sorghum							
	Millet							
	Finger Millet							
	Potatoes							
	All Veget9ables							
	All Fruits							
	Coffee							
	Other (Specify)							
SEASON 2		Acres	Amount	UNIT CODE	Amount	UNIT CODE	Amount	UNIT CODE
	Maize							
	Beans							
	Cassava							
	Sorghum							
	Millet							

	Finger Millet							
	Potatoes							
	All Vegetables							
	All Fruits							
	Coffee							
	Other (Specify)							

UNIT CODES

1= 90 kg sack, 2= 50 kg sack, 3 =kilogramme, 4 = bales 5= crates, 6=tractor trailer, 7 =pick-up trailer, 8=oxen –drawn cart, 9=mkokoteni, 10=wheelbarrow, 11=kikapu

SECTION M: CASH INCOME OF HOUSEHOLD (NON-FARM INCOME)

Type of employment	Number of persons involved		Cash earned in Ksh
	Male	Female	
Service(GO and NGO)			
Employment abroad			
Family business			
Labour wage			
Interest/rent			
Training/Workshop			
Help/debt/prize/grant			
Others(please specify)			