FOREST RESOURCES UTILIZATION AND CONFLICTS IN KAPOLET FOREST, CHERANGANI HILLS, KENYA

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A Thesis Submitted to the Graduate School in Partial fulfillment for the requirements for the award of the degree of Master of Science in Environmental Science of Egerton University.

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DECLARATION AND RECOMMENDATION

This thesis is my original work and has not been submitted or presented for examination for an award of a degree in any other university.

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DEDICATION

I dedicate this thesis to my mother Tabitha for her endless love, support and encouragement.

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ABSTRACT

Forests are of great significance to the local people especially in the rural areas. Like any other developing country, majority of the residents in Kenya depend on forest resources for their livelihood, particularly for fuel wood, timber, Non-Timber Forest Products (NTFP) and other ecological functions. However, rapid increase in population, poor forest management policies and undefined property use rights has led to conflicts over the use of forest resources. Kapolet is one of the affected forests and the aim of this study was to assess how forest resources utilization among different users has led to conflicts. Data was collected by administration of questionnaires to 112 household heads, field observations and interviews with key informants in the selected study areas. Descriptive and inferential statistics were used for data analysis using Statistical Package for the Social Sciences (SPSS version 17) and Microsoft Office Excel spreadsheets. The findings of the study show that 94.6 % of Kapolet forest community residents depend on the forest for their livelihoods. The major product harvested from the forest was firewood (76.4 %). Other products included honey (44.3 %), herbal medicine (38.7 %), water (28.3 %), building poles (21.7 %), grazing land (12.3 %), charcoal (9.4 %) and game meat (4.7 %). There was a significant relationship between household income and charcoal burning ($P=0.000$, $\chi^2=19.702$), household income and collection of building poles ($P=0.017$, $\chi^2=8.200$), age of the respondents and honey collection ($P=0.047$, $\chi^2=7.944$), occupation of the respondents and charcoal burning ($P=0.008$, $\chi^2=13.895$) occupation of the respondents and building poles collection ($P=0.018$, $\chi^2=11.895$), respondents' level of education and charcoal burning ($P=0.000$, $\chi^2=23.025$). The research findings indicate conflicts between the residents and the forest management authority over land. From the study findings therefore, it is necessary to provide alternative sources of livelihoods to the area residents to ease pressure on the forest resources. Forest boundary has to be clearly demarcated and land ownership clearly defined. Participatory forest management should also be enhanced.

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LIST OF ABBREVIATIONS AND ACRONYMS

ADC: Agricultural Development Corporation

CHS: Commission on Human Security

CPR: Common Pool Resources

EEA: European Environment Agency

FAO: Food and Agriculture Organization of the United Nations

FOSA: Forest Outlook Studies in Africa

FPP: Forest Peoples Programme

ICESCR: International Covenant on Economic, Social, and Cultural Rights

IFRI: International Forestry Resources and Institutions

KAPAP: Kenya Agricultural Productivity and Agribusiness Project

KFS: Kenya Forest Service

KIFCON: Kenya Indigenous Forest Conservation Programme

Kshs: Kenyan shillings

KWS: Kenya Wildlife Service

NRM: Natural Resource Management

NTFP: Non-Timber Forest Products

SCBD: Secretariat of the Convention on Biological Diversity

SFM: Sustainable Forest Management

SPSS: Statistical Package for the Social Sciences

Sq. Kms: Square Kilometers

UDHR: Universal Declaration of Human Rights

UN: United Nations

UNEP: United Nations Environment Programme

USAID: United States Agency for International Development

WCFSD: World Commission on Forests and Sustainable Development

WRI: World Resources Institute

WB: World Bank

CHAPTER ONE
INTRODUCTION

1.1 Background information

Forest resources directly contribute to the livelihoods of 90 % of the 1.2 billion people living in extreme poverty and indirectly support the natural environment that promotes agricultural production and hence food supplies to nearly half the population of the developing world (World Bank, 2002). The forest products include timber, Non-Timber Forest products (NTFP) and the forest land itself. Covering 36 million square kilometers, or about 30 % of the globe, the world's forests form one of the most important natural ecosystems. However, forests are declining at an alarming rate and the World Resources Institute (WRI) reports that 46 % of the world's old-growth forests have been destroyed. Competition for forest resources is known to trigger, exacerbate and finance numerous crises and conflicts in developing countries (Renner, 2002).

The major causes of change in forest cover in developing countries include conversion of forests to agricultural land and large infrastructural development causing tension between the need to conserve and the need for development. These have further intensified conflicts between forest managers who are often powerful, central government authorities or the ruling elite and communities that depend on forest resources for survival (Sayer *et al.*, 2005).

Conflicts over forest resources are increasingly regarded as one of the driving forces for policy transformation. Therefore, there is need for information on the origin of conflicts and their effects on forest policy and use of forest resources (Eeva and Elina, 2001). The World Bank (2011) estimates Kenyan forest cover to be about 6.07 % which is below the recommended minimum of 10 %. The latest inventory done in 1994 by Kenya Indigenous Forest Conservation Programme (KIFCON) came up with a differentiation between two types of forest cover. The total indigenous forest cover on gazetted forest areas was estimated by KIFCON, to be 1.06 million hectares (excluding the mangrove forests along the coastline) (Wass, 1994), whereas the area under indigenous forest outside the gazetted forests was estimated to be 180,000 acres (0.18 million ha). Besides the gazetted forests, the country has a total of about 37.6 million hectares of natural woody vegetation consisting of 2.1 million hectares of woodlands, 24.8 million hectares of bush-lands and 10.7 million hectares of wooded grasslands (KIFCON, 1994).

According to the Food and Agricultural Organization (FAO, 2001), most of the closed canopy forests are concentrated in the high and medium potential zones of Kenya where, incidentally, the human population and agricultural production are also concentrated; hence high potential for conflict between closed canopy forest and agriculture. Within the arid and semi-arid zones, closed forests are fewer and are concentrated mainly on isolated mountain ranges and along river banks, both permanent and seasonal, with the rest of this zone being composed of woodlands, bush-lands and wooded grasslands (FAO, 2001). The management of the natural forests and the forest resources is generally governed by the Kenya forest act of 2005 (GoK, 2005) which is implemented mainly by the Kenya Forest Service, since most forest land falls under its jurisdiction as gazetted forest reserve. The Kenya Wildlife Service (KWS) has management responsibility for all indigenous forests falling within national parks, national reserves and game sanctuaries (FAO, 2001).

The conflict in Kapolet forest revolves around forest land use in the form of forceful evictions and displacement of the Sengwer community from the forest which they claim to be their ancestral land (KAPAP, 2009). The Cherangani Hills include 12 forest blocks gazetted as government forests by the colonial government. The proclamation was enacted without the community's endorsement. It prohibited anyone from residing in the forest or carrying out activities without Government's authority. After Kenya gained independence in 1963 the Sengwer thought that better times had arrived (Kiptum and Odhiambo, 2007). Every tribe was celebrating freedom because they were promised entitlement to their traditional land. The Sengwer were sure of getting back their land. They were disappointed when they discovered that their land was given to other tribes due to nepotism, corruption and ignorance of the Sengwer (Kiptum and Odhiambo, 2007). The consequences of losing land for the Sengwer were not only losing a hunting ground, a place to collect honey and to find their traditional herbal medicine but also the natural services provided by the land. In an effort to conserve their territorial entitlements, which include natural resources and cultural heritage, the Sengwer people have resisted the attempts of successive Governments to arbitrarily re-allocate their ancestral domains. According to Kiptum and Odhiambo (2007) the pre-colonial and post-colonial governments denied the Sengwer rights over their ancestral domains. According to Kenya Agricultural Productivity and Agribusiness Project report (2009), there are 487 Sengwer households living in Kapolet settlement, which had been given to them after they invaded a State Lodge. The history of these people is closely linked to the quest of the Sengwer for land and recognition: As a result of years of broken promises from the

government side, approximately 2,000 Sengwer invaded on March 22, 1997 a state owned farm in the plains (Agricultural Development Corporation, Milimani) and stayed there even when their elders and leaders were arrested. After a month of serious fights, the government offered them a new settlement scheme in the Kapolet forest (in total over 3,000 acres) in exchange for a peaceful end of the invasion (KAPAP, 2009). The Sengwer accepted, and in a first phase 1,000 acres were demarcated for nearly 500 households, who moved in the same month, but the promised letters of allotment were not even issued by December 2005. The official reason given was that the land is officially a forest and not suitable for a settlement scheme. Due to the same reason, the second and third phase of the settlement scheme, which supposed to provide the entire 3,000 acres to Sengwer, have not yet started. The community members stated that they have witnessed significant encroachments from non-Sengwer on the entire Kapolet forest, especially logging activities and the establishment of new farms on the land of phase 2 and 3 ((KAPAP, 2009). The political will required for sound, long-term forest management may often rest on the prospect of a stable future. When conflict brings instability, communities and forest managers face even more daunting challenges than usual (Taylor, 2004). The forest has also been constantly used as a hideout for cattle rustlers from the neighboring districts who constantly attack and terrorize the local community and the whole of Cherangani constituency.

1.2 Statement of the problem

Kapolet forest is a constituent of Cherangani hills forest block which is one of the five water towers in Kenya and supplies water to Lakes Turkana, Baringo and Victoria. In recent years the forest has been threatened to extinction due to human activities. The consequence is forest degradation as a result of large scale clearance of forest land for agricultural purposes. Illegal logging activities and charcoal burning is also carried out in the forest. This has led to the reduction of forest cover, soil erosion and destruction of wildlife habitat which has impacted negatively on the livelihoods of the communities. Lack of recognition of community land ownership by the central government has resulted in resentments and hence conflicts between the government and the forest communities. The indigenous Sengwer community also views the restriction to access of some forest resources and allocation of land to other communities unfair as they have been relying on the forest and its resources for their livelihoods for a long time. This together with inconsistent forest management laws has led to conflicts between the communities and the forest management regulators.

1.3 Broad objective

To assess how forest resource utilization in Kapolet forest has led to conflicts among different users.

1.4 Specific objectives

1. To document the benefits and types of forest resources accessed by the forest community in Kapolet forest.
2. To determine the influence of household and socio-economic characteristics of local communities on forest dependency in Kapolet forest.
3. To determine nature and causes of forest use conflicts in Kapolet forest.

1.5 Research questions

1. What are the benefits and types of forest resources obtained from Kapolet forest?
2. Do the household and socio-economic characteristics of the local community in the study area influence their dependency on the forest?
3. What are the nature and causes of conflicts in Kapolet forest?

1.6 Justification

The United States Agency for International Development (USAID) recognizes that ethnic minority communities living in the forests depend on the forest resources and land for their livelihoods, just as their ancestors did for generations. Many of these communities are now facing competition from other communities from outside the area for land resources that they have traditionally used and managed. The communities have tried to accommodate the needs of outsiders, but in some cases this has not been possible, leading to conflict (USAID, 2004). Conflicts also result from contradictory and inconsistent legal and regulatory systems, especially those perceived as illegitimate or at odds with customary laws and practices. Unclear divisions of responsibility and overlapping authority among government organizations also increase the likelihood of conflict (Thomson and Kanaan 2003; Upreti 2002). The state of Kapolet forest which is a major water catchment area has deteriorated over time due to human degradation. The findings of this study will enhance sustainable forest management and develop conflict management options for Kapolet forest to control

degradation without compromising the indigenous Sengwer community's fundamental freedoms, human and indigenous rights.

1.7 Assumptions

It is assumed that the key informants and all the other respondents provided truthful and unbiased information on the research topic.

1.8 Definition of terms

Forest products- Includes bark, bat droppings, beeswax, canes, charcoal, creepers, earth, firewood, frankincense, fruit galls, grass, gum, honey, leaves, flower, limestone, moss, murram, myrrh, peat, plants, reeds, resin, rushes, rubber, sap, seeds, spices, stones, timber, trees and water.

Common Pool Resources- Refer to resources characterized by the difficulty in excluding actors from using them and the fact that the use by one individual or group means that less is available for use by others.

Conflicts - Refer to a state of disharmony between incompatible persons, ideas or interests.

Forest community- Means a group of persons who have a traditional association with forest for purposes of livelihood, culture or religion and are registered as an association or other organization engaged in forest conservation.

Household- Consists of a person or a group of persons, who live together in the same house

Indigenous forest- Refers to a forest which has come about by natural regeneration of trees primarily native to Kenya, and includes mangrove and bamboo forests.

Non-community- Members from outside the community who include illegal timber loggers and charcoal burners.

Open Access - Describes a condition of free access to resources that is available to all.

Tenure- The form of right or title under which the land is held.

CHAPTER TWO
LITERATURE REVIEW

2.1 Importance of forests

A forest refers to any land containing a vegetation association dominated by trees of any size, whether exploitable or not, capable of producing wood or other products, potentially capable of influencing climate, influencing type of the soil, water regime, and providing habitat for wildlife (GoK, 2005). Forests are vital for the existence of life on earth. Tropical forests alone serve as a habitat for more than 13 million distinct species (Hammond, 1996). Forests cover almost one third of the world's land area and nearly all are inhabited by indigenous and rural communities who have customary rights to their forests and have developed ways of life and traditional knowledge that are attuned to their forest environments (Forest Peoples Programme, 2012). At present, the world's forests cover about 4 billion hectares, which accounts for 31 % of the world's land area, while other wooded land covers about 1.1 billion hectares (FAO, 2010). In Africa, forests cover is about 21.4 % of the land area (FAO, 2009), which corresponds to 674 million hectares (FAO, 2010). In Eastern Africa, approximately 13 % of the land area is covered by forests and woodlands which make the resources rather limited. Kenya is the most forested country in Eastern Africa with a forest and woodland cover of 17 million hectares which corresponds to a third of the land area (UNEP, 2006). Despite this fact, closed forest cover only 1.7 % of the land area in Kenya (WRI, 2007).

Forests provide multiple products, benefiting many stakeholders including private goods for commercial trade (e.g., round wood, some NTFPs, and tourism services), private goods for subsistence use (e.g., many NTFPs, fodder, fuel wood and construction poles, medicinal plants), local public goods (e.g., watershed management and soil conservation), and global public goods including biodiversity and carbon sequestration (World Bank, 2009). Around the world, about 60 million indigenous peoples live in forests and depend on them for a range of forest products like fruits, vegetables, roots and tubers, game meat, spices, clothing material such as animal fur and skins, oils, building materials, gums, dyes and medicinal plants contribute to their daily subsistence needs (WCFSD, 2006). Urban areas often depend on forested areas for their water supply and benefit from the multiple environmental services of urban forests and trees (FAO, 2007). The montane indigenous forests of Kenya that comprise Kenya's five water towers (Mau Forest Complex, Mount Kenya, the Aberdares,

Mount Elgon and Cherangani) produce several regulating services of importance including local climate regulation, water flow regulation, erosion regulation, and water purification and waste treatment. These services are further closely associated with other regulating services including disease regulation and natural hazard regulation (United Nations Environment Programme, 2009).

2.2 Threats to forests

Reports from the Food and Agriculture Organization (FAO, 2010) and the United Nations Environmental Programme (UNEP, 2001; UNEP, 2006), indicate that the world's forests are decreasing at an alarming rate. For many centuries the world's forests have been under pressure due to increasing human population (UNEP, 2001). With a growing population follows expanding agriculture, increasing commercial logging, increase in plantations, mining, industrialization, urbanization and building of roads, which all lead to deforestation in the tropical regions (Duveiller *et al.*, 2008).

Deforestation is a process where forests are cut down, burned and damaged. It has been occurring globally for many centuries (Urquhart *et al.*, 2001). Unfortunately, the deforestation rate has increased drastically in developing countries in the last 50 to 100 years (FAO, 2009). The loss of forest through deforestation has many negative impacts on the environment and climate. Forests hold approximately 70 % of all land-living animals and plants, and millions of species are affected by deforestation since it destroys their natural habitat (National Geographic, 2010). Deforestation threatens ecosystems in tropical forests since these processes lead to biodiversity loss (Lung and Schaab, 2009). There are also natural factors that affect the world's forests, such as natural disasters, forest fires, insect attacks and other diseases. Of these factors, the main cause of deforestation is conversion from tropical forest into agricultural land and pasture for livelihoods (FAO, 2010). Despite their economic and environmental importance, forests in Kenya continue to be under threat of conversion to other land-use types. The main hazards are: charcoal production; logging of indigenous trees; marijuana cultivation; cultivated fields in the indigenous forest; shamba-system practices; livestock grazing; quarries; landslides; human settlements. Various reports point to the extent and devastating effects of such practices on erosion, sedimentation and water quality. (UNEP, 2006; Ongwenyi *et al.*, 1993; Brakel, 1984; World Bank, 2006). According to FAO global forest assessment report (2010), between 1990 and 2010, Kenya lost an average of 12,050 ha or 0.32 % per year. In total, between 1990 and 2010, Kenya lost

6.5 % of its forest cover or around 241,000 ha. In the 10 year period, 2000-2010, deforestation in Kenya's Water Towers amounted to an estimated 28,427 ha. By 2010 such deforestation of montane forests yielded a timber and fuel wood volume of 210 m3/ha with a cash value of 272,000 Kshs/ha. At an estimated deforestation rate of 2,762 ha in 2010, this was equivalent to revenue of Kshs 796 million in 2010. This is a considerable economic incentive for illegal loggers (UNEP, 2012). Since forests are vital for sustaining life and essential for the socio-economic development of many countries (UNEP, 2001), studies about changes in forest cover and their status are of great importance to inform governments and the public for further work with sustainable forest management (Lung and Schaab, 2009).

2.3 Sustainable forest management

Sustainable use in relation to a forest, means the use of a forest and any of its natural resources in a manner and to an extent which does not compromise the capacity of the forest and its use by future generations, and does not degrade the carrying capacity of its supporting ecosystems while sustainable management is management of the forest so as to permit any such use of it as constitutes sustainable use (GoK, 2005). The General Assembly of the United Nations (2007) defines Sustainable Forest Management (SFM) as a dynamic and evolving concept which aims to maintain and enhance the economic, social and environmental value of all types of forests, for the benefit of present and future generations.

Unsustainable forest operations and other pressures on forest resources, such as gathering of fuel wood, can lead to forest degradation and permanent losses in biodiversity. Globally, over half of the temperate broadleaf and mixed forest biome and nearly one quarter of the tropical rain forest biome have been fragmented or removed by humans (SCBD, 2008). Forestry can also have negative impacts on indigenous and local communities and on the livelihoods of other forest dwellers by competing with these communities for access to a finite forest resource base, and by disregarding cultural or spiritual sites and practices (SCBD, 2009).

2.4 Forest use conflicts

According to USAID (2007), forest use conflicts include armed conflict that occur in forests or is funded by the sale of forest products, as well as violence and abuses of human rights and human security related to competition over forest resources and forestland. The latter situation occurs where two or more groups want to use the same area of forest for

different benefits, resulting in violence, seizure of land, or destruction of resources upon which one of the groups depend on (USAID, 2007). Tanzler *et al.* (2004) defines conflict as a situation of incompatible or adverse interests, in which one or more parties pursue, or threaten to pursue, their interests through violent means. It includes situations where critical livelihood resources are seized or destroyed, even if violence is not used or threatened because livelihoods and the ability to survive are harmed.

Natural resource conflicts arise from competing claims over a single resource, overlapping and nested claims, conflicting sources of legitimacy and negotiations over the meaning of the resources (Dietz, 1996). They are disagreements and disputes over access to, control and use of, natural resources (FAO, 1998). These conflicts often emerge because people have different uses for resources such as forests, water, pastures and land, or want to manage them in different ways. Disagreements also arise when these interests and needs are incompatible, or when the priorities of some user groups are not considered in policies, programmes and projects (FAO, 2010).

Acknowledging that conflict is a common feature of any resource use system is a prerequisite for sustainable management that is participatory and equitable. Forest conflicts are inevitable as long as there are competing rights, claims, interests, values and power struggles that are enmeshed in complex institutions and multiple legal systems of land tenure ship (Marfo, 2006). Forest conflicts arise when decision rights are ambiguously defined (Schmid, 1995). In forest use conflict, the concept of human security converges with definitions of human rights. International definitions of what constitutes human rights are based on the Universal Declaration of Human Rights (1948). Of specific relevance to forest conflict, the International Covenant on Economic, Social, and Cultural Rights (1966) states that there are two major viewpoints on the definition of human security: 1) freedom from fear, protecting people from acts of violence and violent threats to their rights, safety, or rights and 2) freedom from want which encompasses broader issues of human well-being and dignity (CHS, 2003).

Scholars have proposed two theories to explain the role of natural resources in conflicts. One points to scarcity (the neo-Malthusian) and the other points to abundance. The neo-Malthusians argue that rapid population growth, environmental degradation, resource depletion, and unequal resource access combine to exacerbate poverty and income inequality in many of the world's least developed countries (Malthus, 1798). These deprivations are

easily translated into grievances, increasing the risks of rebellion and societal conflict. Internal disputes can arise from local environmental degradation, for instance, when factory emissions pollute a main freshwater source (Malthus, 1798). Other scholars claim that it is resource abundance, rather than scarcity, that is the bigger threat to create conflict. They argue that conflict emerges when the incentive for rebellion exceeds the cost (Collier and Hoeffler, 1998). Some countries with abundant natural resources have experienced what has been coined the "resource curse"- corruption, economic stagnation, and violent conflict over access to revenues (Lambini, 2010). Common Pool Resource management has been associated and is well documented with conflicts due to the heterogeneity, collective management challenges, as well as stakeholders with diverse interests, perceptions, values and claims involved in the use and management of these resources. Common-pool resources (CPRs) are systems that generate finite quantities of resource units so that one person's use subtracts from the quantity of resource units available to others (Ostrom *et al.*, 1994).

Hardin's (1968) theory on tragedy of the commons states that it is difficult and costly to exclude potential users from common-pool resources that yield finite flows of benefits, as a result of which those resources will be exhausted by rational, utility-maximizing individuals rather than conserved for the benefit of all. He further asserts that pessimism about the possibility of users voluntarily cooperating to prevent overuse has led to widespread central control of common-pool resources but such control has itself frequently resulted in resource overuse. Dependency of rural households on Common Pool Resources (CPRs) and their diverse use pattern have become an important topical issue in developing economies since CPRs are usually characterized by multiple use values such as consumptive, recreational, environmental and spiritual with different interests of rural households (Baland and Platteau, 1999). Conflicts arise from complex bundles of rights and interests and have been fields of power Struggles as skewed power share among communities, timber companies and the Forest Services, as well as some other interest groups over control of the forest leading to conflicts. Access to and the use of these natural resources plays an important role in many conflicts (Marfo, 2003).

The use and management of Common Property Resources have been a source of tension between different actors world over. Conflicts in the forest sector revolve around control and access to the forest and forest products and although the demand of forest products has steadily risen, the total area of forests continues to decline for instance between 1990 and 1995, the total area of forests in developing countries decreased by 65.1 million

hectares (Ongugo *et al.*, 2008). The major causes of change in forest cover in developing countries include conversion of forests to agricultural land and large infrastructural development causing tension between the need to conserve and the need for development (Ongugo *et al.*, 2008). Forest management decisions are strongly influenced by the security of forest property rights, and best long-term forest management practices which often hinge on strengthening local control over forest resources. Property rights regimes can be conceptualized as bundles of rights that range from access, withdrawal, management, exclusion, and finally, to alienation (Schlager and Ostrom, 1992).

Ensuring Sustainable Forest Management (SFM), typified by balancing multiple uses among many different users, rests critically on high-quality governance for the sector. The World Bank (2009) observes that poor governance negatively affects forest-dependent communities. Unclear and insecure land tenure and other property rights, lack of adherence to the rule of law, and excessive discretionary authority threaten the livelihoods of hundreds of millions of indigenous people and the rural poor (World Bank, 2009). Good governance can promote equitable distribution of forest benefits, respect traditional rights and knowledge, and provide the platform for prior and informed consultations with legitimate stakeholders (World Bank, 2009).

The Mount Elgon, Mau, Tugen and Mount Kenya among other forests have been centers of conflicts among the communities due to population pressure and conflicts with forest regulators which have not only affected the conservation of the forest ecosystem but also the livelihoods of the adjacent communities (Ongugo *et al.*, 2008). Studies carried out by the International Forestry Resources and Institutions (IFRI) in 14 forests worldwide indicate the wave of conflicts have led to incidences of forest destruction through often illegal activities by forest adjacent communities leading to degradation of the forest resources and loss of biodiversity (Ongugo *et al.*, 2008). Conflicts in forest management are inevitable due to the multiple-function and multiple-use nature of forests, as a result of which there is a wide array of stakeholders with varying and sometimes conflicting interests in the forest. These conflicts are diverse, but usually involve the problem of control, access and power of the actors (Marfo, 2006).

2.5 Effects of forest use conflicts

Natural resource conflicts often provide challenges to sustainable forest management and the daily activities of the forest fringe communities as well as have nagging effect such as

loss of biodiversity and endangered species, forest revenues losses, illegal logging, violent conflicts in communities and poverty (Taylor, 1997; Applegate *et al.,* 2001). Poor conflict management can be detrimental to the conflicting parties that comprise the management authority and local users. Local people may suffer not only due to the source of the conflict, e.g., loss of land and livelihoods, low wages, poor working conditions and environmental damage, but also from the conflict itself and from inadequate or inappropriate measures employed to resolve the conflict (Wilson, 2009). Forest conflicts could degrade the environment, cause climatic changes, disrupt projects, undermine livelihoods and affect national policy on forest land use. More importantly, failure to manage forest conflict could lead to community level social unrest, hence resulting in policy derailment and societal disintegration (Lambini, 2010).

Conflicts can also have positive impacts on forests, in the short term. This can happen if for example, an army enforces forest protection. An army might exploit the forest for its own needs, which may be less intensive than commercial logging. Furthermore, the presence of armed forces may discourage illegal logging by outsiders, as well as poor logging practices by legal operators. In Colombia, land mines have had the inadvertent effect of protecting the forest to some degree, and some guerilla groups have used the threat of violence to practice "gunpoint conservation" (Alvarez, 2003).

2.6 Forest use conflict management and resolution measures

Conflict management includes measures that are meant to limit, mitigate, and contain a conflict, eventually enabling a transformation from conflict to lasting peace by addressing the root causes and effects of conflict while Conflict resolution measures are taken to address the underlying incompatibilities of a conflict and thereby enable the parties to terminate the conflict and deal with disputes through open and predictable processes (United States Institute of Peace, 2007).

Responses to forest use conflicts must be developed on a case-by-case basis within an effective and legitimate governance framework, the key elements of which include laws and institutions designed to allocate forest resources and forestland rationally and equitably to promote development, uphold the rights of forest dwellers, and protect the environment. (USAID, 2006). Other responses comprise a system of participatory land-use planning and forest zoning through which explicit tradeoffs can be made among competing users and a means to legally assign control over forest resources and forestland through recognition of

traditional ownership systems, community forest management agreements, land title to individuals and communities (USAID, 2006). Consensus-based decision-making can reduce the potential for conflict when the stakeholders seek win-win solutions, secure economic benefits for local people, share responsibility for resulting actions, and collectively gather necessary data (Upreti, 2002). For effective management of forest resources, it is also important to provide access to information, develop and implement mutually agreed upon monitoring and evaluation in addition to ensuring that local communities and key stakeholders are aware of and able to exercise their forest-related rights, entitlements, and responsibilities (USAID, 2005).

Cooperation in environmental and natural resource management is valuable in building peace among parties that are, or could be, in conflict (Conca, 2002). Participatory decision-making among competing claimants and relevant stakeholders reduces conflict by facilitating discussion of local issues with key stakeholders, helping diffuse tensions and mitigate conflict in addition to promoting solutions that include sustainable forest management and equitable benefit sharing (USAID, 2005). According to USAID (2007) report on forest conflicts in Asia it is vital to instill respect for the rule of law regarding forest and land allocation, tenure, and use, accelerate political reform to reduce corruption and political interference in administrative decisions and strengthen the judicial branch of government to reduce conflicts.

Decentralization processes can contribute to social stability through the clarification and devolution of rights. Formal recognition of traditions, customs, rules, laws, and policies dealing with issues of access to and use and management of forest resources can bring order and predictability to situations of competing interests (Ruben *et al.,* 2008). Incorporating indigenous and local knowledge in forest management greatly reduces incidences of conflicts (WCFSD, 1999). Governments in countries prone to conflict should adopt and implement within their national forest programs components and activities designed to recognize, defuse, and address cases and root causes of conflict in and about forests while donors should assure long-term financing and work toward developing local and national institutional capabilities to recognize, defuse, and address conflicts in forestry and land sectors before they turn violent (Ruben *et al.,* 2008).

2.7 Conceptual framework

The conceptual framework below (Figure 1) is a modification of the Driver-Pressure-State-Impact-Response (DPSIR) model of the European Environment Agency (EEA, 1998). The driver in this case is the increasing human population who exert pressure on the state of the forest through resource extraction and land use resulting in forest degradation and conflicts. The response comprises the management decisions aimed at promoting sustainable forest resource utilization.

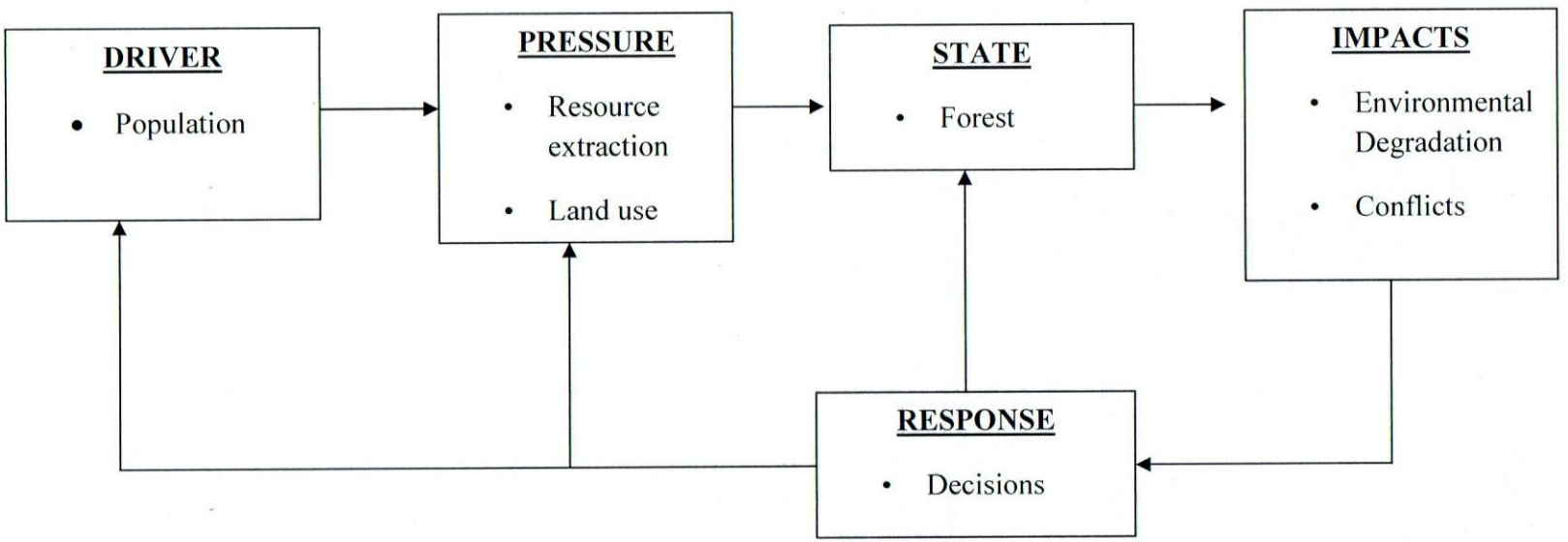

Figure 1. Conceptual Framework

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Study area

Kapolet Forest is located 1° 10' N latitude, 35° 10' E longitude. It lies in the Counties of Trans-Nzoia and Pokot and covers 10,800 acres (KAPAP, 2009). Kapolet Forest is 2,246 meters above sea level. The area experiences long rains between April and July, and short rains around September (Gill, 2004). Kapolet being an indigenous forest is a source of Rivers Moiben and Kapolet (Ainopmaget) which are the tributaries of River Nzoia, which drains into Lake Victoria. Similarly, Rivers Muruny and Empop the tributaries of Kerio River that drains its water into Lake Turkana originate from Kapolet forest (Figure 2).

Kapolet village is located just adjacent to the forest and the major inhabitants are the Sengwer community. Sengwer (also known as Cherangany) is an ethnic minority hunter-gatherer indigenous people living along the slopes of Cherangani Hills. They are distributed in two administrative Counties: Trans Nzoia and Pokot. It is estimated that the current population of the Sengwer considered as one of the marginalized groups is about 30,000 (Kiptum and Odhiambo, 2007). The Sengwer livelihood, health system and culture depend on the natural resources found in the forests. Their traditional economies were based on herbal medicine, bee-keeping, hunting and gathering. The forest also offers cultural rights and spiritual anchorage (Kiptum, 2001).

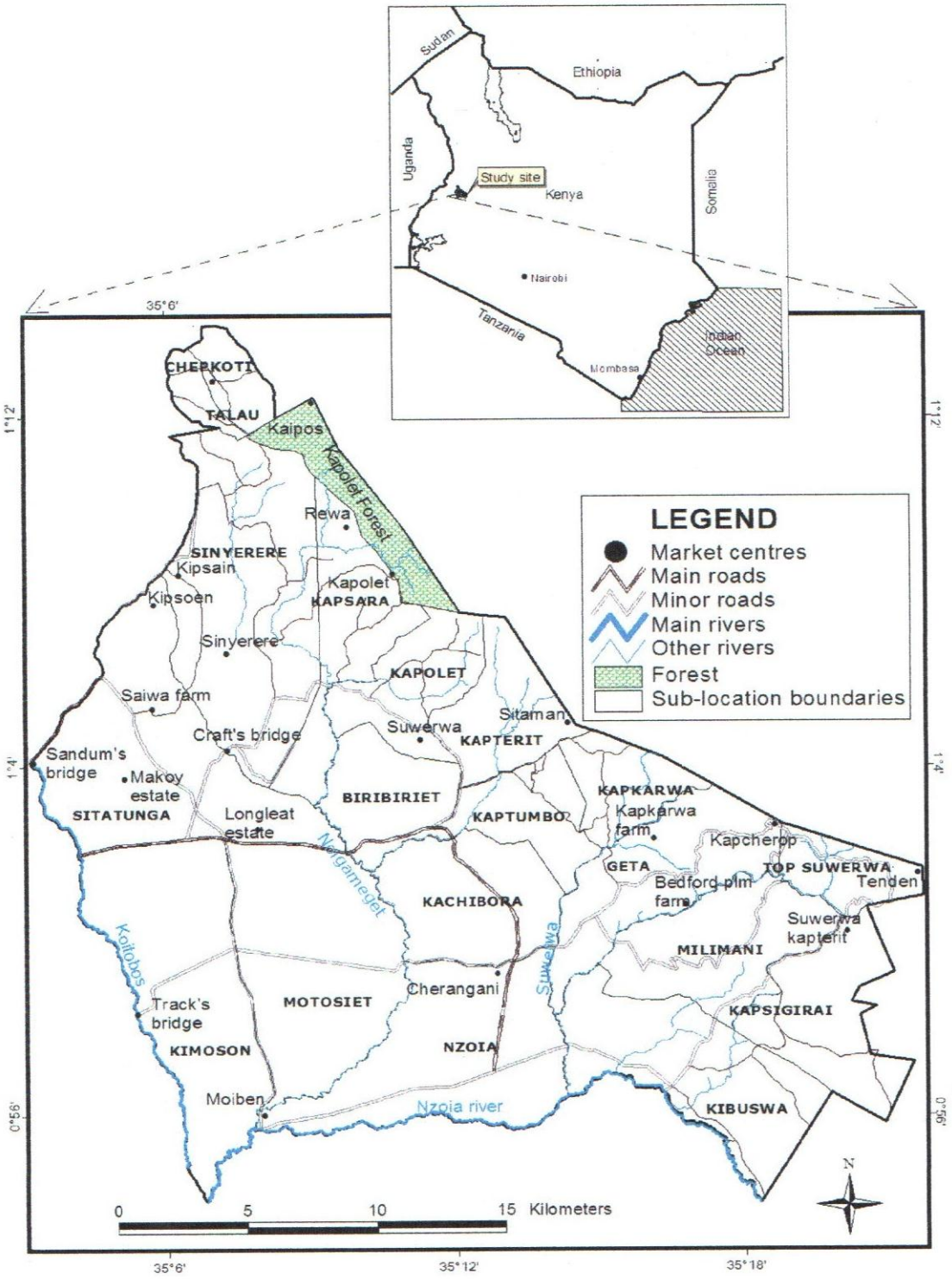

Figure 2: Map of the study area

3.2 Research Design

The study adopted a social survey research design to collect primary data from the respondents using a questionnaire. Field observations and oral interviews with key informants were also carried out. A multi-stage purposeful sampling was used where 112 households were surveyed proportionately to household units in the study areas. Research assistants from the local community assisted in the translation of the questionnaires for better understanding by the respondents since majority of the target population were semi-illiterate. Secondary data was obtained from existing literature. The area administrators and KFS officers were helpful in providing useful information on the community and forest management practices in place.

3.2.1 Target Population

With a total area population is 13,322 people; the targeted population comprised an accessible population of about 1,126 individuals; 364 from Kapolet, 320 Talau and 442 Kaibos in West Pokot County (KAPAP, 2009).

3.2.2 Sampling procedure and Sample Size

Simple random sampling was used to select the households to be interviewed (Mugenda and Mugenda, 2003). A total of 112 individuals were interviewed as a representative of the entire population. Purposive sampling was used to select key informants for interview and individuals in the different sub locations. Selection was based on proximity to the forest boundary. According to Obua (1996), local communities living within a range of five kilometers from the forest boundary directly affect or are affected by the presence of a forest. Consequently, state control of the forest affects their attitudes towards management of the forest resources. Forty four questionnaires were administered in Kaibos location, 36 in Makutano location and 32 in Talau location. The questionnaires were proportionally distributed in the three locations on the basis of population size and total area in square kilometers. Kaibos had the largest population of 442, Kapolet 364 and Talau 320 (KAPAP, 2009).

3.2.3 Data collection

Primary data was collected by the administration of a questionnaire to randomly selected household heads, field observations and interviews with the key informants. The key informants included the area chiefs, village elders, zonal forest officers, forest guards and the county forest officers. Thirty questionnaires were used for pre-testing at Rewa location which has similar characteristics as the study area. After the pre-test, errors in the questionnaire were rectified and it was later administered to the households in the selected locations for the actual data collection. A total of 112 questionnaires were administered to the respondents. The questionnaire consisted of open and close ended questions. The close ended questions captured data on age, gender, level of education, occupation, income level, land tenure and area of residence whereas open ended questions focused on forest benefits, current forest use conflicts and management practices in place. Secondary data was obtained from journals, published documents, government offices, internet and articles in books related to forest resources use and management. The primary data collected also focused on the community access to forest resources, conflicts arising from forest use and effects on the community roles in conservation.

3.2.4 Data analysis

Statistical Package for the Social Science (SPSS v. 17) computer software was used to analyze quantitative data obtained from the questionnaires at 95 % confidence level. Coding of data was done before entry and analysis. Microsoft Office Excel spreadsheets were also used in the analysis of data. Descriptive statistics were run to generate frequency distributions and percentages and results presented in form of tables and graphs. Chi-square test (χ^2) was performed to test the relationship between household dependency on the forest and their demographic and socioeconomic characteristics as it is the best tool for analysis of categorical data (Mugenda and Mugenda, 2003).

Table 1: Summary of objectives, variables and data analysis techniques

Research objectives	**Data collection methods**	**Variables**	**Data analysis methods**
1. To document the benefits and types of forest resources accessed by the forest community in Kapolet forest.	➢ Questionnaires ➢ Interviews with key informants	➢ Resource type ➢ Accessibility	➢ Descriptive statistics
2. To determine the influence of household and socio-economic characteristics of local communities on forest dependency in Kapolet forest.	➢ Questionnaires	➢ Income ➢ Gender ➢ Level of education ➢ Age ➢ Occupation	➢ Descriptive statistics ➢ Chi square
3. To determine the nature and causes of forest use conflicts in Kapolet forest	➢ Questionnaires ➢ Interviews with key informants	➢ Land tenure ➢ Resource competition	➢ Descriptive statistics

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

The survey covered a total of 112 households living within a range of five kilometers from the forest with an assumption that they directly or indirectly depend on the forest. Three locations (Kaibos, Makutano, and Talau) and a total of 14 villages were covered. Forty four questionnaires were administered in Kaibos location, 36 in Makutano location and 32 in Talau location.

4.2 Benefits and types of products harvested from the forest

It is evident from the results (Figure 3), that the forest communities greatly depend on the forest and its products for their livelihoods. Majority (94.6 %) of the residents indicated they obtained resources and benefitted from the forest. The major products harvested by the residents from the forest included firewood (76.4 %) and honey (44.3 %) while charcoal (9.4 %) and game meat (4.7 %) were the least harvested products. The respondents also cited several benefits from the forest. A number of the residents (39.6 %) associated reliable rainfall received in the area to the presence of the forest while 7.5 % indicated the development projects initiated by the Kenyan government after the construction of a dam along Kapolet river to supply water to Kitale town.

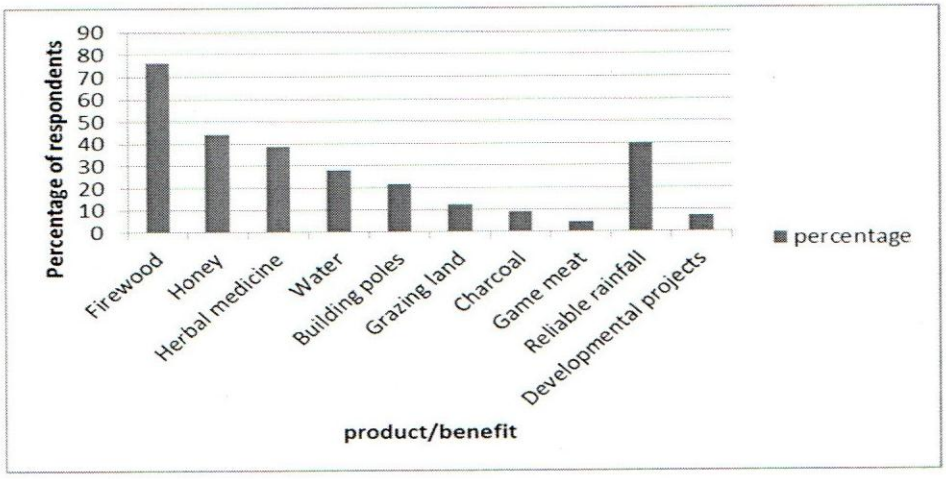

Figure 3: Benefits and types of products harvested from the forest (multiple responses)

According to the World Commission on Forests and Sustainable Development (WCFSD, 1999), 300 - 350 million people are highly dependent on forests and live in or adjacent to dense forests on which they depend for their subsistence and income. Rajiv (2010) further states that forests are important natural resources for poor as they provide a wide range of goods and services and a source of livelihood for the communities living adjacent to the forest in terms of food, fuel, medicine, building materials and raw materials for industrial processing. Fuel wood was the most harvested forest product as it is the most available source of energy for household use in rural areas including the study area. The WCFSD (1999) also notes that in developing countries, fuel wood accounts for more than 70 % of all energy use. However, the respondents were unwilling to talk about engaging in charcoal burning and hunting for game meat as they seemed to know the illegality of such activities and the consequent penalties imposed on the offenders by the forest administrators. Mekbeb *et al.* (2009) observed that understanding how rural communities use and depend upon local natural resources is a critical factor in developing policies to sustain the long-term viability of coexistence of human and natural systems.

Despite these benefits, there were also some negative effects due to the very existence of the forest. Ninety one percent of the respondents claimed that the forest was a hiding ground for criminals, notably cattle rustlers who have been constantly terrorizing the local residents. They take cover in the forest during the day and at night they execute their raids in the nearby villages and drive the stolen livestock back into the forest. This has made it difficult for the police and the anti-stock theft unit to track them and recover the stolen livestock. Other notable negative effects include destruction of farm crops by wild animals including baboons, wild pigs, porcupines, birds, pests and occasional bush fires which sometimes extend to the nearby villages thereby causing destruction of property.

4.3 Demographic and socio-economic characteristics of the respondents

The household characteristics are important in the determination of the dependency of the residents on the forest for their livelihoods. It is assumed that households with low income are more dependent on the forest and its products than those with a higher income. The demographic characteristics include gender, age, level of education and occupation while the socio-economic characteristic included the income of the respondents.

4.3.1 Gender of the respondents

Of all the respondents 68.8 % were male while 31.2 % were female (Figure 4). Kaibos had the highest number of male respondents (28.6 %) while the lowest number of female respondents (9.8 %) was recorded in Makutano location. The high number of male respondents compared to females is due to the Kalenjin culture where the man is considered as the head in a family setting and the female can only take responsibility in the absence of the man.

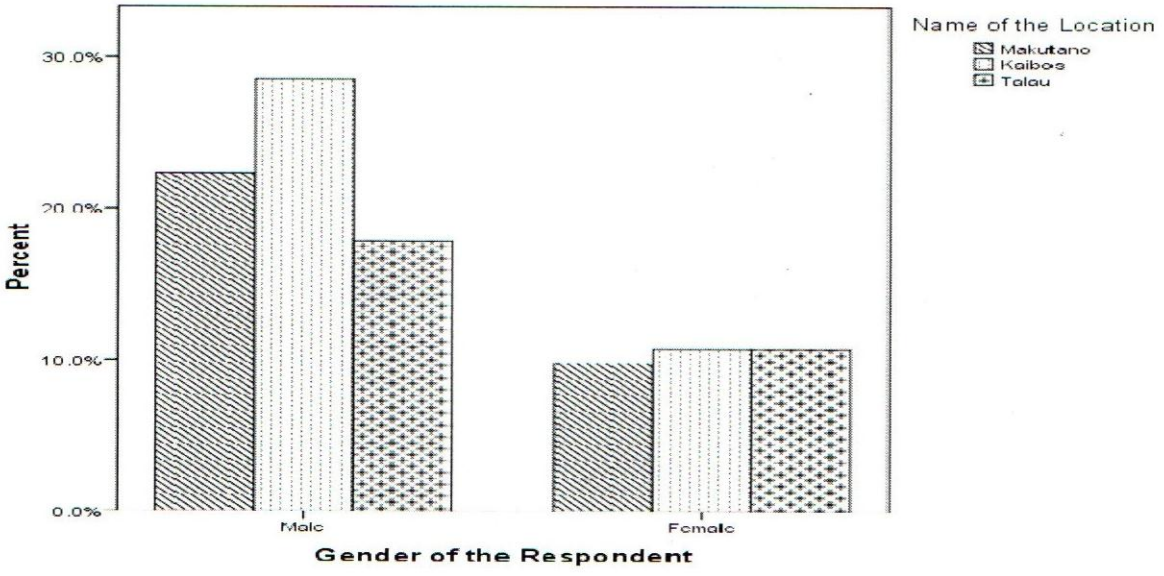

Figure 4. Gender of the respondents

The forest communities of Kapolet who are mainly Sengwer have allocated different duties to each gender. The females are responsible for firewood collection, fetching water, and gathering fruits and other non-timber forest products while the males collect honey, building poles and graze the livestock in the forest. According to Makindi (2012), there are differences in responsibilities, user rights, legal status, division of labor and decision-making between men and women in different societies. The male population being greater than the female means there is a likelihood of more building pole harvesting and grazing inside the forest. This will reduce the tree cover and can negatively affect the forest undergrowth if it is not carried out in a controlled manner.

4.3.2 Age of the respondents

Majority (41.1 %) of the respondents were in the age bracket of 36 – 60 years, 31.3 % between 26 – 35 years, 14.3 % below 25 years, whereas 13.4 % were over 60 years.

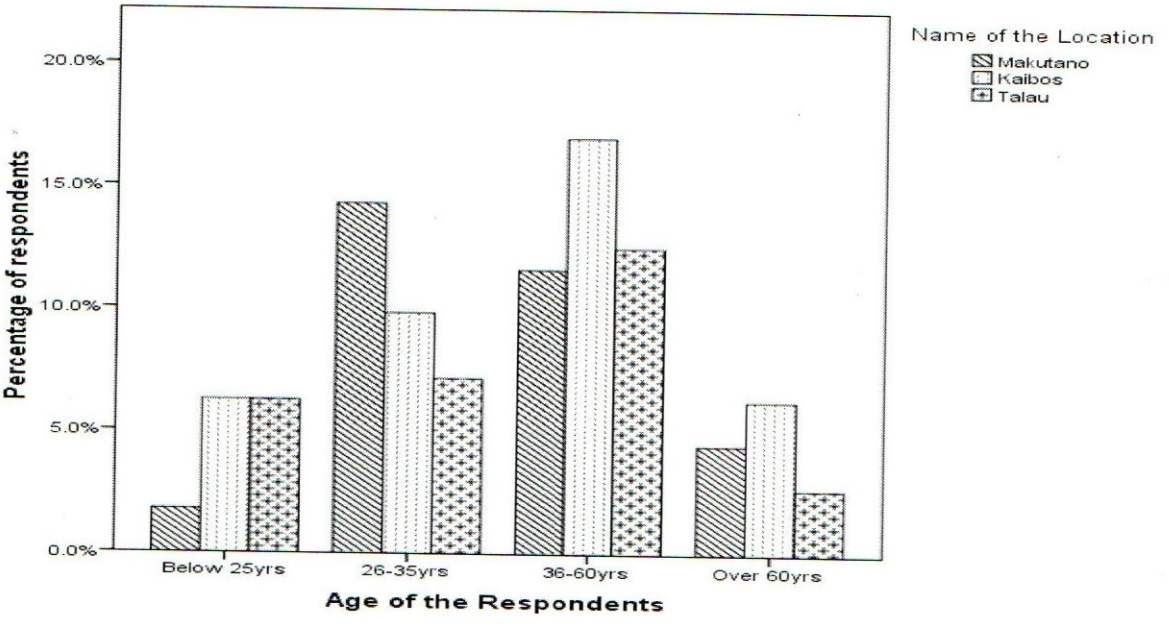

Figure 5: Age of the respondents

The results project an increase in population of the community. This will in turn increase the demand for forest resources to meet their daily needs for survival resulting to further degradation of the forest. Ongugo *et al.* (2008) point out that conflicts tend to continue or even worsen with population growth as the forest communities will continue to use and scramble for the scarce forest resources. This is in agreement with .Malthus' (1798) theory on population dynamics and its relationship with the availability of resources. He stated that in the absence of consistent checks on population growth, scarce resources will have to be shared among an increasing number of individuals creating misery and wickedness that cannot be avoided hence conflicts. Thomson and Kanaan (2003), further note that during periods of uncertainty and intense competition, people highly dependent on forest resources may be more prone to engage in conflict.

4.3.3 Level of education

The study findings indicate that most (53.6 %) of the respondents had basic primary education, 17 % had secondary education, 16.2 % tertiary education and 13.4 % were illiterate.

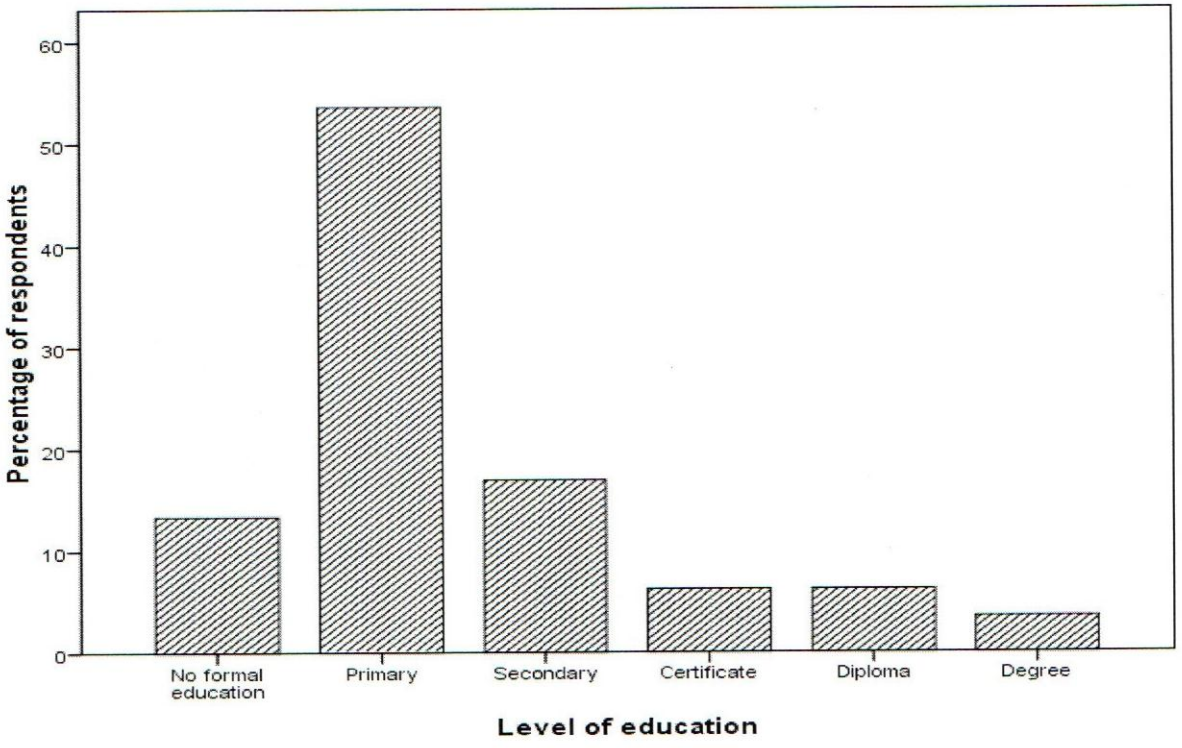

Figure 6: Education level of the respondents

The low numbers of individuals with tertiary education can be attributed to high rates of school dropouts in primary and secondary levels due to lack of school fees and/or early marriages in the case of girls. This increases their dependency on forest resources as most school dropouts are unemployed. The study found out that the educational level of the respondents had a significant relationship with the use of charcoal ($P = 0.000$, $\chi^2 = 23.025$) but not with the other forest products. Comparatively educated respondents were more likely to use of other sources of energy like gas and solar energy than illiterate respondents. This is possible because of high awareness in primary, secondary and tertiary institutions concerning the destructive effects of charcoal burning on forests. This sentiment is further echoed by Obua *et al.* (1998) who note that people with higher education tend to be employed and do not use many forest products.

4.3.4 Occupation of household heads

More than half of the household heads (59.8 %) carried out farming, 17.9 % casual laborers, 12.5 % civil servants while 9.8 % engaged in small scale businesses. Kaibos location was the leading in number of farmers (25.9 %) while Talau had the highest number of casual laborers (11.6 %) as shown in figure 7.

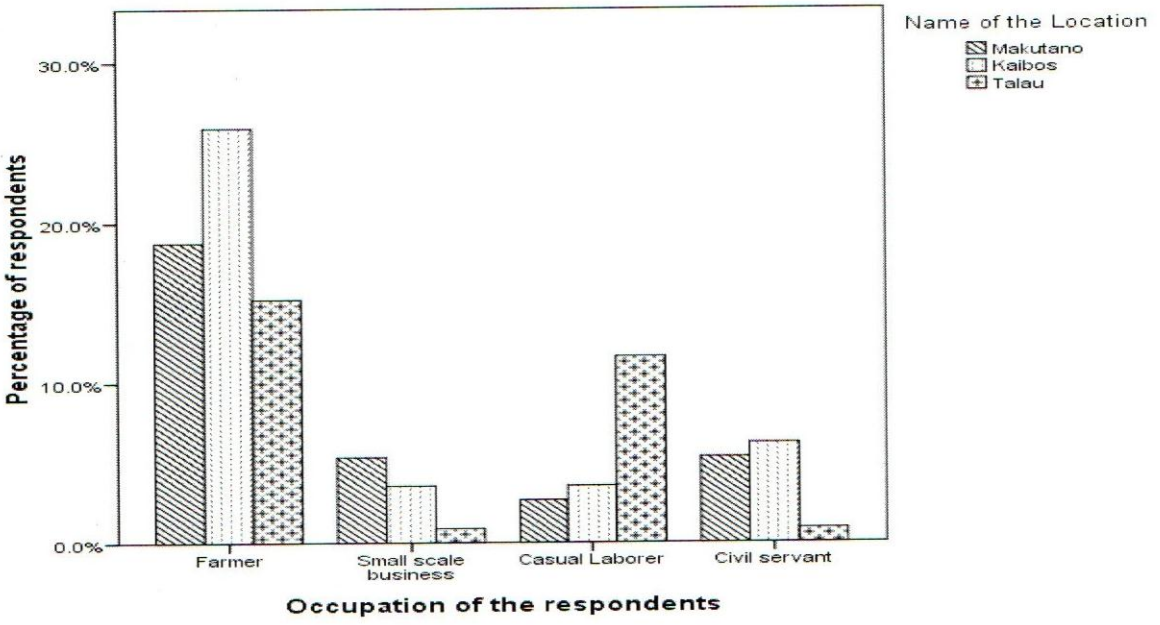

Figure 7: Occupation of household heads

The Chi-square test was used to assess the relationship between the occupation of the respondents and use of forest products. The results showed a significant relationship between the occupation of the respondents and the use of charcoal ($P = 0.003$, $\chi^2 = 13.895$). The large number of farmers is because the respondents reside in rural areas with farming as the main source of livelihood and the absence of production or industrial companies which could offer them salaried jobs. Therefore, the residents have undertaken farming as a form of self-employment and way of life to meet their day to day needs. Most farmers practice mixed farming. The food crops grown by majority of the farmers include maize, beans and Irish potatoes. Other food crops are sweet potatoes, millet, sorghum, kales, cabbages and bananas. Coffee and tea make up the dominant cash crops. Animals kept include cattle, sheep, goats and donkeys.

4.3.5 Income of the household heads

The income generated by 55.4 % of the respondents was below 20,000 Kenyan shillings (Kshs) per month. This is considered as low income based to high cost of living in the country. A considerable number (42.9 %) reported a medium income of between 21,000-49,000 Kshs per month while those earning high income of above 50,000 Kshs per month were only 1.8 % of the respondents. There was no respondent from Talau location with a high monthly income.

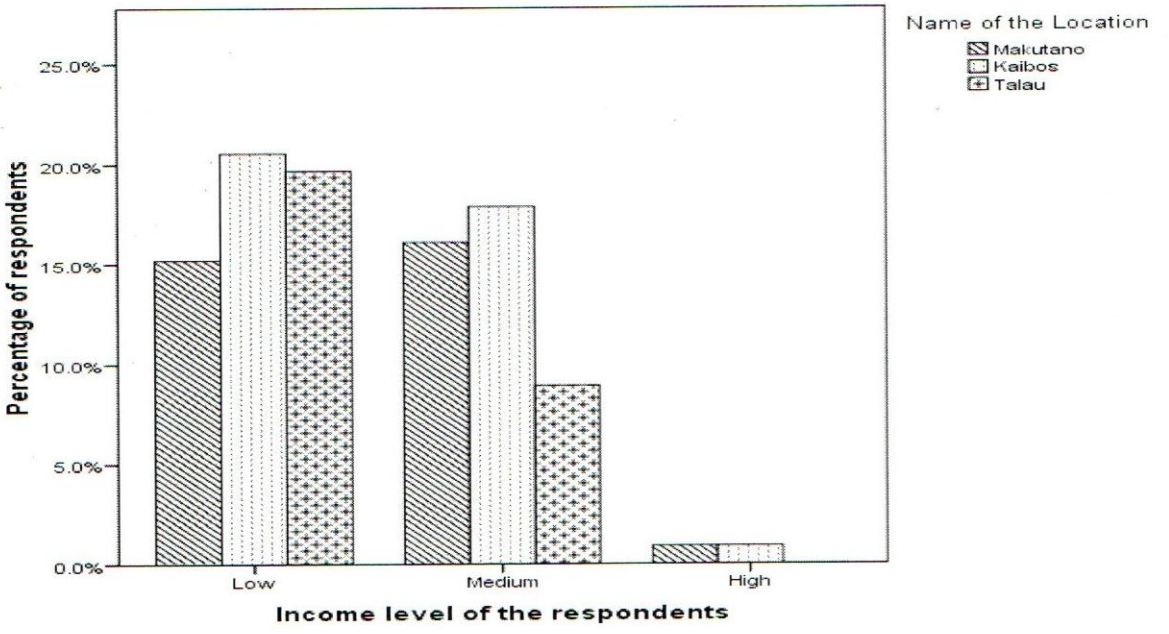

Figure 8: Income level of the respondents

A large number of household with the low income were farmers (66.1 %) where as those with high income were civil servants (100 %). Those with medium income were farmers (54.2 %), civil servants (22.9 %) and 18.8 % of the middle earners were engaged in small scale businesses. The Chi-square test was used to find out the association between the income of the respondents and their dependency on the various forest resources. The results depicted a significant association between the income of the respondents and their dependency on charcoal ($P=0.00$, $\chi^2 =19.702$) and building poles ($P=0.017$, $\chi^2 =8.200$). However there was no significant relationship between the income of the respondents and their dependency on firewood, herbal medicine, honey and grazing land.

The association between respondents' income and their dependency on charcoal and building poles could be due to the availability of these resources at low or even sometimes no cost. This is agreement with the findings of Urvashi *et al.* (2005), who suggest that resource dependence increases at all income levels with an increase in the level of common-pool biomass availability. Also the majority low income earners largely depend on the forest for their survival and efforts by the forest regulators to restrict their access on these forest resources could lead to conflicts. Timber, fuel wood and charcoal constitute significant economic incentives which provides poor people with immediate and significant cash incomes, as well as productive land (UNEP, 2012). The WCFSD, (1999) states that around 350 million of the world's poorest people depend almost entirely for their subsistence and survival needs on forests.

4.4 Forest use conflicts

Eighty nine percent of the respondents acknowledged the presence of conflicts. The nature of the conflicts revolved around the use of forest and its products. They cited two major types of conflict namely; the community versus the government and the community versus non-community members.

4.4.1 Community versus the government

Of those who admitted to the presence of conflicts in the region, 79 % cited the government and the community conflicts arising from resource use by the community. The issue of land takes center stage as a factor in the emergent conflicts. Sixty six percent of the respondents indicated land as a major cause of the conflicts between the government and local community. The local community claimed they have been denied their rights due to the fact that they have not been handed the title deeds and the necessary allotment letters to their ancestral land, that is Phase one of the Kapolet settlement scheme. The Sengwer claim that historically their ancestors settled peacefully in Kapolet before it was made a crown land. The land was then disposed from the ancestors without compensation. The ancestors included Kipemkoin, Kones arap Kiptas, Kirongo arap Sikirio, Kamirut Kimamet, Sikirio Kimekong and Arap Pem-bwein and according to the law the land in question ought to be returned to the original occupants as the first beneficiaries. However following the petition of Kapolet land reserve to the sengwer community in Trans-Nzoia district for resettlement exercise by the government, the community

strongly feels that justice was not done in the allocation of the stated land. They say that some influential leaders in the former regime through the provincial administration mushroomed from nowhere forming a committee and started allocating the said land to themselves and their relatives. Also the residents are calling for instant resolution of the pending allocation of Phase two of Kapolet land settlement scheme. This is in line with article 63 (d) of the constitution of Kenya (2010), which recognizes ancestral lands and lands traditionally occupied by hunter-gatherer communities as community land. The issue of the forest boundary proved to be another bone of contention. Residents claim there is no clear forest boundary demarcation to mark the end of the forest and the start of community land.

The restriction of access and harvesting of forest products by the management authority result in conflicts. The community views this as a denial of their rights since the Sengwer being one of the indigenous communities has been depending on the forest and its products for their livelihoods. The product harvesting has been sustainable and no major destruction has been reported in the past according to the community members. However, in the recent past there has been a shift towards farming and livestock keeping by most of the community members although some have stuck to their past mode of life of hunting and gathering. According to the Forest Peoples Programme (FPP) report on forest people numbers across the world (2012), forest communities do not have secure tenure and are denied access and use of their territories because of inadequate government policies, extractive industries' activities, or conservation initiatives, such as protected areas.

4.4.2 Community versus non-community members

The study area community mainly comprises the indigenous Sengwer tribe (91 %) while the remaining 9 % is made up of a mixture of Luhya, Pokot and Sabaot tribes. According to 21 % of the respondents, there exist conflicts between the community and non-community members from neighboring communities including illegal timber loggers and charcoal burners. The residents claim that there is encroachment by non-community members. This is confirmed by satellite images of the forest which show a 4.4 % decrease in the forest cover between April 1984 and February 2001 as shown below.

Figure 9: Forest cover in April 1984

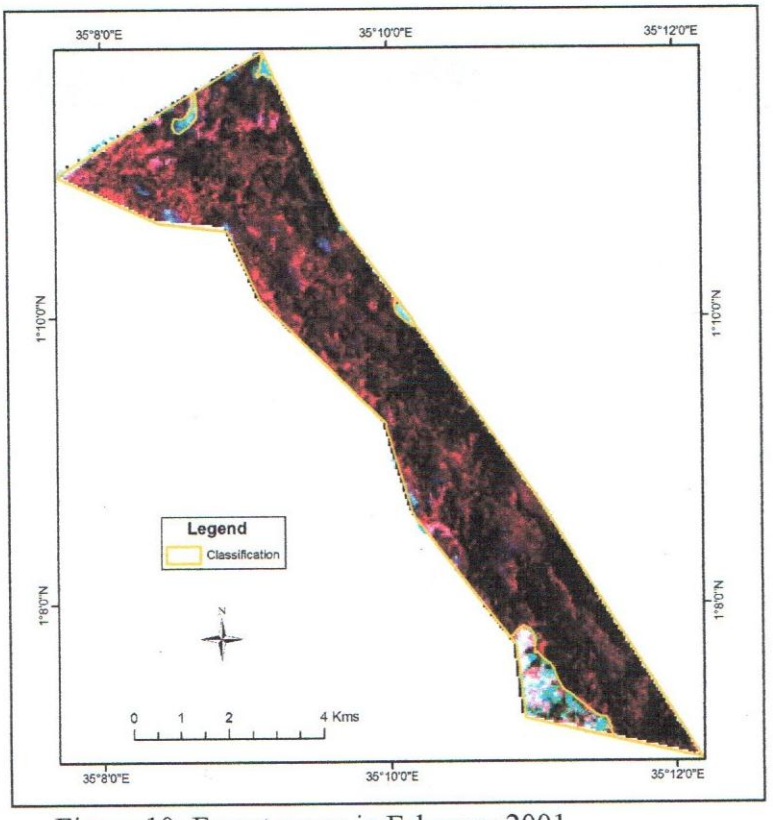

Figure 10: Forest cover in February 2001

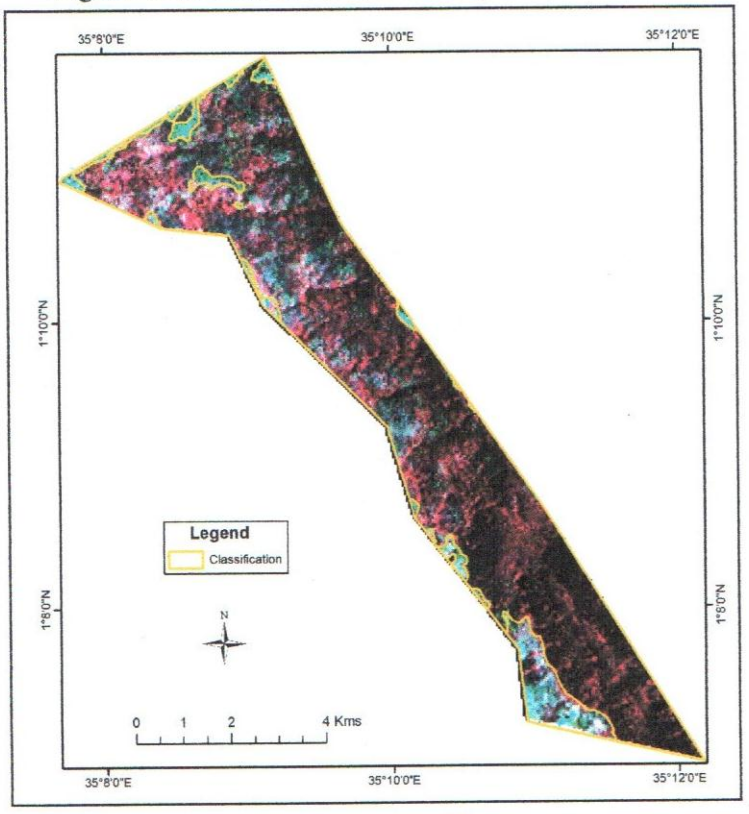

Table 2: Classification of Kapolet forest

Kapolet forest			
Class Type	**1984 (Sq. Kms)**	**2001 (Sq. Kms)**	**Comments**
Forest	14.467	13.832	Decrease
Disturbed forest	0.821	1.458	Increase

The areas within the yellow outlined polygons represents the portion of the forest that has been disturbed. This translates to an increase in disturbance from 0.821 Square kilometers in 1984 to 1.458 Square kilometers in 2001. The major causes of change in forest cover include livestock grazing in the forest, illegal timber logging and charcoal burning. Grazing of livestock in the forest leads to degradation as it discourages undergrowth. Illegal timber logging and charcoal burning has been ongoing and the respondents attributed these practices to people from outside the community. They claim the loggers are usually given the go ahead by the very authority which is supposed to protect the forest upon receiving bribe. This has angered most of the residents as they themselves have restricted access to the forest resources and their efforts to conserve the forest yields to nothing. The above conflicts have had several negative effects on the livelihoods of the community members and the forest. This has led to increased poverty as most residents live as landless squatters hence they cannot carry out farming to meet their needs. The conflicts also contribute to further destruction of the forest and thereby leading to loss of biodiversity and other forest resources.

4.5 State of forest management and conflict management measures in Kapolet

4.5.1 Respondents perception on forest management

Eighty three percent of the respondents expressed dissatisfaction in the way the forest resources are managed with only 17 % showing satisfaction. The major complains included few forest guards deployed by the KFS to guard the forest. Kenya forest service has only about one forest guard in charge of 3,000 hectares of forest (Ongugo *et al.*, 2008). The guard often lacks facilitation in terms of transport, arms, ammunition and means of communication.

The respondents also complained of harassment by the guards when collecting fuel wood and other forest resources even when they had obtained permits. The other management issue was exclusion of the community members in the management of the forest. Seventy eight percent of those interviewed said they were hardly involved in management with 22 % acknowledging involvement in management of the forest through employment of local forest guards. Lack of community involvement has made it harder for the authorities to effectively manage the forest resources as degradation will continue while the members watch since they feel they are not part of the management. This is in agreement with Obua *et al.* (1998) who observed that genuine involvement of local communities in the decision making process and management of forest resources has advantages as it serves to promote public interest and confidence in forest activities besides helping to build credibility and transparency in forest management. It also reduces management costs and forest degradation and increases benefit flow to local communities. Conventional forest management strategies should also include recognition of the roles of indigenous people, their knowledge and social organization in forest management as in the case of the Kaya community and Kaya forest in the coastal region of Kenya.

4.5.2 Conflict management measures

Seventy five percent of the respondents cited lack of organizations or individuals to manage the ongoing conflicts. Twenty five percent acknowledged conflict management measures by some organizations including the catholic peace and justice commission and the Natural Resource Management (N.R.M). The measures included organizing negotiations between the conflicting parties, provision of alternative livelihoods to the locals to reduce overdependence on forest resources and issuance of permits for those wishing to harvest resources to avoid uncontrolled harvesting (Table 3).

Table 3: level of community satisfaction with current conflict management measures

Level of satisfaction	**Frequency (n=100)**	**Percentage (%)**
Very satisfied	1	1
Satisfied	6	6
Somehow satisfied	34	34
Dissatisfied	56	56
Very dissatisfied	3	3
Total	100	100

More than half of Kapolet forest community members are dissatisfied with the current conflict management measures in place citing lack of commitment by forest regulators in trying to come together with community members and getting to understand the root cause of the conflicts and forging the way forward. In general, conflicts over natural resources, including timber, are difficult to resolve and often reoccur over time. However, conflicts can be mitigated with approaches and interventions that strengthen institutions and develop capacity to manage conflict (Capistrano, 2003).

CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Most of the residents around Kapolet forest depend on the forest for their livelihoods. The major resources harvested from the forest being fuel wood. Other products include honey, herbal medicine, water collection, building poles, grazing land, charcoal and game meat. Other benefits brought about by the existence of the forest include reliable rainfall, and development projects of schools and water supply in the area. Dependency on the forest is influenced by demographic and socio-economic characteristics. This is depicted by a significant relationship between income, age, level of education, occupation and utilization of some forest resources like charcoal, building poles and honey.

Two types of forest use conflicts exist in Kapolet forest the first one being between the local residents and the government mainly due to land allocation and restriction on access to forest resources. The second type of conflict is between the forest community and non-community members who have been accused of degrading the forest resources. Lack of community involvement in forest management and inadequate facilitation of the management personnel are the main shortcomings in forest management in Kapolet forest.

5.2 Recommendations

A wide range of alternative livelihoods should be provided to the forest community to reduce their dependence on the forest products. This is because with the projection of population growth the forest can no longer fully support the growing population. Viable alternative livelihood projects in the region that could improve the welfare of the community include bee keeping, livestock keeping, agroforestry, horticulture, cash crop farming (tea, coffee and pyrethrum) and poultry keeping. Alternative sources of energy like solar and biofuel should also be adopted by the community members. Clean Development Mechanisms (CDM) projects should be initiated in the area to improve the local economy through employment creation and poverty alleviation via carbon credits benefits to farmers, in addition to promotion of renewable

energy and energy access. An electric perimeter fence should be put around the forest to control cases of wild animals and cattle rustlers who use the forest as a hideout.

Support should be provided to the community members through agricultural credit facilities, improved transport and marketing of their agricultural produce and improved technology to promote agriculture and livestock keeping. This will increase their income and hence less dependence on the forest. Education should also be promoted in the area through, discouragement of early girl child marriages and provision of scholarships and bursaries for bright needy students as this will enhance the school completion rates hence increased employment in the area and decreased dependence on the forest.

Land ownership should be clearly defined and land titles issued to genuine community members in addition to clearly demarcating the forest boundary to prevent encroachment into the forest. The traditional rights of the indigenous Sengwer/Cherang'any people to forest have to be recognized as it is of aesthetic and spiritual importance to them. Participatory Forest management should be implemented to fully involve the local community through its members in the management of the forest for a better outcome. The national government should also consider nominating Kapolet forest as a biosphere reserve as it meets the three complementary functions of a biosphere namely conservation, development and logistic support.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

Informed consent and cover page

My name is Brian Kanyongi. I am a student at Egerton University undertaking a Master's degree in Environmental Science. I am currently undertaking a research on forest resources utilization and conflicts in Kapolet forest and conducting a survey in households of the area.

I would like to ask you some few questions related to the subject. The information you will provide will be useful in finding out the status of the conflicts and planning future management of the same in this region and the whole country.

Participation is voluntary. All information you give will be confidential.

Questionnaire Number ☐

Interviewee Number ☐

Date of Interview	Day:	Month:	Year:

SECTION I: HOUSEHOLD CHARACTERISTICS

		2	3	4	5
ame of the respondent optional)		Village	Location	Constituency	County ....
	7	8	9	10	11
ender	Age (years)	Level of education	Occupation	Income level	Area
. Male ☐ .Female ☐	a.18-25 ☐ b.26-35 ☐ c.36-60 ☐ d.Over 60 ☐	a. None ☐ b. primary ☐ c. secondary ☐ d. Certificate ☐ e. Diploma ☐ f. Degree ☐ g. other (specify)	a. Farmer ☐ b. Business ☐ c. Laborer ☐ d. Civil Servant ☐ e. Private sector ☐ f. Other (specify)	a. Low ☐ b. Medium ☐ c. High ☐	d. Urban ☐ e. Rural ☐

SECTION II: FOREST USE

12. Do you benefit from the forest and its products?

a. Yes ☐ b. No ☐

13. If yes what benefits and resources do you get from the forest.

.....

.....

.....

14. From your experience how accessible are the forest products? Kindly provide an explanation.

	Rating	Explanation
A	Very Accessible ☐	
B	Accessible ☐	
C	Somewhat Accessible ☐	
D	Inaccessible ☐	
E	Very Inaccessible ☐	

15. Land ownership

a. Private ☐ b. Communual ☐ c. Government ☐

d. Squatter ☐ e. Others.....

16. Are there any negative impacts brought about by the forest?

a. Yes ☐ b. No ☐

17. If yes name them.....

.....

18. What can be done to minimize these impacts?

.....

.....

.

SECTION III: FOREST MANAGEMENT

19. Who owns the forest?

a. Community ☐ b. State ☐ c. don't know ☐

20. Are the forest resources effectively managed?

a. Yes ☐ b. No ☐

21. If yes, what management practices carried out by the authorities are you aware of?

.....

.....

22. Do you have any complains concerning the management of the forest?

a. Yes ☐ b. No ☐

What are the three major complains in order of priority?

a.....

b.....

c.....

23. Have you ever complained to any authority/individual?

a. Yes ☐ b. No ☐

24. If yes whom did you complain to?

.....

25. Were your complains effectively addressed?

a. Yes ☐ b.No ☐

26. If no what are your recommendations on how these complains can be addressed to improve the management of the forest?

.....

.....

27. Is the Community involved in management of the forest?

a. Yes ☐ b.No ☐

28. If yes, what is the role of the community in forest management?

.....

.....

SECTION IV: FOREST USE CONFLICTS

29. Are there any conflicts over the use of the forest and its resources?

a. Yes ☐ b. No ☐

30. If yes who are involved and what causes these conflicts?

	Communities involved	Causes
A		
B		
C		

31. How frequent are the conflicts?

a. Very frequent ☐ b. Frequent ☐ c. Less frequent ☐

32. What are the effects of the conflicts?

.....

.....

.....

33. Are there organizations/ offices/ individuals responsible for conflict management and resolution?

a. Yes ☐ b. No ☐

34. If yes what methods are being employed to manage these conflicts?

.....

.....

.....

35. How can you rate your satisfaction with the conflict management measures currently in place?

a. Very satisfied ☐

b. Satisfied ☐

c. Somewhat satisfied ☐

d. Dissatisfied ☐

e. Very dissatisfied ☐

36. What are your recommendations on how better these conflicts can be managed and prevented from recurring in future?

.....

.....

.....

Thank you very much for your time and contribution.

END

APPENDIX 2: LETTER OF RESEARCH AUTHORISATION

EGERTON UNIVERSITY
Tel: Pilot. 254-51-2217620
254-51-2217877
254-51-2217631
Dir.line/Fax: 254-51-2217847
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P.O. Box 536 - 20115
Egerton, Njoro, Kenya
Email: bpgs@egerton.ac.ke
www.egerton.ac.ke

OFFICE OF THE DIRECTOR GRADUATE SCHOOL

Ref: NM12/2740/10 Date: 30th July, 2012

Mr. Brian Kanyongi Rotich
Dept of Env.Sci
Egerton University
P. O. Box 536
EGERTON

Dear Mr. Rotich

RE: CORRECTED PROPOSAL

This is to acknowledge receipt of two copies of your corrected proposal, entitled **"Unsustainable Forest Management and Forest Use Conflicts in Kapolet Forest, Cherangani Hills, Kenya".**

You are now at liberty to commence your fieldwork.

Thank you.

Yours sincerely,

Prof. M.A. Okiror,
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

c.c. Supervisors

MAO/vk