

**SOCIO-CULTURAL FACTORS INFLUENCING WOMEN'S
PARTICIPATION IN TREE GROWING IN SIAYA COUNTY, KENYA**

JOHN ODIAGA OLOO

A Thesis Submitted to Graduate School in Partial Fulfilment of the Requirements for the Award
of the Degree of Doctor of Philosophy in Environmental Science of Egerton University

EGERTON UNIVERSITY

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DECLARATION AND RECOMMENDATION

Declaration

I declare that this is my original work and has not been previously published or presented for the award of a degree in any university.

John Odiaga Oloo Signature.....Date.....

Recommendation

This research has been submitted with our approval as university supervisors.

Dr. Paul. M. Makenzi Signature.....Date.....

Department of Environmental Science, Egerton University

Prof. John Gowland Mwangi Signature.....Date.....

Department of Agricultural Education and Extension, Egerton University

Prof. Shaukat Abdulrazak Signature.....Date.....

National Commission for Science, Technology and Innovation

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DEDICATION

This work is dedicated to my mother Dorina Oloo, wife Rose Anyango, children, daughters and son's in-laws and grand-children.

ABSTRACT

Climate change resulting from global warming is currently one of the global environmental issues of concern. Trees play a very important role in mitigating this problem through sequestering carbon dioxide which is one of the major green house gases. The importance of trees is incontestable as they have many environmental, social and economic benefits. Effective community participation plays an important strategy for ensuring adequate tree cover but in some communities, some socio-cultural factors hamper participation of women. In Kenya, environmental degradation occasioned by low tree cover is evident. The current tree cover in the study area is approximately 3% which is far below the recommended national level of 10%. However, those socio-cultural factors that might influence women's participation in tree growing in the study area has not been fully studied and documented. Therefore, the broad objective of this study was "to identify and document the socio-cultural factors which influence women's participation in tree growing in Siaya County, Kenya". This study employed a cross-sectional survey research design. The instruments used were; questionnaire, discussion guide and interview schedule. Reliability of 0.710 was realized when pilot tested. A sample size of 280 respondents i.e. 190 women and 90 men were interviewed. Data analysis used Statistical Package for Social Sciences (SPSS) software i.e. Coefficient for determination (R^2) for quantitative data at 0.05 confidence level, and for descriptive data, pie-charts, tables, percentages generated. On land title deeds, 95% had men names only, 50% agreed traditions influence participation, and about 40% agreed beliefs influence while for gender, 54% agreed that it does not. On triangulation, traditions, beliefs, and land tenure were confirmed as influencing women's participation in tree growing. The R^2 values realised were: 3.6%, 3.6% and 4.0% with *p-values* significant at 0.037, 0.037 and 0.280 respectively. Three tree species women are forbidden from growing are *Euphorbia triculli*, *Albizia coriaria* and *Tamarindus indica*. In conclusion, the three socio-cultural factors influencing participation of women are: traditions, beliefs and land tenure. To increase tree cover, women should be involved in tree growing and Luo Council of elders should sensitize community members to discard traditions and beliefs which discriminate against women, and include names of women in land title deeds.

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LIST OF ACRONYMS AND ABBREVIATIONS

APRM	African Peer Review Mechanism
CBO	Community Based Organization
CBS	Central Bureau of Statistics
CBNRM	Community Based Natural Resources Management
DAO	District Agricultural Officer
DLPO	District Livestock Production Officer
DFO	District Fisheries Officer
DDO	District Development Officer
DN	Daily Nation
DEO	District Environment Officer
DFEO	District Forest Extension Officer
EMCA	Environment Management Coordination Act
FBO	Faith Based Organization
GAD	Gender and Development
GOK	Government of Kenya
HIV	Human Immunodeficiency Virus
INSTRAW	International Research and Training Institute for Advancement of Women
IFOAM	International Federation of Organic Agriculture Movements
IDRC	International Development Research Council
KEFRI	Kenya Forestry Research Institute
KEFADO	Kenya Female Advisory Organization
KNCHR	Kenya National Council for Human Rights
LM	Low Marginal
MDG	Millennium Development Goals
NEMA	National Environment Management Authority
NGO	Non-Governmental Organization
PFM	Participatory Forest Management
PEAP	Provincial Environmental Action Plan
UNDP	United Nations Development Programme

USDA	United States Development Agency
UNESCO	United Nations Educational, Scientific and Cultural Organization
WB	World Bank
ZFM	Zonal Forest Manager

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Tree growing involves planting and tending of tree germplasm for farm forestry, land reclamation, agro-forestry, woodlot and landscaping purposes. Different types of trees that grow in Bondo and Siaya sub-counties in Kenya include: fuel wood and timber trees, fruit trees and ornamental trees, among others. Trees are useful in many ways as they filter pollution from the air, help recycle water, prevent soil loss, create shade, shelter from wind and rain, and erosion control (DFO, 2009; DLPO, 2009; ZFM, 2010). Tree planting in the farms directly diversify the productivity of the farm making the ecosystem more resilient and sustainable therefore improving the standard of living of the family (IFOAM, 2002). In addition, it reduces the time taken by women to go to the forest to collect firewood and reduce the strain and dangers that they are exposed to while in the forest (Kinyanjui & Njenga, 2002).

Land tenure and land size have a bearing on tree growing. Farmers would wish to try a new innovation or technology when they are sure of rights to land. Ways of land ownership is either by renting or by holding title. Farm size is another important factor because those with large sizes normally tend to try new innovations than those with small parcels (Rolling, 1990). Land tenure is a vital part of social, political, and economic structures (<http://www.fao.org/DOCREP/005>, 2012). However, according to Amudavi (1993), no significant relationship exists between farm size and uptake of any new innovation. Work done by Kalineza, Mdoe, & Mlozi, (1999) in Gairo division of Morogoro area in Tanzania on factors influencing farmers in adoption of soil conservation techniques such as tree planting establish that land ownership does not significantly influence the probability of planting of trees. Similarly, land tenure is less important in influencing their decisions to plant trees for soil conservation. Bradley (1991) agrees that the relationship between land tenure and tree growing has far reaching implications for development of agro-forestry for environmental conservation and these trees could be cut and used as fuel wood and also as building poles. According to Ouma, Ouma, Bett, Chuchu, Muriki, & Ndongye (2004), land tenure insecurity has contributed to low investment in soil conservation measures with in River Njoro watershed. Proper use of land

should strive to blend between indigenous knowledge with appropriate technology based on prevailing environmental conditions (Critchely, 1987).

Tradition plays an important role in influencing a person's decision-making, including their likelihood of adopting changed practices and vary between or among individuals and regions (Richards, Lawrence, & Kelly, 2003). Traditions are formed over generations because they are believed to be the best or most appropriate ways of doing things. As such, there is much resistance to discarding long-held traditions; both for sentimental as well as for practical reasons (Dunn, Gray, & Phillips, 2000). Social norms are the informal rules in a society that govern how an individual should act in a particular social context (Richards *et al.*, 2003; Finlay, 2004).

Ekisa (2010) in his research on socio-economic and cultural aspects for community participation in afforestation and agro-forestry programs in Teso district, Kenya, notes that the culture of people has a lot to do with making important decisions. He concludes that existence of beliefs and taboos have prevented women from planting certain tree species. Women generally start their daily activities earlier than men and end up retiring to their beds after men (Ochola, 2002). Women are involved in many household chores which prevent them from engaging in planting of trees as opposed to men (Ekisa, 2010). A study by Rogers (1983) in Tanzania observes that women are unaware that they work more than men but they are unable to change the situation. The women's work day was longer and involving more work than men's work day because of women's household responsibilities. The gender norms regarding the division of labor seem to revolve around the needs of men. The rules fluctuate to benefit the men depending on the particular situation (Feinstein, Feinstein, & Sbrow, 2010). Work done by Chavangi (1985) and also Kerkhof (1992) in Kakamega County conclude that due to many household chores, women have little time to participate in agro-forestry.

Growing of trees is an exercise that can be done by all regardless of their social status in the society and gender. It is a human right and ensures quality and a healthy environment. Women should be involved in this exercise because they contribute close to 74% of small scale farm managers (Wangari, 2009). Research by Christinah, Petterson, & Uttaro (2002) in the then Siaya and Kisumu counties established that women's participation in tree planting was seriously hampered by beliefs and taboos. According to the DFEO, in Bondo County, it is still

unimaginable for women in Luoland to participate in tree planting. In case the husband discovers that his wife has planted any tree seedlings, sacrifices must be done to cleanse the home lest a bad omen befall them (Personal discussion).

Environmental degradation results when there is deterioration of the environment through depletion of resources, such as air, water, and soil. The destruction of the ecosystems and the extinction of animals and plants when natural habitats are destroyed or natural resources are exhausted are evidence of confirming environmental degradation. Factors that lead to land degradation are two folds: first is natural (droughts, storms on sea, land and deserts such as hurricanes, tornados, catrines and volcanic eruptions), and second are human factors which include deforestation, industrialization and urbanization. These factors lead to water, air and soil pollution (IPPC, 2007; Kum, 2008; Powell, 2008).

Indicators of low tree coverage in the study area are; surface run-off, siltation of dams, rivers and lakes, high turbidity of water bodies after rainfall, presence of gullies, charcoal burning, open grounds, drying of springs, heavy brick making, shrinking of water bodies and increased distance covered by women while collecting firewood (DAO, 2010; NEMA, 2011; ZFM, 2011). Commercial tree planting at farm level was 25,000 seedlings in Bondo sub-county, while 45,000 seedlings were realized in Siaya during 2010 planting season (ZFM, 2010). During the same planting season, Bondo sub-county planted 20,000 seedlings for Agro-forestry whereas in Siaya sub-county, 40,000 seedlings were planted. A small number of women participating owned tree nurseries. In Bondo sub-county, out of 14 tree nurseries, only four were owned by women while in Siaya sub-county, out of 173 tree nurseries, 37 were owned by women groups and 15 by individual women (ZFM, 2011).

Globally, there is an increased concern that inadequate ground tree cover is one of the contributors to climate change. Reduced carbon sequestration by trees is leading to increased green house gases in the atmosphere resulting in global warming. In Kenya, this problem is even more evident as a result of low tree canopy cover which has declined from 3% to 1.7% in the last decade due to human factors. 1.7% is very low compared to the international figure of 10%. Locally in Tree coverage in study area of Bondo and Siaya districts is 3% and 2.8% respectively (ZFM, 2011).

The set target by Zonal Forest Managers for Bondo and Siaya during 2010 planting season for commercial tree planting was 50,000 seedlings and 80,000 seedlings but only 25,000 seedlings and 45,000 seedlings were planted. For agro-forestry trees, Bondo sub-county targeted 30,000 seedlings while Siaya sub-county targeted 60,000 seedlings but the two sub-counties realized 20,000 seedlings and 40,000 seedlings respectively (ZFM, 2011). The two sub-counties had the potential of having more tree coverage as the area experience good weather, soils, temperatures and rainfall patterns. This problem of inadequate tree growing resulting in low ground tree cover is partly due to socio-cultural challenges of non or inadequate participation of women. Various research works on socio-cultural factors have portrayed women as not fully participating in the field of tree growing but these actual socio-cultural factors have not been identified in the study area. Both men and women are the ones who are responsible for planting and caring for trees. No research has documented any restrictions to men culturally as regards to tree growing. Knowledge of the various socio-cultural factors influencing tree growing by women in the study area (Siaya County) would help in developing strategies for women with the aim of improving tree cover.

Concerning policy issues as regards environmental conservation, it recognizes participation of all stakeholders. According to the new Constitution of Kenya (2009), women and men have the right to equal treatment including the right to equal opportunities in political, economic, cultural and social activities. The Government Regulations under Farm Forestry, Rules of 2009 has the objective and purpose of promoting the establishment and sustainable management of farm forestry for the purposes of; maintaining a compulsory farm tree cover of at least 10 percent of any agricultural land holding, conserving water, soil and biodiversity, sustainable production of wood, charcoal non-wood products and carbon sequestration and other environmental services (GOK, 2009). In Kenya, a key provision in the Forest Act of 2005, which currently is under review, is the requirement for intensive stakeholder participation in decision-making. The Act requires public consultation for all major forest decisions under the third schedule, and prescribes an elaborate procedure for the public to present various issues before decisions are made and published. Among others, public consultation is required for Joint Forest management Agreements (Section 46), variation of boundaries of revocation of state or local authority forests among others. The proposal further approves the *locus standi* (legal standing) in a court of law, which legally enables concerned citizens to seek redress in courts if they are dissatisfied with a

decision (Section 58: Restraint of breaches of the Act). Under Participatory Forest Management (PFM), the Act provides for establishment of Community Forestry Associations (CFAs) and requires that all partners to pull together their diversity to capture the interest of all stakeholders and encourages forest resources' benefits sharing as a means of facilitating, developing and sustaining partnerships (GOK, 2007). It is important to note that without the participation of women, it will not be easy to implement PFM because women are part and parcel of various communities.

1.2 The Statement of the Problem

Environmental degradation in Siaya County which can be as a result of low tree cover, can lead to other problems such as; increased surface run-off, soil erosion, siltation, turbidity and shrinkage of water bodies, open grounds, and gullies. In the past, various programs and projects had been initiated by the government and non-governmental organizations in the study area with the purpose of increasing tree cover yet not much has been achieved. While socio-cultural factors may have a great influence on limited participation or lack of participation by women in tree growing in most communities in Siaya County, these factors have not been adequately studied and documented. The purpose of this study was therefore to establish the same by identifying those factors and provide practical ways of involving women to effectively participate in tree growing.

1.3 Objectives of the Study

The broad objective of this study was to identify and document socio-cultural factors influencing women's participation in tree growing in Bondo and Siaya sub-counties of Siaya County, Kenya.

1.3.1 The Specific Objectives

- a) Identify and to document the dominant tree species and their distribution in Bondo and Siaya sub-counties, Siaya County.
- b) Identify the socio-cultural factors which influence tree growing in Bondo and Siaya sub-counties, Siaya County
- c) Investigate the gender issues in tree growing in Bondo and Siaya sub-counties, Siaya County

- d) Establish how socio-cultural factors influence women's participation in tree growing in Bondo and Siaya sub-counties, Siaya County

1.4 Research Questions

- a) Which are the dominant tree species and their distribution in Bondo and Siaya Sub-counties?
- b) Which are the socio-cultural factors influencing tree growing in Bondo and Siaya Sub-counties?
- c) What are the gender issues in tree growing in Bondo and Siaya Sub-counties?
- d) How do socio-cultural factors influence women's participation in tree growing?

1.5 Justification

Women normally are the ones gathering firewood and should be in the fore front to grow and tend for more trees. When trees are within reach of women, less time will be taken for firewood collection and more time devoted on other productive activities. Due to population pressure, trees are being cut to create farmlands. Weather patterns have contributed to crop failures which have led women resorting to other coping mechanisms like charcoal production and selling of firewood thus resulting in further environmental degradation.

According to the 2009 Human and Household Census in Kenya, Bondo sub-county had 76,468 males and 81,054 females while Siaya sub-county had 87,502 males and 99,741 females (GOK, 2009). It means that the numbers of females were higher than males in the two sub-counties. The presence of trees will reduce soil erosion, restore soil fertility and act as sink for carbon-dioxide which is a major contributor to global warming. The findings of this study will contribute towards the attainment of Millennium Development Goals numbers one, (Eradicate extreme poverty and hunger), three (Promote gender equality and empower women), and seven (Ensure environmental sustainability) and will also assist policy makers to make appropriate decisions as regards to tree growing in Bondo and Siaya sub-counties.

1.6 Scope of the Study

The scope of this study was confined to Bondo and Siaya Sub-Counties. These two sub-counties are occupied by Luo community and were the initial transit or settlement areas when the

community reached Kenya on their way from Southern Sudan via Uganda. The socio-cultural issues under study are; tradition, beliefs, gender, and land tenure system. The socio-demographic factors considered as intervening variables are; age, gender awareness and education level. A cross-sectional survey design was used to carry out the study from November 2012 to January 2013.

1.7 Definitions of Terms

Conservation: This is the sustainable use of resources for present and for future generations.

Culture: This is what binds some people together and very distinctive from other peoples' way of life and belief. It is ethnicity specific but not static.

Environment: this is the totality of nature and natural resources plus the cultural heritage, infrastructure and other man made facilities that facilitate socio-economic activities.

Environmental Degradation: This is any activity that lowers the quality of the environment

Farm forestry: Means the practice of managing trees on farms whether singly, in rows, lines, boundaries, or in woodlots or private forests

Gender: These are socially constructed roles and the resulting relationships between women and men, girls and boys in terms of rights, obligations and opportunities in a specified setting

Gender Daily Calendar: This is an illustration of the work load of men, women, boys and girls in a 24 hours period

Key Informant: This is a person who has broad knowledge of the community especially its past, present and is capable of making future predictions on the trends identified. He or she is an opinion leader in the community.

Land Tenure: This is ownership of land that bestows absolute rights over land.

Norms: These are unwritten and non-formal ways by which community members behave towards various issues

Tree: This is timber producing plant, or shrubs, bush of any kind, and includes a seedling, sapling or reshoot of any age, or any part thereof

Tree Growing: This involves identifying tree types, deciding where they are planted, digging of holes, care given after transplanting, or wildy grown in terms of weeding, watering, pruning and putting fence around them

Social Issues: Refers to how actions taken by one member of the society influences others members of the same society

Tradition: Is a ritual or belief held by a given society and has been observed for along **time**

CHAPTER TWO

LITERATURE REVIEW

2.1 Socio-Cultural Factors

Socio-cultural factors are complex and focus on knowledge, beliefs, arts, morals, laws and customs and any other capacities and habits acquired by man as a member of a society. These factors are important because a member of the society needs to know them in order to participate in various activities (Tylor, 2006). Normally, in any society, the social issues are actions taken by individuals and have close interconnectedness with other people. The culture aspect of a society is concerned with questions of shared social meanings, that is, the various ways we make sense of the world. The meanings are generated through signs, most notably those of language (Cole, 2005). That is, culture is understood to be a fact of place. In so far as culture is a common whole way of life, its boundaries are largely locked into those of nationality and ethnicity (Baker, 2008). The process of globalization suggests that there is need to re-think on the conception of culture. Cultures are not pure, authentic and locally bound. They are the synergic and hybridized products of interactions across space (Bhabha, 1994). Culture is the peoples' way of life. It includes the way people worship, the homes they live in, and how children are taught the ways of a society. It also includes the food people eat, the way of dressing, and their recreational activities. This study was to find out whether socio-cultural factors had influence on women concerning tree growing. The findings of the study confirm that some socio-cultural factors do influence the participation of women in the field of tree growing.

2.1.1 Tradition and Customs

Traditionally, women have a lesser role than men in the decision making process that affect and control their own lives and those of their homesteads and entitlements (Flintan, 2003; Muir, 2006). Additionally, constraints on women's time often limit opportunities for their participation in public meetings (Vernooy, 2006). Hall (1997) holds the view that when two people belong to the same culture, it means that they interpret the world in roughly the same way and can express their thoughts and feelings about the world in ways which will be understood by each other. The culture depends on its participants interpreting meaningfully what is happening around them, and

making sense of the world. According to Barker (2008), language is the privileged medium in which cultural meaning are formed and communicated. It is the means and medium through which people form knowledge about themselves. Work done by Papadopoulus (2010) concludes that culture has some positive attributes which include: that it organizes individuals life daily, weekly, annually and the prevailing customs and traditions bind individuals to the group, that it provides individuals with the face-to-face human interaction and tactile contact that are needed for human development and survival and, that it gives a sense of belonging to a group that is collectively wiser than any individual.

Phiri, Franzel, Maforngaya, Jere, Katanga, & Phiri (2003) in their studies establish that proportionately more men plant improved fallow than women primarily because married women need consent from their husbands before planting trees. Kinyanjui (2002) observed that Kikuyu women plant more trees and mainly fruit trees like avocado that supplements family income; Kipsigis women are least involved in tree planting activities and only do so for medicinal tree species in order to reduce medical costs at family level and Kisii women are more involved in tree planting compared to the above women from the two communities. Kisii women are the ones driving the Kisii economy when it comes to choice of trees to be planted, site of planting and do the actual planting with out any cultural barriers and this has contributed to tree coverage which is close to 15% (District Forest Officer 2011). Tradition plays an important role in influencing a person's decision-making, including their likelihood of adopting changed practices. While traditions will differ between individuals and regions, it is clear that tradition underpins the "*social organization of agriculture*". Traditions are formed over generations because they are believed to be the best or most appropriate way of doing something (Dunn *et al.*, 2000). Nyasimi, Okang'a, Mutuo, & Masira (2008) at Sauri Millennium Village document that development in Africa are bound to fail due to the strongly embedded and practiced socio-cultural beliefs, rites, and norms. In particular, the socio-cultural practices are hindering women's accessing critical resources and from becoming active participants in development activities. In Africa, cultural practices exert a strong influence on human behavior thus affecting subsistence economic production, social organizations and structures (Sen, 2004). The cultural practices are complex and intertwined in the everyday lives of rural African people, creating an intricate link with development (Hantington, 2000; Mbokogu, 2004). According to Khadiagala (2001), cultural practices may not only restrict implementation of development programs but can

restrict participation as well. This study was to establish if tradition/customs influence participation of women in tree growing in the study area. The finding of the study confirms that tradition/customs does influence participation of women in tree growing and agrees with findings of Dunn *et al* (2000), that tradition plays an important role in influencing a person's decision-making, including their likelihood of adopting changed practices and differ between individuals and regions, and traditions are formed over generations because they are believed to be the best or most appropriate way of doing things, Khadiagala (2001) who notes that cultural practices may not only restrict implementation of development programs but can restrict participation as well and also Flintan (2003), that traditionally, women have a lesser role than men in the decision making process that affect and control their own lives and those of their homesteads and entitlements.

2.1.2 Beliefs and Norms

There are traditional beliefs or taboos about cutting or planting tree species among the Luo (Diamond, 1992). Cohen and Atieno-Adhiambo (1989) assert that in Luo community, it is a taboo for a woman to plant finger euphorbia. Korir (2002) similarly notes that in Kakamega district of western Kenya, lack of women's participation in tree growing is perpetuated through various taboos and beliefs. Harris (1940) argues that cultural values influence not only the original adoption or rejection of an innovation but also how the new idea is to be inter-grated into the existing way of life. In Bondo and Siaya sub-counties, cultural practices prohibit women from actively participating in environmental conservation measures like tree growing is common (DFO, 2009). This study was to investigate if beliefs/norms influence tree growing in the study area. The findings of this study agree with Cohen and Atieno-Adhiambo (1989) by asserting that in Luo community, it is a taboo for a woman to plant finger euphorbia. According to Korir (2002), notes that in Kakamega county of western Kenya, lack of women's participation in tree growing is perpetuated through various taboos and beliefs Chavangi (1984), found out that if a woman plants a tree, she will become barren or/and her husband will die What differentiates this study from the previous ones on beliefs/norms is that a part from recommending strategies which can be put in place in addressing this aspect of life, this study has also gone ahead to give the economic losses on our economy for not allowing women to grow particular tree species like *Euphorbia triculli*

2.1.3. Gender

Gender is ascribed system of social, economic, political and historic relations where inequalities are generated, developed, and reproduced. The role of land inheritance (by lineage, gender, and/or other culturally determined characteristics) is core determinant of effective accesses to land. Cultural aspects are thus of critical importance for the understanding and devising of any appropriate interventions for rural development (FAO, 2000). In summary, gender roles are: socially constructed, dynamic, learned, and complex. They differ within and between cultures influenced by age, ethnicity, religion, education, and socio-economic status. Gender demarcates responsibilities between men and women in: social and economic activities, access to resources, services and decision making authority (Ochola, 2002). According to Gender Concept Theory (Feminist Theory) it explains the extension of feminism into theoretical or philosophical discourse. It aims at the understanding of gender inequality. It also examines social roles, experiences, interests, and promotion of women's rights and focuses mainly on two scenarios: condition of women in the society and, women experiences subordination from men (Adams, 1991)

According to Rocheleau (1984), certain tree species may have culturally defined gender specific and ownership restrictions. Women provide the bulk of the agricultural labor force in many countries (World Bank, 2004). In Kenya, women provide 80% of the agricultural labor force (GOK, 2000b). Kimenye, Karugia, & Wanyoike (2002), recommend that extension services should address disparity against women in their strengthened efforts to pass over quantitative information about the benefits of fodder trees.

Kabeer (2008) contends that gender-specific constraints are made up of those societal norms and practices that apply to women or men by virtue of their gender. In as much as men are generally assigned a key bread winner role, they are also expected to have greater obligation to participate in social work. Women's access to paid work, on the other hand is likely to be influenced by their socially ascribed responsibilities for caring for family members and the extent to which they are expected to combine this with productive or paid work. The gender division of labor in production and reproduction will neglect other aspects of the social constructions of masculinity and femininity that prevail in different context of restrictions in women's work. Taboos against women or men restrict their participation in certain works.

Gender participations are mainly learnt through the process of socialization and through the cultural milieu of the society concerned. Gender prescriptions are especially evident in the division of labor in societies (Waswa, Otor, & Muganda, 2006). In working to try and break the traditional barriers like unacceptable participation of women in planting of trees in Bondo sub-county, KEFADO (2006) facilitates the understanding that both women and men have been disempowered through lopsided traditional socialization process which allocate gender roles very unfairly and which create high levels of expectations in the minds of women and men, eventually translating into untold anxiety in majority of men whose attempts to meet the social expectations become unachievable with the end results being defense mechanisms in terms of violence, yet it is fear of facing realities of life.

Women have a critical role in the conservation of Biodiversity and maintenance of ecosystem services as they depend on soil, fresh water, trees, fisheries, plant medicines, and other ecosystem services and make it imperative to provide them with greater autonomy in the way ecosystems are used and managed (GOK, 2006). In Kenya, gender policies have been created to address gender inequality. Ministries of Gender, Sports, Culture, Social Services and National Gender Commission among others have been set up. Several women have been appointed to key positions in the cabinet, Civil service and state corporations, but the government has not reached the levels expected by gender conventions and declarations ratified by Kenya. The laws that take away women's rights are still in place, and the values and culture of societies that foster discrimination against women are intact (APRM, 2003). The traditional gender roles of men and women play a large part in marriage and family dynamics. The gender roles are set by society but they can change as time changes. The economy has also had a large effect on gender roles (http://www.ehow.com/info-8337918_traditional-gender_roles-marriage.html, 2011).

Hambly (1992) in his study in Siaya County, found out that tree establishment on any piece of land was done by men since they have titles. Chiuri (1996) contends that in the Agikuyu community of Nyeri County, women were not allowed to plant trees but nurtured those which germinated from the wild seedlings. Oyuaya (1995) in a study in Machakos County found a significant gender difference in adoption and contributed this to the fact that women were more committed to farm work than their counter parts and hence could easily put into practice what they have learnt. There is certainly evidence that women are a driving force for natural resource

management (Davidson & Stratford, 2000). Makindi (2002) also reports that certain taboos and beliefs barred women and female children from planting trees in Kitui County, Kenya.

The introduction of gender adds another dimension to the analysis of the multi-dimensional niches in the rural landscape defined by space, time, specific plants, products and uses. Gender is a complicating factor due to the unequal power relationships between men and women in most societies. These power relationships, however, are subject to change (Rocheleau & Edwards, 1998). At the root of gender inequality is often the power of others to limit a woman's capacity to exercise the rights she chooses. Local laws and norms affecting women's rights generally prevail over statutory dictates and guarantees, although the former tend to be grounded in traditional patriarchal values while the latter increasingly reflect international standards of human rights and gender equality (Grigsby, 2004). This study has endeavored to demonstrate whether gender influences tree growing in the study area. The findings of this study supports those findings of Kabeer (2008), that gender-specific constraints are made up of those societal norms and practices that apply to women or men by virtue of their gender and Rocheleau (1992), who found out that certain tree species may have culturally defined gender specific and ownership restrictions. However, no concrete evidence was found to associate gender as a factor influencing tree growing by women in Siaya County. This was supported by 54.4% of household heads, discussion with key informants, women groups and Luo Council of Elders. None of the above researchers had come up with such findings in the study area.

2.1.4 Gender and Development (GAD)

One way of dealing with gender is to justify the special focus on gender inequality, and on women, by way of statistics and case studies that show the painful evidence of global gender imbalances at all levels. This evidence, combined with the argument that promoting women's rights will lead to sustainable development does help in advocating a gender-sensitive development approach (Sweetman, 2004). Gender has been shown to be a key determinant of rights to natural resources and to the benefits accruing from them (Watson, 2005). It has been proved that gender relations have a direct impact on the use, management, and conservation of natural resources (Agrawal, Yadana, Andrade, Bhattacharya, & Agrawal, 2006). Gender relations are always undergoing changes as men and women continue to haggle. Gender relations are dynamic and changing as a result of process of negotiations in response to changes in the

environment. Men are more likely to make decisions about access, often undermining women's needs and views, and yielding to negative social consequences (Watson, 2005).

This relationship between gender, environment and sustainable development can be one ridden with dichotomous dimensions and complexities (Waswa *et al.*, 2006). Gender and Development approach aims for full equality of women within the framework of economics. Apart from giving women the democratic right to participate, it is quite possible that if women are represented at all levels of decision-making, they would bring different views into the development process and debate different views (Braidotti, Charkiewicz, Hausler, & Wiering, 1994). According to the new Constitution of Kenya (2009), women and men have the right to equal treatment including the right to equal opportunities in political, economic, cultural and social activities. Although land is readily available to whoever needs it, its allocation is subject to men who control villages, homes or lineage heads. Usage of land is determined by male elders. Females had no say in land matters, even though they are the primary users of this important factor of production. In order for females to gain accesses to land, they do rely on their fathers, husbands and sons. While the ethics of gender, development, and participatory development, deals with challenges and changing relations of power, in practice, they can simply exasperate existing exclusion and unequal gender roles Cornwell (2003).

The achievement of the Millennium Development Goal three (MDG 3), i.e. promoting gender equality and empowerment of women, calls for removal of barriers to women's economic participation (World Bank, 2008). This challenges cultural norms, traditions and requires deep changes in day-to-day individual behavior and practices, which are normally regarded as "private matter of males" (World Bank, 2008). Environmental problems affect women in very specific ways and this was noted as early as 1982 when INSTRAW (United Nations International Research and Training Institute for Advancement of Women) involved women in solutions related to problems related to water, sanitation and energy. It is hoped that present and future environmental decisions cannot be undertaken without the active involvement of women.

In tracing the involvement of women in environmental conservation, Shiva (1989) found that the *chipo* (*tree-hugging*) movement in India is one of the most cited of the environmental movements of women. Ecofeminists have portrayed *chipo* as a movement that shows women's

concerns about environment and their interest in protecting the environment against the corporate male world. Jackson (1994) argues that under colonial rule the alliance of colonial and chiefly interests in natural resources management strengthened the position of dominant local chiefly–patriarchal interest and eroded those of women. Diduk (1998) records that in 1958, a women’s protest movement demonstrated outside the residence of the colonial officer and women were protesting against attempts to reinforce soil and water conservation based on contour ridge ploughing which created excessive labor for women. Women experience adversity of lived environment relations that are the product of power structure that mediate environmental relations which also include ideologies of gender. In this study, women are not free to make decisions concerning tree growing because men yield power of them as a result of control and access to resources. Women are the ones who suffer most consequences of environmental degradation because the study confirms that they long distances gathering firewood at the expense of engaging in other productive activities if they had trees to be felled nearby. This confirms the idea that unless women are actively involved in tree growing, the land cover in this community is likely to continue being low.

2.1.5. Land Tenure

Land tenure theory suggests that security of tenure is linked to higher productivity and better land management (Panayotou, 1993). This is due to the fact that whoever is investing is sure of usage of resources from his or her land. According to Mehra (1997), secure tenure of land make farmers become more inclined to invest in slow growing investments like trees or labor intensive land conservation practices. Insecurity of tenure or unclear rights to land is a strong disincentive to all forms of long term investments such as rain water harvesting structures. Where tenure is based on communal right, it requires communal decisions which may not be easy to obtain (Ngigi, 2003). According to IFAD (1992), those who have obtained individual title deeds to their farms are more likely to invest in soil and water conservation than those farmers with out the tenure. This study was to determine if land tenure has any relationships with tree growing. The study support findings of Ngigi (2003) that insecurity of tenure or unclear rights to land is a strong disincentive to all forms of long term investments and Mehra (1997) that secure tenure of land make farmers become more inclined to invest in slow growing investments like trees or

labor intensive land conservation practices. Lack of tenure to women is a disincentive to them with respect to tree growing.

2.2. Luo Social-Structure

Luo Nyanza is one of the places in Kenya where cultural structures are fairly strong and well defined with a strong Council of Elders and functioning to some degree (KNCHR, 2007). Traditions and customs of most Africans gave male members of their communities power based on trust. At present, the same African cultural practices are at cross roads and are no longer as strong as they used to be and as such, they hold little sway in the face of modern statutory law. At times they are deliberately being ignored, abused, distorted, misinterpreted and twisted for personal gains (KNCHR, 2007). Luo traditions are clear on the role of clans, family members, men, women, boys and girls, in any livelihood circumstances, in household and community based activities (Ochola, Muhia, & Mwarasomba, 2000). The various roles of boys are: defending the clan members against any external aggression, herding of animals, ploughing with animals, clearing of farm lands and compounds, building of various home structures, thatching of roofs, weeding, planting of trees and any other duty which the elders would assign from time to time. The duties of girls are: collecting water and fire wood, cooking, washing clothes, weeding and any other duty they may be assigned by elderly women while for women, they are charged with weeding of farms, collecting of water and fire wood, cooking and washing of clothes and men with the duties of engaging in herding of animals, building and thatching of houses, planting trees, making decisions of traditional issues, overall decision makers concerning all resources of the home. The basic social unit of the Luo was the family. The Luo community value large families and they therefore embrace polygamy. The Luo are religious and believe in God the creator whom they referred to as *Nyasaye* (Ochola *et al.*, 2000). Sacred shrines and trees exist for sacrificial purposes. Huge trees are associated with the supernatural powers. Example of such tree is *Ober* (*Albizia coriaria*). The ancestral spirits are particularly honored in the community and for that reason; children are named after the dead in order to appease their spirits.

2.2.1 Socio-Cultural Practices that Influence Tree Growing

Christinah *et al.* (2002) in their extension work in Siaya and Kisumu counties on the factors influencing women's participation in growing of trees, establish that women are traditionally

forbidden to grow trees due to culture. In addition, they observed that though the trend was changing, men are still expected to make decisions about species type and placement of trees. In some communities such as the Luo (study area), it is still considered culturally inappropriate and unacceptable for women to engage in tree growing and fencing (Peoples & Bailey, 2000). The Agikuyu community of Kenya believes that trees possess spirits capable of intervening in human affairs (Leakey, 1977b).

Bondo and Siaya sub-counties Strategic Plans 2005-2012 points out that for the implementation of the National Population Policy for Sustainable Development, the following have been identified as the gender issues: there exists inadequate participation and representation of women at all levels of decision making in development matters, there exists profound gender disparities in the provision of education and attainment of higher education at all levels of schooling, prevalence of negative cultural practices like barring women from growing trees, wife inheritance even if one is HIV Positive, and women not allowed to inherit properties. In addressing the same disparities, the two strategic plans have called for concerted efforts to decrease gender disparities and equal participation and representation of both men and women in all spheres of development. The subject area of study has been a concern to other researchers as well. This study was to recommend appropriate interventions for involvement of all women in the area of tree growing. The respondents were not only household heads but also key informants, women groups and Luo Council of Elders. The triangulation from the four target groups ensured adequate coverage of the study.

2.3 Environmental Conservation

Western Kenya, a densely populated region of the country, is an example of many areas in Africa where the continued threat to the World's land resource is compounded by the need to raise food production and to reduce poverty (KEFRI, 2005). Attainment of food security is intrinsically linked with reversing agricultural stagnation and safeguarding the natural resource base. Farmers in this region with farm size typically less than one hectare per household has many problems. Key among these are low and declining soil fertility, which is a reflection in low crop yields (maize yields being typically less than one tonne per hectare, fodder and fuel shortages, and low incomes from farming activities). Many households in this region suffer from food insecurity (Nordin, Niang, Jama, & Nyasimi, 2002).

According to Fosket & Fosket (1999), environmental conservation concerns about an ‘environmental crisis’ that have been raised by scientists from a wide range of disciplines (Chemistry, Biology, Atmospheric Science etc). These concerns have been publicly presented and argued by various environmental organizations such as Greenpeace, Friends of the Earth and Sierra club. The global conferences on the earth environment, from Stockholm in 1972 to Rio–de-Janeiro in 1992, and Buenos Aires in 1998, have brought together politicians and environmentalist issues through debate in the public arena. Conservation is not preservation for the former entails wise use while the latter connotes ‘no touching’. The study endeavored to show the importance of involving all stakeholders especially women in sustainably conserving the environment by involving them in tree growing.

2.4. Benefits of Controlling Environmental Degradation

Growing of trees will shorten the distances taken by women while searching for firewood and increase soil fertility which has a positive impact on both crops and livestock production. This is so because conservation preserves important soil nutrients which are critical for plants growth. It also results in social mobility and increases diversity resulting in greater economic opportunities (Powell, 2008). Other benefits include, improved air quality for they are effective in pollution reduction, help anchor soil and reduce storm run–offs, saving the high costs of draining ditches, storm sewers, and other engineered solutions. Trees can play an important role in deadening unwanted noise. Sound waves are absorbed by tree leaves, branches and twigs (Odingo, 2009a; 2009b; USDA, 2007).

Environmental issues are important in human development because of the centrality of natural resources in the enhancement of quality of life. Environment plays an important role in agricultural development and supports over 80% of Kenyans for income and food. In Kenya, environmental management is key to sustain tourism sector which is a major source of livelihood in addition to contributing to overall development. A country with problems like deforestation, pollution and poor conservation of fauna and flora is potentially incapable of assuring its population of a good quality of life. The environment is also related to quality of life expectancy in terms of its impact on the incidence and spread of air and water borne diseases. The effective management of the environment and the prudent utilization of natural resources are critical in fostering sustainable development (UNDP, 2002).

Environmental conservation contributes immensely to a healthy nation (low incidence of diseases, increased food production, industrial growth and increased foreign exchange). In addressing the environmental issues in Kenya, Environment Management and Coordination Authority Act of 1999 was enacted by parliament and created National Environmental Management Authority whose main concern is to deal with environmental issues on behalf of the government (GOK, 2007). There exists overwhelming evidence of climate change and one of the apparent signals is the rapid and drastic occurrence of glaciers on Mt. Kenya with scientists projecting that the ice cap on the mountain could disappear by 2020. Further there has been a wide spread change in extreme temperatures in Kenya. Data from the Meteorological Department show that cold days and cold nights have become less frequent, while hot nights have become more frequent. In addition, Lake Victoria and other lakes in the Rift Valley are showing serious decreasing water levels (GOK, 2008).

Environmental conservation is required in order to address already degraded land. The degradation process lowers the current and/or potential capacity of land to produce goods and services. It is important to note that continued deterioration of land may eventually lead to a permanent decrease of its biological potential and a deterioration of living conditions for inhabitants (GOK, 1997). One of the benefits of environmental conservation is increase in soil fertility which has a positive impact on both crop production and livestock production. This is so because conservation preserves important soil nutrients which are critical for plants growth. It also results in social mobility and increases diversity resulting in greater economic opportunities (Powell, 2008). Environmental benefits resulting if trees are used in conservation include, improved air quality for they are effective in pollution reduction. Trees also help anchor soil and reduce storm run-offs saving the high costs of draining ditches, storm sewers, and other engineered solutions (USDA, 2007). Noise pollution is often an overlooked problem. Excessive and unwanted sound has negative physical and psychological effects. Noise can come from many sources. Trees can play an important role in deadening unwanted noise. Sound waves are absorbed by tree leaves, branches and twigs (USDA, 2007). The study was to demonstrate that one of the key areas of conserving the environment is through tree growing which is cost effective and sustainable.

2.5 The Role of Trees in Environmental Conservation

Studies have shown that planting trees between crops and around land plots can help prevent soil erosion, restore soil fertility and provide shade, thereby offsetting some of the effects of climate change (Spore, 2008). By planting faster growing trees, shrubs, on fallow land, farmers help the soil to retain more water. Agro-forestry also contributes to climate change mitigation, since trees and shrubs absorb more carbon than other crops. The IPCC reports that agro-forestry has the potential to sequester nearly 600 million tones of carbon dioxide a year by 2040. Trees help maintain production during excessive or poor rainfall. Their deep roots system can explore a larger soil volume for water and nutrients during drought (Spore, 2008).

In times of heavy rainfall, their evapotranspiration rates help them pump excess water out of the soil. Trials show that income from trees and tree products exceeds the value of crop yield lost through competition by US \$ 10 or 42% during average years and US \$ 22 or 180% when 50% of the crop fails due to drought (Spore, 2008). According to (Standard Newspapers, 2009, January 25), a ready market for various tree products has made many farmers in Western Kenya shift to commercial tree growing and farmers in the region were earning Kshs.150,000.00 up from Kshs. 50,000.00 from well stocked woodlots. This research is meant to prove that growing of trees is a viable enterprise whether grown as a woodlot, hedge or grown with other compatible crops. The study confirms that the study area does not benefit from the various merits from trees because the current tree cover is low and as a result issues of soil erosion is very common which directly impacts on soil productivity. Unless all people in the society especially women are fully involved in tree growing, the environment in the area will deteriorate further. The income which farmers can generate from selling trees and their products is missing.

2. 6 Agro-Forestry Trees

Agro-forestry can be used to mean all practices that involve a close association of trees with crops, animals and/or pasture. The association is both ecological and economic. Soil carbon sequestration through changes in land use and management is one of the important strategies to mitigate the global greenhouse effect (Tan & Lal, 2005). Agro-forestry is an importance carbon sequestration strategy because of carbon storage potential in its multiple plant species and soil. Average carbon storage by agro-forestry practices has been estimated

as 9, 21, 50, and 63 Mg C per hectare in semi-arid, sub-humid, humid and temperate regions respectively (Montagnini & Nair, 2004).

Agro-forestry is frequently invoked as a solution to problems of land and water degradation as well as an answer to shortages of fuel wood, cash income, animal fodder and building materials in Sub-Saharan Africa. It is important to note that agro-forestry is only one of the several approaches for improving land use in any given situation. The promise of nitrogen fixing trees for improving soil fertility in crop land and pastures, role of wind breaks, higher protein tree fodder for livestock and given the fact that agro-forestry practices are appropriate for a wide range of places within the landscape, not just for crop land and pastures makes agro-forestry a very relevant entry in restoring degraded environment (Thomas *et al.*, 1997; KEFRI, 2005). Fodder trees contain high levels of crude protein and minerals and many show high levels of digestibility. They are readily accepted by livestock and presumably because of their deep-root systems, they continue to produce well into the dry season. However, antinutritive factors can be a problem in some species (Paterson, Karanja, Nyaata, Kariuki, & Roothaert, 1998). Woody species, including trees, shrubs or under shrubs, are an important component of the potential fodder resources for both livestock and wildlife. The fodder value of their leaves and fruits is often superior to herbaceous plants, particularly in the case of legumes. In arid and semi arid zones, they provide the largest part of the protein supply during the driest months; for example, it is estimated that, in the Sahel, up to 80% of the protein ration is provided by plants of the Capparaceae family during the three driest months of the year (Speedy & Pugliese, 1992).

Bondo and Siaya districts fall in ecological zone IV mainly and climate condition of the semi-arid areas put the two districts in high demand on farm water management. Environmental conservation if properly done will ensure increased soil-water content, supply, retention and both crop and livestock yield significantly. Water harvesting and soil moisture retention are cheap and have successfully been used in dry land farming scenarios around the world (Duveskog, 2001). According to Wangari (2006), environmental protection has been achieved through tree planting, including soil conservation, sustainable management of the local environment and economy, protection and boosting of local livelihoods. In addition to helping local women generate their own income through such

ventures as seed sales, the Movement has succeeded in educating thousands of low income women about forestry and has created about 3000 part-time jobs. Trees that can grow well under the prevailing climatic conditions in the study area are: *Grevillea robusta*, *Cassuarina equisetifolia*, *Calliandra callorhysus*, *Leuceana leucocephala*, *Sesbania sesban*, *Moringa oleifera*, *Cassia siamea*, *Eucalyptus species*, *Mangifera indica*, *Paw paw*, *Musa species* and *Passion fruit* (KEFRI, 2005; DFO, 2010).

Additionally, medicinal plants in particular are often the original materials of herbal medicine. Kinds of herbal medicine are raw plant materials, processed plant materials and medicinal herbal products (WHO, 1998). Examples of these trees in Luoland include *Cassia siamea*, *Cassia didymobotrya*, and *Tamarindus indica* among others (DFO, 2008). Most patients in Kenya rely on traditional herbal medicine even when conventional doctors, give them prescriptions. The continent's pharmacists make up only one percent of the worlds total. In Kenya, lack of access to hospitals due to poverty and distance as well as culture fuelled the use of traditional medicine. According to the World's Health Organization, 80% of Africans depend on traditional herbal medicine (Daily Nation, 2011, July 8).

2.7 Participatory Forest Management in Kenya

The inclusion of local communities in the management forests, including state-owned, formerly state-owned and community forest resources has become increasingly common in the last 25 years. Almost all countries in Africa, and many in Asia, are promoting the participation of rural communities in the management and utilization of forests and woodlands through Participatory Forest Management (PFM) Many countries have now developed or are in the process of developing changes to national policies and legislations that institutionalize (PFM) (Wily, 2001). Kenya has embraced Participatory Forest Management (PFM) as an approach towards achieving sustainable forest management. This is out of realization that involvement of the wider stakeholders would significantly contribute towards sustainable management of forests. In this approach, local communities and other stakeholders participate in management of forest resources as provided for by the Forest Act 2005. It's against this background that these guidelines have been developed for stakeholders involvement..

The stakeholders spearheaded by the Kenya Forest Service, with technical support from the Commonwealth Secretariat, prepared these guidelines. Most of the ideas presented in these

guidelines were collected and collated from foresters, researchers, natural resource managers, non-governmental organizations and community groups previously involved in participatory forest management. The guidelines also capture lessons learnt from neighboring countries such as Tanzania, Uganda and Zambia (GOK, 2007). The reason of this guideline was to incorporate all stake holders in the management of forest and forest resources and women are recognized as important stakeholders whose slot is specifically stated in every committee for conservation purposes. The foregoing is a pointer that in the past some segments of the society have been excluded conspicuously in management of community assets due to culture. The finding of this study confirms the fear that the guidelines sought to address because in the study area, women are not fully involved in tree management.

2.9 Theoretical Framework

The study was carried out within the broader guidance of the following theoretical frameworks; socio-cultural theory, theory of cultural relativism, and the evolutionary theory of land rights as applied to Sub-Saharan Africa as they relate to tree growing.

2.9.1 Socio-cultural theory

This emerging theory in developmental process looks at the important contributions that society makes to an individual's development. It stresses the interaction between developing people and the culture in which they live. It explains that parents, caregivers, peers and the culture at large are responsible for the development of higher order functions (Gallagher, 1999).

2.9.2 Theory of cultural relativism

This theory is based on the principle that one's beliefs and activities are understood by others in terms of that individual's own culture (Boas, 1974). It holds the view that ethical truths only hold relative to a specific culture.

2.9.3 The Evolutionary Theory of Land rights as Applied to sub-Saharan Africa

The above theory is considered dominant framework of analysis used by mainstream economists to assess the land tenure situation in developing countries and to make predictions about its evolution. It presupposes that due to increased population pressure, and market integration, land rights evolve towards rising individualism and that this evolution eventually

leads right holders to press for the creation of duly formalized private property rights (Platteau, 1996)

2.10 Conceptual Framework

Both the socio-cultural theory and theory of relativism, relate to tradition/culture, beliefs/norms in the society as they affect an individual who is supposed to respect the culture of the community. The two theories require one to be conscious of any undertakings so that nobody in the society is offended by their actions. Intervening variables are not controlled and depending on the outcome from the respondents, they can have both positive and negative relationships of how independent variables correlate with the dependent variable (Figure 1).

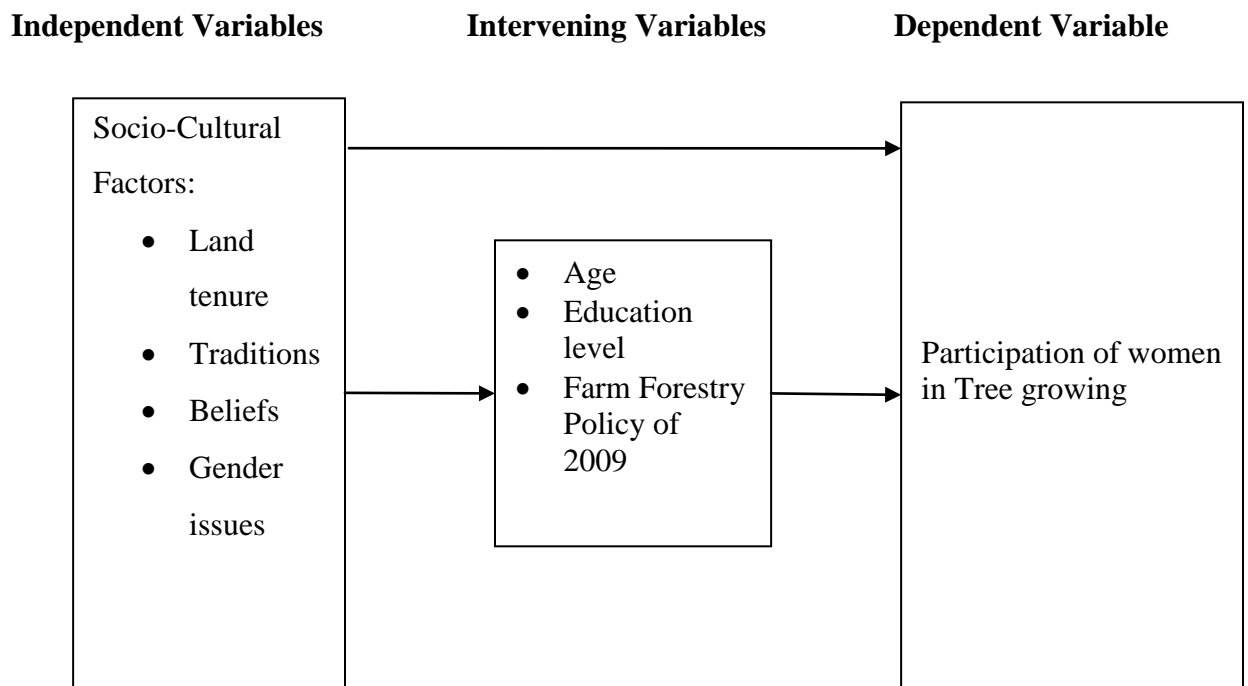


Figure 2.1: Conceptual frame for determining socio-cultural factors influencing women participation in tree growing

The conceptual framework was to guide in identifying which of the listed socio-cultural factors (land tenure, traditions, beliefs, and gender) influence participation of women in tree growing. The intervening variables considered were; age of a person, education level and policy issues on farm forestry.

Age of a person

People who are advancing in age are often more open to participating in tree planting because they have lower household needs, and tree planting requires relatively low labor inputs (Thatcher, Lee, & Schelhas, 1997). This tendency was also observed by DFO (2009) that a relationship exists between age of a person and tree planting i.e. as one advance in age, there is a high tendency to plant more trees to protect both land and also to act as a future source of income. However, Vanslebrouck, Van Huylenbroeck, & Verbek (2002) on the willingness of farmers to participate in agric-environmental measures, note that as the age of a person increases, there is a corresponding decrease in their willingness to participate in environmental schemes. Amudavi (1993) disagrees with this finding. This variable was considered as the first intervening variable. There was no clear relationship between age of a person and tree growing which implied that the outcome was more influenced by other activities other than age.

Education level

Agea, Obua, Namirembe, & Buyinza (2005) and Obua, Bwana, & Turyahabwe (1998) contend that education increases people's environmental awareness, appreciation of value of trees and people's ability to communicate. Alternatively, some studies have found that willingness to participate in environmental practices is influenced by education, with the higher the education level, the more likelihood of participation in some practices (Vanslebrouck *et al.*, 2002). On the other hand, Finlay (2004) established that the likelihood of participating in land care is associated with education levels. Indirectly, education may be important in enabling people while seeking off-farm income, and may therefore increase their financial capacity to invest in changed practices (Cary, Webb, & Barr, 2002; Ndiema, 2002). Molnar (1985) found out that education increases managerial, competence, and therefore enhances ability to diagnose, assess, comprehend and respond to any situation. This variable was considered as the second intervening variable. There was a positive relationship between education level of a person and tree growing which implied that when more people are educated, their perception changes.

Policy Issues

The Agricultural Act, cap 318, the agriculture (Farm Forestry) rules, 2009 states that...Every person who owns or occupies agricultural land shall establish and maintain a minimum of 10 percent of the land under farm forestry which may include trees on soil conservation structures or rangeland and cropland in any suitable configurations with the following objectives: maintaining a compulsory farm tree cover of at least 10 percent of any agricultural land holding, conserving water, soil and biodiversity, provision of fruits and fodder and carbon sequestration and other environmental services (GOK, 2009). Policy issues did not influence the outcome of the dependent variable because the existing rules on Farm forestry of 2009 do not discriminate on any member of the community.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter presents research design employed in conducting this study, the study area, research design, sample size and sampling procedure, data collection instruments, data collection, reliability, data analysis and data analysis summary.

3.1 The Study Area

Siaya County lies between latitude $0^{\circ} 26^1$ to $0^{\circ} 28^1$ north and longitude $33^{\circ} 58^1$ east and $34^{\circ} 33^1$ west with total surface area of 1520 km^2 . It has six sub-counties namely; Ugunja, Yala, Ugenya, Siaya, Bondo and Rarieda. The county borders Busia county to the north, Kakamega county to the north eastern, Vihiga county to the east, Kisumu county to the south east, with Lake Victoria to the south and west. The study location was Bondo and Siaya sub-counties. Bondo sub-county was divided into eleven locations found in three administrative divisions namely; Nyangoma, Usigu and Maranda with land surface area of 593 km^2 (DLPO, 2010) while Siaya sub-county was divided into ten locations contained in three administrative divisions namely; Karemo, Boro and Township with land surface area of 605.8 km^2 . The map of the study area is shown in Figure 3.1

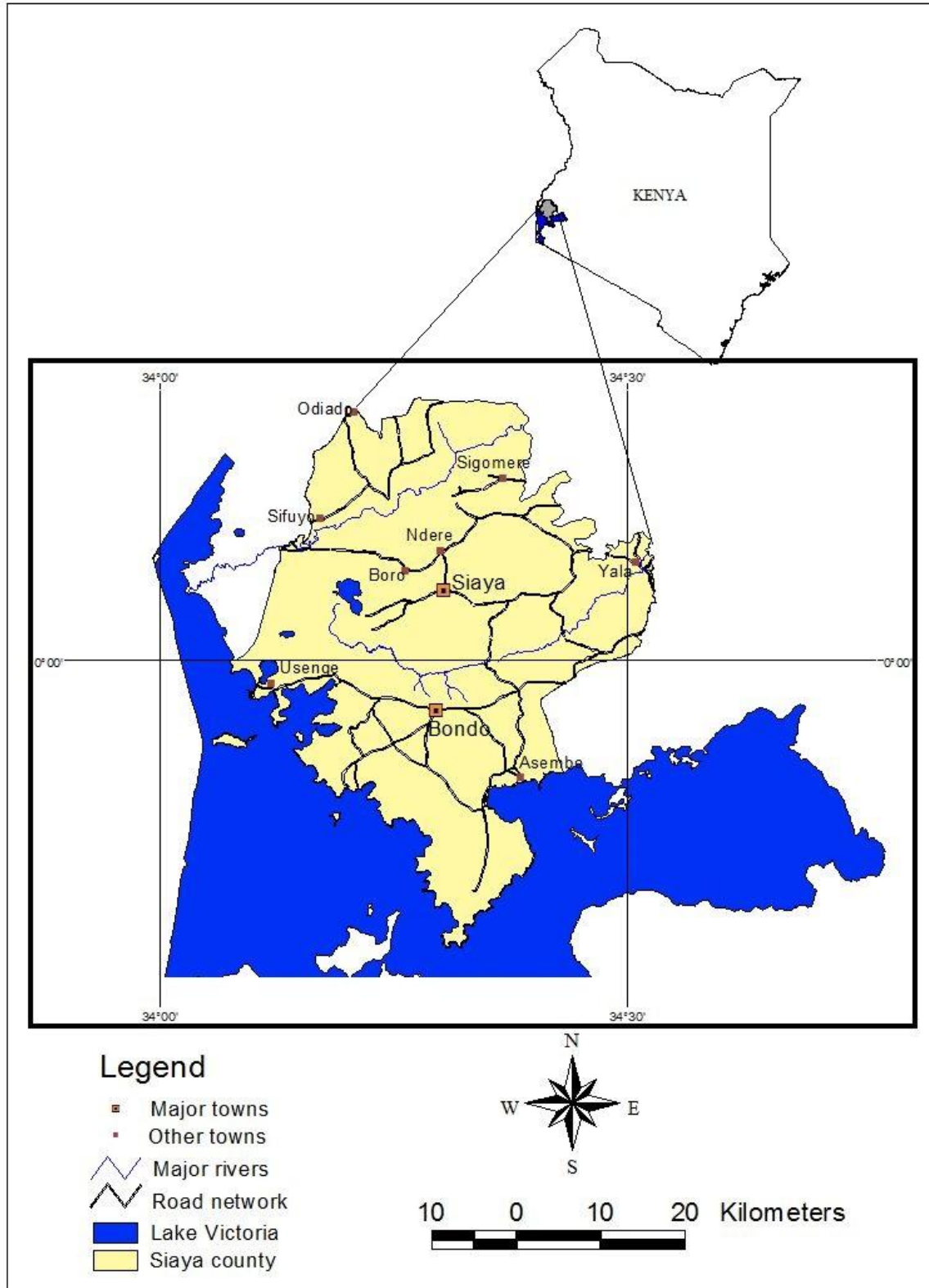


Figure 3. 1: Map of Siaya County

Source: Ministry of Devolution and Planning, 2014

3.2 Research Design

The study employed a sociological survey design which allows collection of information from a population with the purpose of making inference about the targeted group in a more objective way (Kombo & Tromp, 2006). This type of study utilizes different groups of people who differ in the variable of interest but share other characteristics such as socio-economic status, educational background, and ethnicity. It is carried out at a single point in time, does not involve manipulation of variables, and allows a researcher to look at numerous things at ago (Trochim, 2006). The design provides self reported facts about respondents, and their inner feelings, attitudes, opinions and habits. This design took a ‘slice’ of the targeted group and allows basing of overall findings on their views of those targeted assuming them to be typical of the whole group. It gives a snapshot of information, quick and cost effective (Kothari, 2007).

3.2.1 Demography and Ethnic composition

Bondo Sub-county has a human population of 157,522 (Males-76,468 while Females-81,054), 337,296 households and population density of 266 persons per square kilometres. Siaya Sub-county has a human population of 187,243 (Males-87,502 while Females-99,741) 45,398, households and human population density of 326 persons per square kilometres GOK (2009). The major ethnic group in the county is Luo with other communities forming insignificant figures (CBS, 2009). Women are more than men and if they are to participate in tree growing then a bigger tree cover would be realized. The various age structures of males and females for the whole county are in (Table 1)

Table 1: Age structures of males and females in Siaya County

Age bracket in years	Males	Females
0-10	132, 328	131, 471
10-20	107, 516	104, 073
20-30	58, 686	71, 578
30-40	35, 152	40, 260
40-50	21, 508	31, 568
50-60	17, 493	26, 808
60-70	12, 819	18, 813
70-80	8, 724	12, 637
80+	4, 159	6, 155
Total	398, 385	443, 363

Source: CBS, 2009

3.2.2 Topography

Bondo Sub-county is divided into scattered highlands such as Got Ramogi and Usenge in Usigu division, Got Abiero and Sirafuongo in Nyan'goma division, and lowlands of Yala swamp. These features result into differences in relief, soils, and land use. They give rise to altitudes ranging from 1140-1400meters above sea level. The oldest exposed volcanic rock such as basalt, elite, and rylite cover the sub-county geologically. Siaya sub-county has three major geomorphologic areas namely; dissected uplands, moderate lowlands, and yala swamp. These have different relief, soils, and land use. There are a few hills found in the district namely; Mbaga and Odiado. Rivers Nzoia and Yala traverse the sub-county and enter Lake Victoria through Yala swamp. The altitude of the district ranges from 1140m to 1200m above sea level. Others include intrusive of past Nyanzanian/Pre-Kavirondian age. They are the bearers of coarse and fine aggregates used in the construction industry. Fertility of soils here range from moderate to low resulting in most soils being unable to produce without the use of either organic, inorganic, or in most cases both types of fertilizers (DAO, 2010)..

3.2.3 Climate

Bondo sub-county has a modified equatorial climate with strong influence from local relief and the expansive Lake Victoria which influence rainfall amounts and distribution (DLPO, 2010). The rainfall regime ranges from 800mm to 1300mm per annum. Rainfall distribution is bimodal with long rains occurring between March and June with short rains falling between

September and December. Temperature ranges between 15⁰C and 30⁰C with a mean annual temperature of 21.75⁰C. Soil types are mainly Ferrasols and Gleysols. Higher altitude areas are suitable for agriculture and livestock keeping. The rivers Nzoia, Yala and Lake Kanyaboli have great potential for irrigation. Low altitude areas like Boro and Karemo divisions are good for growing cotton (DAO, 2009). For Siaya sub-county, it has warm, dry, and humid climate with the district annual rainfall ranging 800-1600mm distributed in a bimodal regime. Long rains fall from March to May and short rains from October to November. The temperature ranges from 15⁰C-32⁰C with a mean of 24⁰C and annual evaporation rate of 2000mm to 2200mm. From the geological coverage, the soil types are ferrasols, luvisols and gleysols (DAO 2010; DLPO, 2010).

3.2.4 Vegetation

The study area is dominated by indigenous trees like *Balanites spp*, *Acacia spp*, *Grewia vilosa*, *Albizia coriaria*, *Diospiros abyssinica*, *Euphorbia triculli*, *Markhamia lutea*, *Cassia siamea*, *Candelibrum spp*, etc while common exotic trees are *Eucalyptus spp*, *Thevetia peruviana*, *Casuarina equistifolia*, *Croton spp*, *Leuceana leucocephala*, *Jacaranda mimosifolia*, *Grevillea robusta*, etc (ZFM, 2011). The abundance and diversity of trees increased towards the upper parts of the study area and this is attributed to the fact the upper parts experience more reliable rainfall, soils are relatively fertile and less interference from termites compared to the lower parts of the study area. The various plant species have also adapted to local environmental conditions prevailing.

3.2.5 Human Activities

Agriculture contributes 75% to household incomes. As a result, massive unemployment is experienced particularly among the youths resulting in felling of trees to pave way for farming leading to less soil coverage resulting in serious soil and water erosion. Common animals kept include; zebu, sheep, goats, donkeys, poultry and dairy animals (DLPO, 2010). Common crops grown include; maize, sorghum, millet, sweet potatoes, groundnuts, cowpeas, cassava, beans, vegetables and the major cash crop is cotton. The main cash crops are cotton and sugarcane. Ecologically, the sub-counties spread a cross agro-ecological zone LM₁ to LM₃ (DAO, 2010). Women tend the farms while men either do off-farm work or do fishing or in towns seeking formal employment (CBS, 2009). Faced with unreliable farming conditions, many people

especially women look for alternative source of livelihood such as charcoal production and selling of fire wood leading to environmental degradation (NEMA, 2011).

3.3 Sample Size and Sampling Procedure

According to (Fraenkel & Wallen, 1990; Kathuri & Pals, 1993), a minimum of 100 subjects is recommended for descriptive studies. To get a representative number of respondents, four groups were settled upon i.e. household heads, key informants, women groups and Luo Council of Elders. Chief's meetings at Location levels were the points of identifying household heads and key informants. The essence of identifying these groups was explained after which men and women formed two groups. Because of the numbers involved, small papers with yes and no were written and folded. Each member then moved to pick one and wait for all others to pick then the papers were opened and those with yes were taken as respondents. A total 120 household heads, 40 key informants, four women groups with membership of 110, and 10 members of Luo council of elders were picked giving a sample size of 280. *n* objects an equal chance of being picked. The method does not require any additional information on the frame other than the list provided. Sampling procedure was done in phases:

Phase One: This involved primary data collection and discussions at two stages i.e. Stage one: 4 women and 2 men from 20 locations giving a total of 120 respondents for getting insights about household characteristics. All respondents were married and had their own homes. This was important because nobody could prevent them from growing trees within and outside their compounds. Stage two: 40 key informants i.e. 1 woman key informant randomly selected from every location among qualified women totalling to 20 women and 1 male key informant selected at random from among other qualified men in every location giving a total of 20 male key informants. Using interview schedule, the informants gave their independent views on various issues which later were summarised into code books. The criteria for identifying the key informants in addition to one stated were: (a) minimum age of 70 years, and (b) opinion leaders in the community.

Phase Two: Discussions with registered women groups using discussion guide. The lists of registered women groups was obtained from District Gender and Social Development Officers from the two sub-counties which had been in operation for at least the last 2 years to ascertain

their cohesiveness, and also being active. In every division, one women group was identified at random making a total of three groups per sub-county and out of them, two groups were randomly selected giving a total of four groups with 90 women and 20 men in attendance giving a total of 110. Peil (1995) recommends that when a researcher wants to get correct information, the right individual or group should be targeted for clarity of results. Random selection helps in ensuring that all groups in the research area have equal and independent chances of being selected (Kothari, 2007).

Phase Three: Triangulation of findings from the three groups (household heads, key informants and women groups) was undertaken with Luo Council of Elders whose membership was 10 using a discussion guide. The Council is the custodian of Luo culture. This was very important for correlation purposes because should there be need to request Luo community to change any of their current socio-cultural practices for the Council has an important role to play as an institution.

3.4 Data Collection Instruments

Four different instruments were developed. Questionnaire was for household heads and interview schedule was for key informants. There were two discussion guides targeting women groups and the Luo Council of Elders. Supervisors reviewed and confirmed their suitability for the work intended. Structured questionnaire is the best tool for collecting a wide range of information from a large number of individuals. The idea is to help get data from respondents and serves as a standard guide for the interview who each needs to ask the questions in exactly the same way. However, one weakness with it is that it is not easy to explore questions in any detail or depth. It was used for household and its reliability was 0.710. The questionnaire was divided into two sections; section A deals with personal data, section B deals with socio-cultural issues i.e. influence of socio-cultural factors on tree selection, site selection and actual planting, gender issues and perception. The second interviewing schedule was for women groups. It was also divided into various sections: Section A was for with general information about the group, section B dealt with specific questions on tradition, beliefs, gender and land tenure, for women groups, section A had general questions, section B had questions on tradition, beliefs, gender and land tenure while section C was on gender analysis tools i.e. 24 hours daily calendar and activity profile. A discussion guide was divided into two sections: Section A dealt with general

information about the council, section B dealt with the socio-cultural factors influencing tree growing like, tradition, beliefs, gender, land tenure and their perception on cultural issues and lastly whether in their opinion, Luo Nyanza is adequately covered by trees.

According to Mugenda and Mugenda (1999), people's opinions, views, attitudes and perceptions are best received by the use of questionnaires and scheduled interviews. A digital camera was used in capturing respondents (key informants, women group and Luo Council of Elders). In capturing the feelings, opinions, attitudes of respondents about tradition/customs, beliefs/norms, gender and land tenure system, open questions, nominal (using codes) and ordinal data (using recommended scales) were used. Likert's scale for ordinal data was used to gauge whether they strongly agreed (1), disagreed (2), neither agreed nor disagreed (3), agreed (4) or strongly agreed (5) with various statements. During the interview, the researcher and the assistants were able to see various types of trees and their distribution and inquired from respondents their various uses.

3.5 Data Collection

Secondary data was obtained from Government, non-governmental organizations reports, Journals, and the Internet. Primary data was collected from household heads, key informants, women groups and Luo Council of Elders. The LCE knows the community well, have a broad knowledge of the community and can give ways of life of the said community that are no longer observable to many. Women groups (one of the group techniques used in social sciences to gather quantitative and qualitative (descriptive) data involves selection of small group of people (Focussed group discussion) and moderated in discussion, a phenomenon or problem, with a view of generating ideas and has the advantage of not only generating ideas and interactions among members of the group and between researcher and the respondents. The group approach has the advantage of being relatively cheap and convenient way of gathering information from several respondents in a short time (Ghauri & Gronhaug, 2005). To ensure equal participation of all group members, ground rules were agreed upon at the beginning of the discussion. The rules were; respect for each others ideas, one participant to speak at a time, no shouting, equal participation for all and no person was to dominate the discussion, use of local

language allowed and had to be translated to English by the moderator. The dominant types of trees were identified during the interview and the extent of spread in the study area was noted.

All the respondents were informed in good time about the visit of the researcher and his assistants. Those who are literate filled the questionnaires by themselves and researcher and his assistants collected them after filling on the very day. However, those respondents who were illiterate or semi-illiterate were assisted in filling the forms by the researcher and his assistants. In latter cases, questions were read out one by one to the respondents and their responses written down. To build consensus between the respondents and the researchers, respondents were asked to validate the information provided.

3.6 Reliability

Before primary data collection started, pilot-testing was carried out in a different county occupied by the same Luo community mainly i.e. Kisumu East sub-county. Respondents were 44 household heads, 7 key informants and 2 women groups. All were identified during various chief's barazas and the latter were from Ministry of Labour, social security and services. The results after pilot testing gave a figure of 0.710 which was a good estimate of reliability of the instruments for they were above the minimum threshold recommended. When the reliability estimate is closer to 1.00, the instruments used are good as recommended by Fraenkel and Wallen (1990).

3.7 Data Analysis

Data from open-ended questions were coded with respect to three levels i.e. (a) Key informants (b) Women groups and (c) Luo Council of Elders and thematic areas. Statistical Package for Social Science (SPSS) software and content data analysis were employed. In regression model, the R^2 (coefficient of determination) was used to show how well the regression line approximates the real data points. The independent variables are tradition, beliefs and land tenure. For gender analysis, the 24 hours gender daily calendar for women and men in tree growing was used (Table 10, page 60)

$$Y = a + b_1 * X_1 + a + b_2 * X_2 + a + b_3 * X_3$$

Where Y=Dependent variable (Tree growing)

a=constant or intercept

b₁=slope or regression coefficient

X_1 = Land tenure

b_2 =slope or regression coefficient

X_2 = Tradition

X_3 = Beliefs

b_3 =slope or regression coefficient

Spearman's correlation was used in analyzing how intervening variables influenced the outcome of the study (age and education levels of household heads)

For qualitative data, descriptive analysis was used to examine interpretative and implications of information from Key informants, Women Groups and Luo Council of Elders. Simple statistical tools like percentages, frequencies, cross tabulations were used content analysis. Answers from key questions were used to help in analysis of information from key informants, women groups and Luo Council of Elders. This approach allowed for comparisons of different respondents, and enabled in-depth analysis.

3.8 Data Analysis Summary

The following was a summary of data analysis:

Table 2: Data analysis summary

Specific Objectives	Research Questions	Independent Variables	Dependent Variables	Statistical analysis tools
1.Determination of common indigenous and exotic trees and their distribution	1. What are the dominant indigenous and exotic tree types and their distribution in the study area?	Species distribution	-Indigenous and exotic tree species	Descriptive statistics (numbers, frequencies, percentages)
2. Identification of socio-cultural factors which influence women's participation in tree growing i.e.	2. Which are the socio-cultural factors influencing participation of women in tree growing?	-tradition/customs -beliefs/norms -land tenure	Participation of women in tree growing	-descriptive statistics (numbers, frequencies, percentages, tables) -Coefficient of determination (R^2)
3. Identifying gender issues related to tree growing i.e. choice of trees, site, digging of holes, transplanting, weeding, watering, pruning and fencing	Which are the gender issues in tree growing?	-Gender daily calendar -Activity profile	Participation of women in tree growing	Descriptive statistics (numbers, frequencies, percentages)

<p>4. Determining how socio-cultural factors influence women's participation in tree growing i.e. freedom of participation in tree growing</p>	<p>How do socio-cultural factors influence participation of women?</p>	<p>Identifying tree species, sitting, digging of holes, transplanting, weeding, watering, pruning & fencing</p>	<p>participation of women in tree growing</p>	<p>Descriptive statistics (frequencies, percentages, tables, histograms etc)</p>
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CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results and discussions of the findings of this study in response to the specific objectives of the study which were to: (a) identifying and documenting dominant indigenous and exotic trees and their distribution, (b) identify socio-cultural factors which influence women's participation, (c) identify the gender issues related to tree growing, and (d) determine how the key socio-cultural factors influence participation of women in tree growing.

4.1.1 Age of Household Heads and Correlation with Tree Growing

Age in this study is the time of life when a person becomes qualified to assume certain civil and personal rights and responsibilities, usually at 18 years or 21 years. (Figure 4.1) gives a summary of the various ages

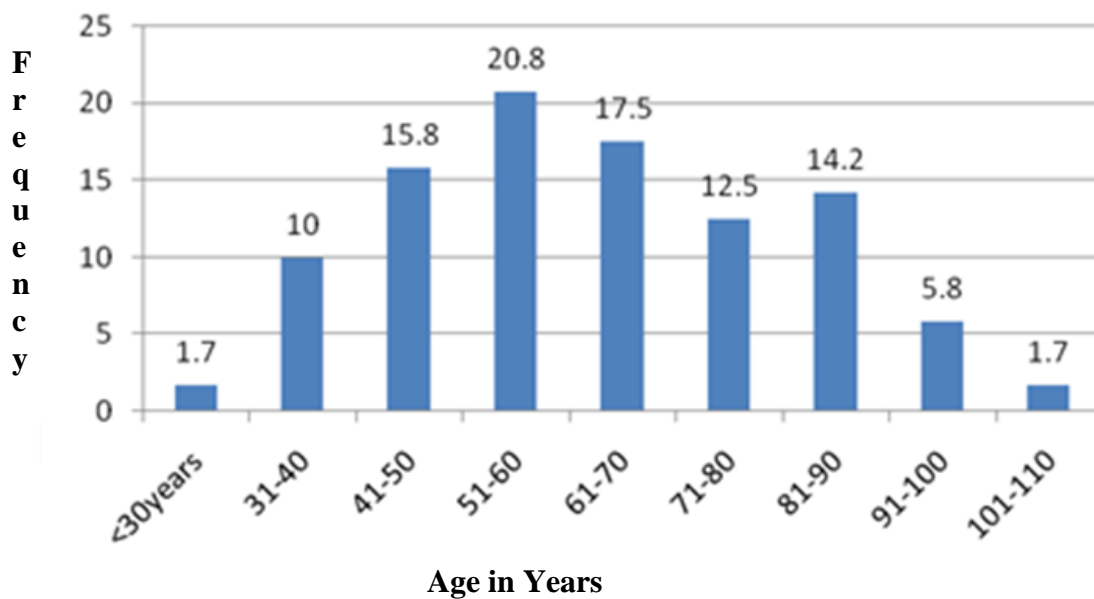


Figure 4.1: Age of household heads n=120

It is expected that when one advances in age, he or she can make independent decisions and have confidence in all transactions. The intervening variable age was used in order to get any association it has with tree growing. The age bracket ranged from <30 years to 100 years with mean age of 55.5 years. The age cohorts of <30 years and >100 years were represented by the minority 1.7%. It was expected that the respondents were free to engage in tree growing because all of them were in their own farms regardless of their age. It was also expected that as one advanced in age, the importance of conserving the environment especially through tree growing was to increase. No correlation was realized between the two. It means that age as an intervening factor had no influence. It however differs with the findings of Vanslebrouck *et al.* (2002) that as a person increases in age, there is a decrease in the willingness of farmers to participate in agric-environmental conservation measures.

4.1.2 Education Level of Household Heads

Education in broad terms is the process of learning and acquiring information. It is generally believed that constant experience about new ideas and skills make people better thinkers and allow one to make informed choice. In this study education levels (Figure 4.2) refers to either formal or informal education and is compared to participation of tree growing to find out any association.

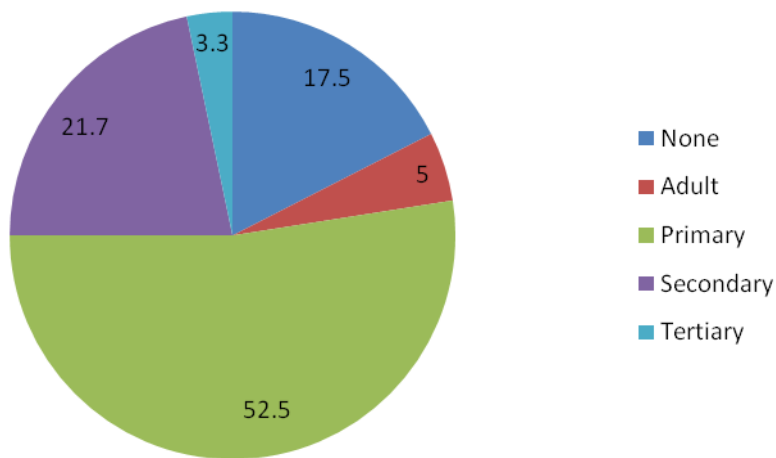


Figure 2.2: Education level of household heads n=120

All household heads educational levels were recorded and this was correlated with tree growing to ascertain if there was any correlation. Majority (82%) of respondents were literate at various levels. Because of high literacy levels, they were expected to make informed decisions

about the seriousness of tree growing. The finding agrees with Agea *et al.* (2005) and Obua *et al.* (1998) that education increases people's environmental awareness, appreciation of value of trees and people's ability to communicate and also some studies have found that willingness to participate in environmental practices is influenced by education, with the higher the education level, the more likelihood of participation in some practices (Vanslebrouck *et al.*, 2002).

4.2 Dominant Trees and their Distribution in the Study Area.

This was important to determine because dominance and distribution of certain tree species can be influenced by different factors. Because of low fertility levels, exotic trees which can add elements like nitrogen, phosphorous, and other soil enriching elements are given priority. The exotic tree types have the advantage of growing faster and if done on commercial basis, then farmers can benefit. The findings of the study agrees with (Spore, 2008) that planting trees between crops and homesteads can help prevent soil erosion, restore soil fertility and provide shade, thereby offsetting some of the effects of climate change. By planting faster growing trees on fallow land, farmers help the soil to retain more water. The first specific objective was realized by identifying ten common indigenous and exotic trees. The findings are in Tables 3 and 4 showing their dominance and distribution.

Table 3: Ten dominant indigenous tree species and their distribution

Scientific name	Common name	Local name	Rate of occurrence in homes	Distribution in %	Main uses
1. <i>Markhamia lutea</i>		Siala	94	23.6	building, agro-forestry
2. <i>Albizia coriaria</i>		Ober	49	12.25	Furniture
3. <i>Euphorbia triculli</i>	Finger euphorbia	Ojuok	32	8.18	Fencing
4. <i>Mangifera spp</i>		Mawembe	30	7.5	Fruit
5. <i>Lannea schweinfurthii</i>		Kuogo	27	6.75	herbal, firewood
6. <i>Cassia siamea</i>	Iron wood	Oyieko	19	4.75	Building, shade
7. <i>Combretum spp</i>		Keyo	19	4.75	Windbreak, firewood
8. <i>Spidium guajava</i>	Guava	Mapera	15	3.75	Fruit, firewood
9. <i>Grewia trichocarpa</i>		Powo	14	3.5	Building, firewood
10. <i>Diospiros abyssinica</i>		Ochol	9	2.25	Herbal, shade

Table 4: Ten dominant exotic tree species and their distribution

Scientific name	Common name	Local name	Rate of occurrence in homes	Distribution in percentages	Main uses
1. <i>Eucalyptus spp</i>	Blue gum	Bao	86	22.4	Building
2. <i>Grevillea robusta</i>	Silk Oak	Bole	63	16.38	agro-forestry
3. <i>Thevetia peruviana</i>	Yellow oleander	Chamama	42	10.92	Fencing, shade, firewood
4. <i>Cyperus spp</i>	White cedar		39	10.14	Furniture
5. <i>Jacaranda mimosifolia</i>	Brazillian rosewood	Jakaranda	38	10.13	Shade
6. <i>Persea americana</i>	Avocado	Abakado	24	6.24	fruit, firewood
7. <i>Terminalia brownie</i>		Umbrella	20	5.2	Shade
8. <i>Pinus spp</i>		Pine	10	2.6	Furniture
9. <i>Leuceana leococephala</i>	Leuceana	Lukina	9	2.34	Agroforestry
10. <i>Azandiritcha indica</i>	Neem tree	Arobaini	8	2.08	Herbal

From the types and dominance of trees, respondents prefer multipurpose trees for building materials, herbal, firewood, wind breaks and improving soil fertility. The trees are also the ones that have survived under harsh environmental conditions characterized by high temperatures, low and poorly distributed rainfall, and soils with varied fertility levels. The major problem with these local types of trees is that they have slow growth rates thus making profit from their sales take along time to be realized.

4.3 Socio-Cultural Factors that Influence Participation of Women in Tree Growing

The second specific objective was to identify the socio-cultural factors which are influencing participation of women in tree growing. All the four categories of respondents (household heads, key informants, women groups and Luo council of elders) were involved at various stages and the individual group responses were triangulated according to the theme. The four independent variables of interest were: traditions/customs, beliefs/norms, gender, and land tenure system.

4.3.1 Traditions

Traditions are inherited, established or customary pattern of thoughts, actions, or behaviour. The handing down of information is done mostly by word of mouth or in written form from one generation to another. As one of the independent variables, it was important to establish if traditions influence participation of women in tree growing (Figure 4.3)

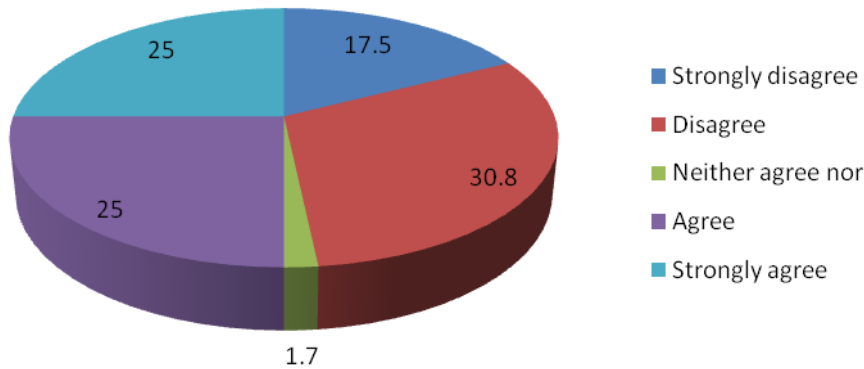


Figure 4.3: Response of respondents on traditions

Out of 120 household heads interviewed, 48.3% either disagreed or strongly disagreed and were of the opinion that tradition/culture does not influence participation of women in tree growing, but 50% of the respondents agreed or strongly agreed that tradition/culture does influence whereas only 1.7% could not decide. Using interview schedule with key informants and guided discussions with four women groups and Luo Council of Elders, it came out clearly that traditions influence participation of women for it is a taboo in the society for women to grow *Euphorbia triculli*, *Agave sisalana*, *Albizia coriaria*, and *Tamarindus indica*. The above responses from respondents, key informants and women groups agree with the findings of

According to Rocheleau (1992), that certain tree species may have culturally defined gender specific and ownership restrictions. It is alleged that if a woman plants a tree, she will become barren and her husband will die Chavangi (1984).

4.3.2 Beliefs

Belief is a psychological state in which an individual holds a proposition or a premise to be true. Every community has their beliefs and the study was set to find out if the societal beliefs influence participation of women in tree growing (Table 5)

Table 5: Response from respondents on beliefs

Response	Frequency	Percentage
strongly disagree	23	19.2
Disagree	47	39.2
neither agree nor disagree	2	1.7
Agree	25	20.8
strongly agree	23	19.2
Total	120	100.0

n=120

Human beings tend to internalize the beliefs of people around them especially during childhood and cling to the minds for long periods to come. Normally, beliefs influence human beings behavior/attitude. Some beliefs may be true or not but because not many people can risk to confirm otherwise, the belief stays. About 40% of household heads agreed or strongly agreed that beliefs influence, 58.4% disagreed, while 1.7% could not decide. Although the percentage disagreeing was big, the percentage agreeing was equally high and this is a pointer to how the beliefs can influence participation of women. Some of the beliefs when women defied beliefs include deaths of their children and husbands and because death is feared, no woman is ready to experiment. A belief is in the mindset of a person and can greatly influence decisions. At triangulation stage, it came out clearly that key informants, women groups and Luo council of elders concurred with the 40% household heads that beliefs negatively influence participation of women in tree growing. This outcome agrees with Chavangi (1984) that if a woman plants a tree,

she will become barren and her husband and children will die. Beliefs and norms make people to fear the consequences especially if associated with negative consequences. The finding further agrees with that of Makindi (2002) that certain taboos and beliefs bar women and female children from planting trees.

4.3.3 Gender

Gender refers to the social attributes and opportunities associated with being male or female and the relationships between women and men, girls and boys. These attributes are context/time specific and dynamic. Every society assigns activities to various sexes. In this study, gender aspects were considered to find out if they were influencing participation of women in tree growing (Figure 4.4)

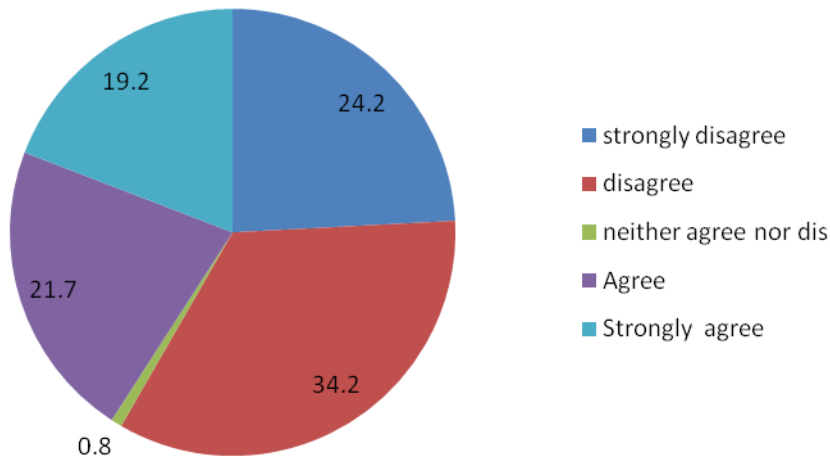


Figure 4.4: Response of household heads on gender

The aspect of gender was to address specific objective number three. The following responses were recorded from household heads: 39.9% agreed while 0.8% was undecided but 54.4% of household heads disagreed or strongly disagreed with this. It means that gender might not be a very significant factor influencing participation of women in tree growing. Discussions with key informants, women groups and Luo council of elders also concurred that gender is not an issue because amongst their daily activities, women get time to do vegetable growing and can use the same period to grow trees. It is important to note that gender is constructed within a given society. The study concludes that gender (roles/responsibilities) is not associated in any way with

tree growing. The finding concurs with Ochola (2002) that gender issues are culture specific and vary from one community to another.

4.3.4 Land Tenure

Land tenure generally refers to possession or holding of the rights associated with each parcel of land. Insecurity of tenure or unclear rights to land is a strong disincentive to all forms of long term investments like tree growing. The government of Kenya allows holding of titles with single names, joint or as a group. Because of various rights to land, the study wanted to establish if land tenure could be influencing participation of women in tree growing. This was to answer specific objective number four (Figure 4.5)

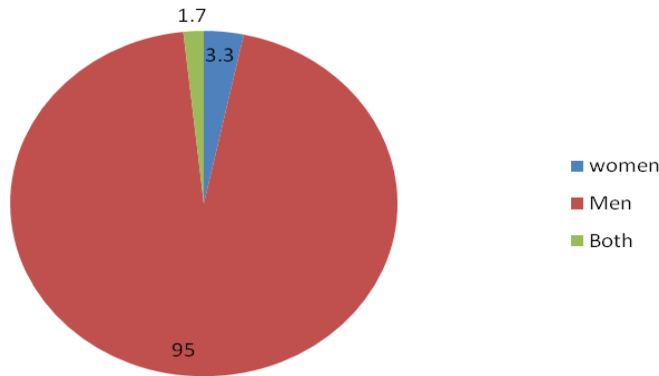


Figure 4.5: Response of household heads on land title deeds

From 120 household heads, 95% of title deeds are in the names of males, 1.8% of the titles in the names of females (all of them were widows) and 3.2% had the names of both wife and husband. Given the known fact that tree growing is a long term investment that requires surety of land title and majority (95%) had male names only, it means that men may have a more say in how land is utilized including tree growing. Thus, lack of women names is silently a demotivating factor to women but they cannot express it loudly to males lest it bring misunderstandings in families. This implies that ownership of land is a factor influencing participation of women in the field of tree growing. This finding agrees with the findings of Ouma *et al.* (2004) that lack of tenure significantly influences long term investments like environmental conservation which encompasses tree growing. It also agrees with findings of Ngigi (2003) that lack of land tenure normally hamper promotion and adoption of rain water harvesting technologies which are long term investments.

4.4 Gender Analysis Tools

These are various tools used not only to define the roles of men, women, boys and girls but they are also very helpful in identifying target groups for specific interventions. The tools include but not limited to 24 hours gender daily calendar and activity profile. The two tools are used to give a true picture of various workloads and specific activities commonly done by members of the community.

4.4.1 Gender Daily Calendar

The gender daily calendar is important in appreciating the daily workloads of different gender groups. It is key in identifying appropriate entry points for any activity focusing on a particular group. It is also important in that if one plans to meet a particular segment of the community, then the time when they are mostly available can easily be detected using this tool. (Table 6)

Table 6: 24 Hours gender daily calendar for women and men

	Women	Men
Time	Activity	Activity
5.00am	-prayer -clean house -milk cows -wakes up school going children	-only during ploughing
6.00am	-Prepare tea/porridge	-milking
7.00am	-fetch water from river, lake -wash clothes and utensils -going to shamba/business es	-goes to shamba
9.00am	-tying animals -back to shamba	-goes back home -takes breakfast
12.00noon	-fetching firewood	-herding of animals

	-lunch preparation	
2.00pm	-untying the animals and giving them water	
	-briefly looking after the animals	
4.00pm	-tying the animals again -going to market. -washing children	-listen to news -tying of animals -going to barazas/casual walk in nearby centers
5.00pm	-going back home	
6.00pm	-untying the animals and taking them home -preparation of boma fire -milking	-untying animals and taking them home -milking
7.00pm	-preparation of supper -ironing clothes -taking supper	-taking supper
8.00pm	-assisting children with homework -making bed for husband	-retires to bed
9.00pm	-making bed for children	
10.00pm	-going to bath	
11.00pm	-retiring to bed	

This scenario which was presented by women during discussions agrees with findings of Ochola (2002) that women generally start their daily activities earlier than men. Ironically, the very women also end up retiring to their beds after men, women are involved in many activities like washing of clothes, cooking, rearing of children and taking care of farms among other roles and prevent them from engaging in planting of trees as opposed to men. According to Rogers (1983) who documented in Tanzania that women are unaware that they work more than men but they are unable to change the situation. The women's work day was longer and involving more work than men's work day because of women's household responsibilities

4.4.2 Activity Profile

This is a tool which shows how the culturally the society has allocated various activities to both women and men in tree growing. From the response of both men and women, one can conclude whether allocation of duties discriminates against a particular sex or it is all inclusive culturally. Various questions were put across and their consensus was what was noted. The questions ranged from; who prepares holes for tree growing, who selects site, who selects types of trees, who does the actual transplanting, who weeds them, who waters them, who prunes, and who puts the fence around the transplanted tree seedlings?

Table 7 shows how various activities considered under tree growing are shared

Table 7: Activity profile for women and men in tree growing

Activity (ies)	Males	Females
	1. Preparation for the holes for transplanting tree seedlings	X
2. Site selection where tree seedlings are planted	X	
3. Types of tree seedlings to be planted	X	
4. Actual planting of trees	X	
5. Weeding of tree seedlings		X
6. Watering of trees seedlings		X
7. Protecting the tree seedlings from destruction by putting protective devices	X	
8. Pruning of trees	X	

From the table above, socio-cultural factors are at play. There are activities which are to be performed by men and there are those to be performed by women. However, when women perform activities which are associated with men, then they are doing them on behalf of men not on their own behalf. All activities in tree growing are for men except weeding and watering which are for women. The allocation of duties is discriminating against women. The finding of the study supports that of Ekisa (2010) that cultural aspects for community limits participation of women in afforestation and agro-forestry programs.

4.5 Perception of Respondents Concerning Changes in Trees Abundance, Land Productively, and Soil /Water Erosion

The perception of respondents referred to here was to capture from the respondents point of view whether some aspects of the environment were changing. If they were changing, then in which direction? Parameters whose results are presented and discussed here were investigated; changes in tree abundance, changes in land productivity, and soil/water erosion. To capture the perception, Likert's scale was used.

4.5.1. Changes of Trees Cover Observed in the Study Area

Concerning the observed tree changes in the area over time, the following response was obtained from household heads (Table 8)

Table 8: Changes of trees cover in the study area

Responses	Frequency	Percent
strongly disagree	24	20.0
Disagree	40	33.3
Agree	13	10.8
strongly agree	43	35.8
Total	120	100.0

n=120

According to response from household heads on observed tree cover in the study area, 53.3% recognized that there were no significant changes in tree status in the area from the time they settled to date. There is a general tendency in the community that sons are allocated their portions of land from the portion of family land. It is not possible for many people to notice changes in their respective areas because where they have settled, they may not have been serious tree growing unless they themselves started it. Not many people in the study area have taken tree growing even as a business. However, a good proportion of respondents (46.6%) agreed that there was a possible change in tree cover from what it used to be. This was likely to be the case because the many homes in the area had used existing trees to construct their houses, and also used them as fuel wood. Continuous land subdivision also results in clearing some areas which used to contain trees thus reducing tree cover. The overall reduction of tree cover has far-reaching environmental implications. Trees help maintain soil fertility, prevent soil erosion and reduce climatic aridity by regulating water supply. The present recurrent dry spells in the parts of the county could be partially caused by uncontrolled tree cutting. The low tree cover has also created shortages in fuel wood and timber. There are other effects noticed by respondents i.e. distance covered by women while collecting fuel wood has increased, dwelling house have become rather smaller due to shortage and or cost of building materials. Another noticeable feature as a result of reduction in tree cover is soil erosion and increased wind speeds which normally cause much destruction in homes and farms.

4.5.2 Changes in land productivity

Farmers have knowledge of either productivity of farm either going up or down with time. When asked on observed changes in productivity, the following were realised (Table 9).

Table 9: Changes in land productivity

Response	Frequency	Percent
strongly disagree	6	5.0
Disagree	12	10.0
Agree	51	42.5
strongly agree	51	42.5
Total	120	100.0

n=120

From a total of 120 household heads, 85% of respondents indicated that they have observed decline a general decline in land productivity. Only 15% however disagreed to strongly disagree. Normally the number of bags of various crops can be used as a measure. The study did not go to the extent of finding the exact number of bags realized per acre of land. The decline could result from continuous usage of same pieces of land over the years. The decline may also result from low quality seeds, late planting, high weed infestations to late land preparation. Lack of or inadequate numbers of nitrogen fixing trees may also be a major cause. The decline in land productivity may also result in decrease in grazing lands coupled with decline in both quality and quantity of pastures.

4.5.3 Trend of Soil and Water Erosion in the Study Area

The changes resulting from soil and water erosion over the past five years, is reported in (Table 10).

Table 10: Trend of soil and water erosion

Response	Frequency	Percent
strongly disagree	7	5.8
Disagree	2	1.7
Agree	42	35.0
strongly agree	69	57.5
Total	120	100.0

On average, 92.5% of all respondents agreed that soil and water erosion in the area has increased resulting in the obvious presence of gullies, valleys, bare soils in some areas, roots or root hairs of some trees seen indicative of erosive forces that have been at work in the area. On discussion with respondents, many of them agreed that after rainfall, most of waters in streams, ponds and lake areas become turbid. This much soil and water erosion can be attributed to less ground cover which is supposed to reduce the impact of rainfall. Erosion of soil reduces yields and increase the cost of growing food crops in the following ways; erosion reduces the capacity of the soil to hold water and leads to frequent water stress, erosion contributes to losses of plant nutrients which wash away with the soil particles, erosion reduces the productivity of land by degrading soil structure, increasing soil erodability, surface scaling, crusting, reduction in infiltration, seedlings have hard time breaking the soil crust and erosion reduces productivity because it does not remove top soil uniformly.

4.6 Discussions with Key Informants and Women Groups

The discussions with key informants and women groups concentrated on only specific open ended questions (Appendix B and C) which require confirmation at the time of triangulation. From the discussions with 40 key informants and four women groups (two from Bondo and two from Siaya Sub-counties with 110 participants), the following were the main findings which were based on the focus of the study:

- (a) The community has restrictions towards the types of trees which women can grow and the ones they cannot grow. The following tree types are not supposed to be grown by women; *Euphorbia triculli*, *Albizia coriaria*, and *Tamarindus indica*

- (b) Women are not free to choose the types of trees to be planted and even the siting of transplanting whether the husband is alive or after his death. Men in the study area have the obligation over the types of trees to be planted and where they are planted. What women can do on behalf of men is to water and weed the plants. The fear is that when women discuss with their husbands the types of trees to be grown, they might assume ownership which can be a source of conflict with others in the family. Some few women who are widows however have ventured in some aspects of tree growing like choosing types of trees and deciding where they are sited but this number is still small
- (c) Women fear going against the traditions of the society because of the fear of unknown. There is the belief that women who go against the traditions suffer from deaths of their sons and the husband or vice versa. Even if the woman may not have witnessed the repercussions during her lifetime, there is the belief that the generations coming up to the fourth one can get tormented because of what their granny did. This has indirectly inflicted fear among women to the extent that what tradition dictates is what is taken as the gospel truth.
- (d) Gender per se is not a hindrance to tree growing. Despite women being busy, they can spare times off when they can be involved in tree growing just as they get time to engage in vegetables growing. During discussions, women also indicated that lack of proper knowledge on tree growing, termites and drought are other major hindrances.
- (e) Land tenure is an important issue because the women are aware that they are married in the various homes, but their names are not included in the title deeds and the various activities they undertake in the various portions are at the disposal of their husbands.

4.7 Discussion with Luo Council of Elders

The discussions with Luo Council of Elders concentrated on only specific open ended questions which require confirmation at the time of triangulation. The nature of questions discussed can be seen under (Appendix D). The discussion with Luo Council of Elders using discussion guide revealed things which were not coming out clearly during the discussions with key informants and women groups. This institution was formed on 19th March, 1998 with the following main tasks: being the main custodian of Luo traditions and beliefs and to arbitrate on property inheritance. It has a total of 60 members, 15 of whom are women (officials and

committee) members spread all over the country. The main highlights of interest to the study were:

- (a) There were some tree species which women were not allowed to grow i.e. (i) *Euphorbia triculli* (plate 4.1): in any Luo home, presence of this tree species indicates the presence of a man in the home or his presence at one time if deceased. This tree is used to demarcate a home and the main entrance to the home which are a preserve of a man and celebrations follow. This tree indirectly binds this home to the ancestors. The people involved in ancestral issues are men not women. (ii) *Albizia coriaria* (plate 4.2): this tree is also grown by men only. The reason is that the three legged traditional stool is made from this tree exclusively. Women however advanced in age are not allowed to sit on this stool for it is preserved for the owner of the home who is a man. This tree from seedlings stage to maturity when it is cut into timber is supposed to be handled by men only and no woman dares to handle it. (iii) *Tamarindus indica* (plate 4.3): this type of tree produces fruits, many people normally like to visit the homes with such trees so that they take the fruits for free. The owner of the home is the one whose activities are supposed to attract other community members but not a woman who has been brought from another region. Women believe that when a woman plants the tree, it will bring bad omen to her and her children.
- (b) On the issues of how culture influences women, the council indicated that no man in his correct senses can ask the opinion of the woman as regards choice of types of trees, site of planting, actual planting and even at pruning periods and fencing of the trees. All the trees grown either within the homestead or away belongs to the man. If a woman is asked to bring water for plants and also to weed them, she is doing this as part of activities she is expected to do when directed by the man. No tree in any man's homestead should be owned by a woman.
- (c) On beliefs, no woman dares to do things which she never saw her mother-in-law do or her mother do. There is a general belief that when a woman goes against the beliefs, she destroys her own house. Women are reluctant also to participate in tree growing because it is a belief that when the woman is experiencing her periods she is "unclean" and if she touches any growing plant, that plant dries up

- (d) On land tenure, men are reluctant to include the wife's names in any title deed. The community members believe that a woman can terminate her engagement with the man any time of her life even when she is advanced in age. Because of this, if she decides to go, she should go a lone the way she came and the land which she used to dig will be surrendered to her sons. The issue of polygamy also complicates their names in title deeds because the man will be at pains to explain to other women why their names are not included while a particular name is included. There is a common saying in the community that '*dhako ma iyiko edalani echiegi to ok ma pod ngima ma wuotho...*that woman whom you burry in your compound is the one whom you are sure of as your wife but not the living ones". This omission of women names in the title deeds is a disincentive to women in this field of tree growing.
- (e) The community has not taken generally tree growing as a commercial undertaking. From time immemorial, the community members only bother with trees of cultural attachment and also preserved areas with huge and big rocks due to fear of supernatural powers residing in such places. The lengthy discussion with Luo Council of Elders confirmed what had been discussed with key informants and women groups. The types of socio-cultural factors influencing women's participation in tree growing were identified, how they influence, land tenure issues became clear as well as gender issues. All the specific objectives were adequately addressed and the intention of the study achieved

4.8 Economic Importance of Trees which Women are not supposed to Grow

Three indigenous trees which women are not supposed to grow have economic values which can improve the livelihoods of not only the very women but also their husbands and children. Below are the various plates detailing the lost opportunities.



Plate 4. 1: *Euphorbia triculli*

Uses: Fuel wood, traditional medicine (cancer, tumors, warts, rheumatoid etc), living fence as hedge, oil production (latex) compares well with gasoline, latex with rubber, charcoal production. Can produce 400MT biomass (fresh weight=85% moisture) per hectare.



Plate 4. 2: *Albizia coriaria*

Uses: Fodder (foliage eaten by livestock), bee forage, fire wood, charcoal production, timber (traditional three legged stool), boat making, utensils, general furniture manufacture, tannin extracts from bark, medicinal especially bark, roots and leaves. In addition, the tree is drought tolerant and resistant to termites attack



Plate 4. 3: *Tamarindus indica*

Uses: Fruit and can be eaten directly, jam, beverage and syrups making, blends juices or sweetened drinks, ice-creams and snacks, flavor , mixed with white granulated sugar, blend spices to create tambran balls, medicinal, furniture, shade, fuel wood, etc. the tree is resistant to pests and many diseases.

4.9 Regression and Spearman’s Correlation Analysis

The regression analysis on land tenure, tradition and beliefs on tree growing used stepwise method. R^2 (coefficient of determination) which shows the strength or how much of each independent variable contributes to the dependent variable while Spearman’s correlation was used to see if the two intervening variables (age and education levels) had any correlation with tree growing. (Tables 11 and 12)

Table 11: Model summary of land tenure

Model	R	R ²	Adjusted R ²	Std. Error of the Estimate
1	.201 ^a	.040	.032	1.25770

a. Dependent Variable: index of tree growing

Table 12: Coefficient of land tenure

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.718	.240		15.519	.000
	land tenure	-.177	.080	-.201	-2.227	.028

The model summary on land tenure analysis shows that the R² is 4%. This is the contribution of land tenure towards tree growing from the model. The standardized beta coefficient of the same independent variable Table 12 indicates -0.201. This means that the independent variable has a negative relationship with tree growing and as land titles become exclusive rights of men, it influences participation of women by preventing them from participating. It further confirms the influence of land title because the *p-value* significance is high (0.028). The finding of this study agrees with findings of Bradley (1991) that the relationship between land tenure and tree growing has far reaching implications for development of agro-forestry for environmental conservation and these trees could be cut and used as fuel wood and also as building poles. According to Ouma *et al.* (2004), land tenure insecurity has contributed to low investment in soil conservation measures in River Njoro watershed. However, the finding departs from that of Kalineza *et al.* (1999) in Gairo division of Morogoro area in Tanzania that land ownership does not significantly influence the probability of planting of trees. With respect to traditions, Tables 13 below shows the correlation while Table 14 shows the standardizes beta coefficient

Table 13: Model summary of traditions

Model	R	R ²	Adjusted R ²	Std. Error of the Estimate
1	.191 ^a	.036	.028	1.26025

a. Predictors: (Constant), tradition

Table 14: Coefficients of traditions

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.751	.264		14.232	.000
	tradition	-.162	.077	-.191	-2.113	.037

a. Dependent Variable: index of tree growing

R² is 3.6% in Table 13 indicating that the independent variable is contributing to tree growing while for the standardized beta coefficient, the value is -0.191 showing a negative relationship with tree growing. It means that as the community holds customs, beliefs and norms, this discourages participation of women in participating tree growing. The *p-value* is highly significant 0.037 as in Table 14. Tradition as an independent variable influences participation of women negatively in the field of tree growing. The finding of the study agree with the findings of Richard *et al.* (2003) that tradition plays an important role in influencing a person's decision-making and vary between or among individuals and regions Traditions are formed over generations because they are believed to be the best or most appropriate ways of doing things. As such, there is much resistance to discarding long-held traditions; both for sentimental as well as for practical reasons (Dunn *et al.*, 2000). With respect to beliefs, Tables 15 below shows the correlation while Table 16 shows the standardizes beta coefficient

Table 15: Model summary of beliefs

Model	R	R ²	Adjusted R ²	Std. Error of the Estimate
1	.191 ^a	.036	.028	1.26025

a. Predictors: (Constant), beliefs

Table 16: Coefficients of beliefs

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.751	.264		14.232	.000
	tradition	-.162	.077	-.191	-2.113	.037

Dependent Variable: index of tree growing

R² is 3.6% in Table 15 indicating that the independent variable is contributing to tree growing while for the standardized beta coefficient, the value is -0.191 showing a negative relationship with tree growing. It means that as the community holds on to some beliefs/norms e.g. barrenness and death of husband and children when a woman defies them, this discourages participation of women in participating tree growing. The *p-value* is highly significant 0.037 as in Table 16. Social norms are the informal rules in a society that govern how an individual should act in a particular social context. Community members fear facing conflicts with the society (Richards *et al.*, 2003; Finlay, 2004). It is important to note that bad beliefs, taboos and superstitions about planting certain trees, can undermine participation in tree growing activities even where one might be having ownership or access to land. Table 17 shows age and any role in tree growing.

Table 17: The Spearman’s correlation showing the relationship between age and role in tree growing

			age of respondent	role in tree planting
Spearman's rho	age of respondent	Correlation Coefficient	1.000	-.021
		Sig. (2-tailed)	.	.821
		N	120	120
	role in tree planting	Correlation Coefficient	-.021	1.000
		Sig. (2-tailed)	.821	.
		N	120	120

While correlating age of respondents and tree growing, it was noted that it had a negative correlation (-0.021) indicating that age as an intervening variable was not important in influencing participation of women in tree growing and not significant (0.821). It means that age does not influence tree growing.

Table 18 shows the correlation between education levels and tree growing

Table 18: Spearman’s correlation between education levels and tree growing

			role in tree planting	highest educ level
Spearman's rho	role in tree planting	Correlation Coefficient	1.000	.180*
		Sig. (2-tailed)	.	.049
		N	120	120
	highest educ level	Correlation Coefficient	.180*	1.000
		Sig. (2-tailed)	.049	.
		N	120	120

		role in tree planting	highest educ level
Spearman's rho	role in tree planting	Correlation Coefficient	1.000
		Sig. (2-tailed)	.180*
		N	.049
<hr/>			
	highest educ level	Correlation Coefficient	120
		Sig. (2-tailed)	.180*
		N	.049
<hr/>			
		Correlation Coefficient	1.000
		Sig. (2-tailed)	.049
		N	120

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

It showed a positive correlation (0.180) with significance level of (0.049) at 95% confidence level. It means that education as an intervening variable influences participation of women in tree growing. The more people are educated, the more the chances of making informed choices which might go against the prevailing cultural conditions.

4.10 Gender Daily Calendar Analysis

In analyzing gender, the 24 hours gender daily calendar for women and men, it has demonstrated that women start their daily lives earlier than men. They normally wake up at 5am and retire to bed almost at 11pm. The involvement of women in various activities is evident while men on the other hand have more free time from the time they wake up to the time they retire to bed i.e. Table 5, page 47. Although women are busy as indicated, they have time to tend to other farm activities where they could possibly engage in tree growing which is not the case. No evidence was found to associate gender with tree growing in particular in the study area. This is new finding which adds into the field of knowledge.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The following conclusions are made from the study;

1. Indigenous trees common in the area are; *Markhamia lutea* (Siala), *Albizia coriaria* (Ober) *Euphorbia triculli* (Ojuok), *Mangifera* spp, *Lannea schweinfurthii* (Kuogo) and the exotic tree species common in the study area are; *Eucalyptus* spp (Bawo/Kaladal/Nyar-maragol), *Grevillea robusta* (Bole bole), *Thevetia peruviana* (Achak/Maua), *Cyperus* spp , *Jacaranda mimosifolia*
2. Socio-cultural factors that influence participation of women in tree growing in Siaya County are; land tenure, traditions and beliefs for they discourage women.
3. Gender is not a factor influencing participation of women in tree growing because women can create time from their busy schedule when they can engage in tree growing activities especially tree species which culture does not restrict.
4. Culturally, the only activities women are allowed to do in tree growing without asking for consent from men are watering and weeding.

5.2 Recommendations

The following recommendations are made from the study;

1. For increased tree cover, women should fully be involved in tree growing especially those tree species which do not have any attachment to the traditions of the community like i.e. *Markhamia lutea* (Siala), *Mangifera* spp,; *Eucalyptus* spp (Bawo/Kaladal/Nyar-maragol), *Grevillea robusta* (Bole bole), *Thevetia peruviana* (Achak/Maua), *Cyperus* spp , *Jacaranda mimosifolia*
2. More efforts should be put to sensitize the community members the need to have attitudinal change as regards some of the traditions (that a woman cannot decide the type of tree species to be planted), beliefs (that if a woman plants some tree species then her children and husband will die or that they can be barren and land tenure (non-inclusion of their names in the title deeds) for full participation of all members of the society towards the realization of increased tree cover.

3. One of the institutions which can be used to access the community when culture is at cross roads with development is the local ones like Luo Council of Elders because the members of the council understand the community better and the elders are respected.
4. There is need to formulate clear policy guidelines, regulations and bylaws especially at county levels to guide and encourage women to grow trees.

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APPENDICES

Appendix A: Farmer's Bio data and Household Characteristics

Instructions to Respondents

- Please respond to all questions in all sections
- If one has problems with filling, then please feel free to inform the researcher for assistance
- All information given is treated with confidentiality.

Section A: Respondents Personal Data

Date of interview.....Household sample no.....

1. Name (optional).....Location.....Division.....

2. Age of the respondent. (Tick one) (1) <30 years (2) 31-40 years (3) 41-50 years
(4)51- 60years (5) 61-70 years (6) 71-80 years (7)81-90years (8) 91-100 years
(9) 101-110years

3. Gender, (Tick one) (1) Male (2) Female

4. Are you a household head? (Tick one). (1) Yes (2) No

5. Marital status, (Tick one). (1) Married (2) Single (3) Widow (4) Widower
(5) Divorced

6. Highest Education Level, (Tick one). (1) None (2) Adult education (3) Primary
(4) Secondary (5) Tertiary

7. Whose name is in the title deed? (1) Woman (2) Man (3) Both woman and man

8. Profession, (Tick one). (1) Teacher (2) Social Work (3) Engineer
(4) Agriculturalist (5) Others (Specify.....)

Section B: Socio-Cultural Aspects

9. What are the dominant tree species and their distribution?

(i) Indigenous trees and their relative dominance

Local name	English name	Botanical name	Planted	Who Planted	Grown wild	Uses
(a)						
(b)						
(c)						
(d)						
(e)						

(ii) Exotic trees and their relative dominance

Local name	English name	Botanical name	Planted	Who Planted	Grown wild	Uses
(a)						
(b)						
(c)						
(d)						
(e)						

Choose whether you (1) Strongly disagree (2) Disagree (3) Neither agree nor disagree (4) Agree and (5) Strongly agree with the following statements

10. Before settling in this place, the area had many tree species than it has now

- (1) Strongly disagree (2) Disagree (3) Neither agree nor disagree (4) Agree
(5) Strongly agree

11. Generally, land productivity has gone down in terms of yields in the last five years

- (1) Strongly disagree (2) Disagree (3) Neither agree nor disagree (4) Agree
(5) Strongly agree

12. From my observation, uncontrolled cutting down of trees without replacement can increase both soil and water erosion

- (1) Strongly disagree (2) Disagree (3) Neither agree nor disagree (4) Agree
(5) Strongly agree

13. Uncontrolled cutting down of trees without replacement can affect the flow

of streams, rivers, and even recharging of wells

- (1) Strongly disagree (2) Disagree (3) Neither agree nor disagree (4) Agree
(5) Strongly agree

Gender

14. My role in tree planting, (Tick one). (1) Actual planting (2) Watering
(3) Weeding (4) All the three (5) Both 1 and 2
15. I own a Tree nursery, (Tick one). (1) Yes (2) No
16. We own a tree nursery as a group, (Tick one). (1) Yes (2) No

Choose whether you (1) Strongly disagree (2) Disagree (3) Neither agree nor disagree (4) Agree (5) Strongly agree with the following statements

17. Socio-cultural factor influencing participation of women in tree growing is gender
(1) Strongly disagree (2) Disagree (3) Neither agree nor disagree (4) Agree
(5) Strongly agree
18. Socio-cultural factor influencing participation of women in tree growing is
land tenure system
(1) Strongly disagree (2) Disagree (3) Neither agree nor disagree (4) Agree
(5) Strongly agree

Influence of socio-cultural factors on women's participation

On the choice of trees

19. Participation in choosing tree species? (Tick one). (1) Yes (2) No
20. If the answer to 19 is No, then why? (Tick one). (1) Culture (2) Landlessness
(3) Work of men (4) All my time is occupied (5) Not applicable

On site selection

21. I have participated in deciding where tree seedlings are planted? (Tick one). (1) Yes
(2) No
22. If the answer to 22 is No, then why? (Tick one). (1) Culture (2) Landlessness
(3) Work of men (4) All my time is occupied
23. If the answer to 22 is Yes, how often do you participate? Tick one). (1) Rarely
(2) Always (3) Not applicable

On farm tree planting

24. I have participated in tree planting (Tick one). (1) Yes (2) No
25. If the answer to 25 is No, then why? (Tick one). (1) Culture (2) Landlessness
(3) Work of men (4) All my time is occupied
26. Culturally, what kind of trees are you allowed to plant.....
27. Source of wood fuel, (Tick one). (1) From my woodlot (2) From the wild
(3) Normally buy (4) Both from the wild and purchase
28. I own a woodlot? (Tick one) (1) Yes (2) No
29. Size of woodlot I own (Tick one). (1) Nil (2) < 0.25 hac (3) 0.25 - 0.5 hac
(4) 0.5 – 0.75 hac (5) 0.75 – 1.00 hac (6) > 1hac

Choose whether you (1) Strongly disagree (2) Disagree (3) Neither agree nor Disagree (4) Agree (5) Strongly agree with the following statements

30. The distance of getting firewood in the wild has increased in the last five years?
(1) Strongly disagree (2) Disagree (3) Neither agree nor disagree (4) Agree
(5) Strongly agree
31. I am aware of farm forestry regulation of 2009 requiring every farm to have
10% occupancy by trees (1) Yes (2) No
32. Socio-cultural factor influencing participation of women in tree growing
is tradition/customs
(1) Strongly disagree (2) Disagree (3) Neither agree nor disagree (4) Agree
(5) Strongly agree
33. Socio-cultural factor influencing participation of women in tree growing
is beliefs/norms
(1) Strongly disagree (2) Disagree (3) Neither agree nor disagree (4) Agree
(5) Strongly agree

Appendix B : Key Informants Interview Schedule

Instructions to Respondents

- Please respond to all questions in all sections
- If one has problems with filling, please feel free to inform the researcher for assistance
- All information given is treated with confidentiality.

Section A: Respondents Personal Data

Date of interview.....Key informant sample number.....

1. Name (optional).....Location.....Division.....

2. Age of the respondent. (Tick one) (1) <30 years (2) 31-40 years (3) 41-50 years (4) 51-60 years (5) 61-70 years (6) 71-80 years (7)81-90years (8) 91-100 years (9)101-110years

3. Gender, (Tick one) (1) Male (2) Female

4. In this community, normally whose name is in the title deed?

.....

Section B: Socio-Cultural Aspects

Gender

5. What are the roles of men in the field of tree growing?

.....
.....

6. What are the roles of women in tree growing?

.....
.....

7. Does land tenure have influence in participation of women in tree growing?

.....
.....

Influence of socio-cultural factors on women’s participation

8. Who decides the types of tree seedlings to be planted?

.....

9. Who decides the site where tree seedlings are to be transplanted?

.....

10. Who does the actual transplanting of tree seedlings?

.....

11. Culturally, are there tree species which women are not allowed to plant?

.....

12. Does cultural tradition and customs influence participation of women in tree growing in the study area?

.....

13. Does cultural beliefs/norms influence participation of women in tree growing in the study area?

.....

Perception of socio- cultural factors

14. What happens to a woman who defies culture and grows trees?

.....

15. My position in the community is (1) clan elder (2) retired civil servant (3) cleric
(4) divine healer (5) opinion leader

Appendix C: Women Group Discussion Guide

Instructions to Respondents

- Please respond to all questions in this section
- All information given is treated with confidentiality
- Researcher will read the questions one by one then group members will respond. In supporting the answer given by a member, other members will raise their hands in support, absolute numbers will be counted loudly and a percentage will be calculated in this section

Section A: General Information about the Group

1. Name of the group.....Division.....District.....
2. Duration of existence of the group: (1) Two years (2) Three years (3) Four years (4) Five years (5) > 4 years
3. Registration number of the group if available.....
4. Main objective (s) of the group.....

Section B: Socio-Cultural Aspects

5. What are the Socio-cultural factors influencing participation of women in tree growing under the following?

- (a) Tradition /customs (taboos).....
.....
.....
- (b) Beliefs/norms (unwritten code of conduct)
.....
.....
- (c) Gender (Various duties assigned by the community).....
.....
.....
- (d) Land tenure (ownership with respect to title deed).....
.....
.....

(e) Others (specify).....

6. How do socio-cultural factors influence participation of women in tree growing with respect to?

Choosing trees species to be planted?

.....

Site selection for trees?

.....

Actual planting?

.....

7. Has any member witnessed a woman who has defied any traditions if any in this community and plants trees? Yes (1) No (2)

8. If the answer to 7 is Yes, then what happens to her?

.....

9. As a women group, do you own a tree nursery? Yes (1) No (2)

10. If the answer to 9 is No, why?

.....

Section C: Gender Analysis Tools

11. What is the role of gender in tree growing? (Researcher will use 24 Hours Daily Calendar and Activity Profile)

- 24 Hours Daily Calendar (From the time of waking up to the time of retiring to bed

Two groups to be formed i.e. one for women only and another for men only

(Women only)

Time	Activity

(Men only)

Time	Activity

- Activity Profile

Two groups will be formed with one having women only and the other for men only to respond to the following questions:

Activity (ies)	Who does it?		
	Males	Females	Both
Preparing the holes for transplanting tree seedlings			
Site selection where tree seedlings are planted			
Types of tree seedlings to be planted			
Actual planting of trees			
Weeding of tree seedlings			
Watering of trees seedlings			
Protecting the tree seedlings from destruction by putting protective devices			
Pruning of trees			
Any other activity			

Appendix D: Luo Council of Elders Focused Group Discussion Guide

Instructions to Respondents

- Please respond to all questions in this section
- All information given is treated with confidentiality

Section A: General Information

1. Date when this Council was formed.....
2. Current office bearers: Chairman.....Secretary.....
3. What are the main roles and responsibilities of this Institution?. (Terms of Reference of the Council)
 - (i).....
 - (ii).....
 - (iii).....
 - (vi).....
 - (v).....

Section B: Socio-Cultural Aspects

4. What are the Socio-cultural factors influencing participation of women in tree growing in the community
 - (a) Tradition/customs (taboos)
.....
 - (b) Beliefs/norms (unwritten code of conduct).....
.....
 - (c).Gender (Various activities assigned by the community).....
.....
.....
 - (c) Land tenure (ownership of title deed)
.....
6. What is the role of men and women in tree growing in the community?
Males
.....
.....

Women.....
.....
.....

7. What happens to a woman who defies culture and plants trees?

- (i).....
- (ii).....
- (iii).....
- (iv)

8. How do Socio-cultural factors influence participation of women in tree growing with respect to:

Choice of types of trees?

.....
Site selection?

.....
Actual planting?

9. Is Siaya County adequately covered by trees? Yes (1) No (2)

10 If the answer to 9 is No, what could be the reasons.....

.....
.....

11. Are there certain tree species which women culturally are not allowed to plant?

.....

12. If yes, what are the tree species and reasons behind this?

.....
.....

Appendix E: Plates of Various Women Groups and Luo Council of Elders



Plate 1: Officials of Bonde Self Help Group in Nyang’oma Division, Bondo sub-county, 2012



Plate 2: Officials and some members of Nyomolo Women Group in Maranda Division, Bondo sub-county, 2012



Plate 3: Officials and some members of Kanyada Women Group in Usonga Division, Siaya sub-county, 2012



Plate 4: Officials and some members of Kogelo Community health Workers in Karemo Division, Siaya sub-county, 2012



Plate 5: Chairman, Luo Council of Elders (second from left), *Ker Otondi* with some of the officials in Kisumu Office, 2012

Appendix F: Published work by the researcher

Oloo, J.O., Maina, J and Mwangi, J. G. (2010). The effectiveness of farmer field schools' extension methodology in conserving soil and water using contour ploughing, unploughed strips and farm yard manure, *Scientia Educologica*”, *Lithuania*, 26:52-65, ISSN 1822-7864

Birech R.J., Kitaka N., Bebe B. O., Mungai N., Nyaanga D., Lelo F. K., Muok B., Kingiri A., Onyango J. O., Siele E. K., **Oloo J.O.** (2013). Classification of climate-smart innovations in agriculture, water and energy sectors for small and medium-scale applications in eastern Africa. Working Brief no 5, ISBN 9966-41-160-7

Oloo, J. O., Makenzi, P. M., Mwangi, J. G., Abdulrazak, A. S. (2013). Influence of traditions/customs and beliefs/norms on women in tree growing in Siaya County, Kenya. In: Global journal of environmental Science and Technology Vol. 1 (1) pp 01-06, November, 2013. Spring journals

Oloo, J. O., Makenzi, P. M., Mwangi, J. G., Abdulrazak, A. S. (2013). Dominant tree species for increasing ground cover and their distribution in Siaya County, Kenya. In: International journal of Agriculture, innovations and research. Volume 2, Issue 3, ISSN (On-line) 2319-1473

Oloo, J. O., Makenzi, P. M., Mwangi, J. G., Abdulrazak, A. S. (2013). Gender issues in tree growing in Bondo and Siaya Sub-counties, Siaya county, Kenya. In: International journal of Agriculture, innovations and research. Volume 2, Issue 3, ISSN (On-line) 2319-1473

Oloo, J. O., Makenzi, P. M., Mwangi, J. G., Abdulrazak, A. S. (2014). Land tenure, traditions and beliefs are socio-cultural factors influencing participation of women in tree growing in Siaya county, Kenya. In: Elixir Energy & Environment 67 (2014), 21569-21573.

