

**RELATIONSHIP BETWEEN ENVIRONMENTAL
CONSERVATION INITIATIVES AND HOUSEHOLD'S
LIVELIHOOD: A CASE OF COMMUNITY IN SUBA SUB-
COUNTY - HOMA-BAY COUNTY**

BY

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DECLARATION

This Research project is my original work and has not been presented for a degree in any other University.

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DEDICATION

This work is dedicated to my brother Jack Odundo, my sponsor and source of inspiration through this study period. I am indeed grateful.

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ABSTRACT

Environmental degradation and destruction is a rising concern both locally and globally. This is in view of the role of the environment on earth's biogeochemical systems and a source of essential ecosystem services to human wellbeing as well as its role in controlling the green house gas effects. It is based on this argument that the study aimed at establishing the relationship between environmental conservation initiatives and household's livelihood in Suba Sub-County, Homa-Bay County. Previous studies indicated that very little or no attention had been focused on the relationship between environmental conservation initiatives and livelihoods of the rural community. Research objectives included: to determine the relationship between promoting Agro-forestry as an environmental conservation initiative and Livelihood, to establish the relationship between environmental education program as an environmental conservation initiative and livelihood, to establish the relationship between environmental research and technology as an environmental conservation initiative and livelihood of the community in Suba Sub-County, to determine the relationship between promoting ecotourism as an environmental conservation initiative and livelihood of the community in Suba Sub-County and to establish the relationship between the combined environmental conservation initiatives and livelihood of the community in Suba Sub-County. The study adopted descriptive survey design where both quantitative and qualitative data were collected using questionnaires from a total of 375 adult respondents representing randomly selected households. Random sampling in this case took the multi-stage random sampling process to be able to identify the actual study area. Quantitative data was analyzed using both descriptive and inferential statistics where Pearson-Product Moment Correlation and regression modeling were applied to be able to establish the level of relationships between environmental conservation initiatives and the livelihood of the community in Suba Sub-County. Hypotheses of the study were tested using Chi-Square P-value. Inferential statistics were applied purposefully to enable generalization of the results from the sample to the population. The study established that there was a significant relationship between; promoting agro-forestry and household livelihood with a correlation coefficient of 0.106, environmental education program and household livelihood with a correlation coefficient of 0.270 and environmental research and technology and household livelihood with a correlation coefficient of 0.161. Researcher therefore concluded that there was a significant but weak relationship between environmental conservation initiatives and household livelihood as the correlation coefficient tended towards 0.00. This study recommends increased efforts on extension services, adjustments in approaches applied to environmental education among the local communities and extensive mobilization and guidance of the community based on best researched technology applications. This study suggests that further studies can be conducted to investigate opportunities and potentiality of ecotourism, impact of agro-forestry on livelihood and level of adoption of indigenous trees species in farms among community in Suba Sub-County.

LIST OF ACRONYMS AND ABBREVIATIONS

FAO	Food and Agriculture Organization
NTFP	Non-Timber Forest Products
NGO	Non-Governmental Organization
SOM	Soil Organic Matter
CA	Conservation Agriculture
GDP	Gross Domestic Production
NEPAD	New Partnership for Africa's Development
UBOS	Uganda Bureau of Statistics
SAIIA	South Africa Institute of International Affairs
UNEP	United Nations Environmental Program
UN-REDD	United Nations scheme on Reducing Emissions from Deforestation and forest Degradation
IISD	International Institute for Sustainable Development
WRI	World Resources Institute
LADDER	Livelihoods and Diversification Directions Explored by Research
IRR	Internal Rate of Return
CGIAR	Consultative Group on International Agricultural Research
JRMS	<i>Juglans regia</i> Monoculture System
TAMS	<i>Triticum aestivum</i> Monoculture System
JTACS	<i>Juglans Triticum</i> Alley Cropping System

CBNRM	Community Based Natural Resource Management
JFM	Joint Forest Management
CBFM	Community Based Forest Management
WMA	Wildlife Management Areas
UNESCO	United Nations Educational, Scientific and Cultural Organization
NEESTAS	National Environmental Education Statement for Australian Schools
EE	Environmental Education
EOSE	Environmental Orientation to School Education
AEETAP	Africa Environmental Education and Training Action Plan
KNBS	Kenya National Bureau of Statistics
SPSS	Statistical Package for Social sciences

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Forest ecosystems are extremely important refuges for terrestrial biodiversity, a central component of Earth's biogeochemical systems, and a source of ecosystem services essential for human well-being. Globally forests are considered big contributors to the economy. The forest sector currently employs (both formally and informally) about 1.7% of the global workforce (FAO, 2014). Forests also provide high levels of commercial benefits to households; sources of income and subsistence benefits which constitute reservoirs of economic values that help ameliorate shocks to household incomes; particularly in rural areas in poor countries (Chomitz and Kumari 1998 and FAO, 2014). Environmental income alone accounts for 28% of total household income, 77% of which comes from natural forests. Environmental income shares are higher for low-income households (Angelsen *et al.* 2014). It is also estimated that 12 percent of the world's population directly depend on environment through collecting wood-fuel and charcoal for their own use.

Angelsen *et al.* (2014) refers to environmental benefits as “the hidden harvest”, the diversity of goods and services provided freely from the environment, from non-cultivated ecosystems such as natural forests, woodlands, wetlands, lakes, rivers, and grasslands. The three primary environmental roles in supporting rural livelihoods include supporting current consumption, providing safety-nets in response to shocks and gap-filling of seasonal shortfalls and providing means to accumulate assets and providing a pathway out of poverty. Conservation initiatives have also been viewed globally as a “safety net” that helps prevent poor households from falling into deeper poverty (Angelsen & Wunder, 2003 and Barbier, 2010). Forest products make significant contribution to the shelter of at least 1.3 billion people, or 18 percent of the world's population. Forest products are used in the construction of peoples' homes all over the world. The recorded number of people living in homes where forest products are the main materials used for walls, roofs or floors is about 1 billion in Asia and Oceania and 150 million in Africa (FAO, 2014). In realizing the close tie between conservation and livelihood of the community, the protectionist paradigm that had dominated nature conservation since the 19th century shifted and adopted a more inclusive notion that poverty reduction and environmental protection should go hand in hand

(Roeand Elliot 2004). This move saw the emergence of several approaches to reconcile development and conservation goals. The promotion of commercial non-timber forest product (NTFP) production, encompassing both extraction and cultivation, is one of these approaches (Ros-Tonen *et al.* 2005).

In New England, forests contribute \$20 billion annually to the local and regional economies, sustaining over 100,000 jobs in the woods, mills, and supporting services. Natural beauty and recreation assets draw tens of millions of visitors annually to New England thus boosting tourism industry which is the largest in the country. It is also worth noting that tourism based on foliage displays alone attracts over 1 million tourists annually and generates \$1 billion in revenue for New England businesses. (A policy Agenda for Conserving New England's Forest, 2012).

Among the environmental challenges facing England include soil erosion due to inappropriate land management, animal and crop production on inappropriate land, overstocking, bad timing of agricultural practices, and degradation of river banks by stock and lack of ground cover in winter months. Soil erosion has significant social, economic and environment impacts, which include land degradation thus unproductive agriculturally, silting of water bodies which spoil spawning gravels used by fish, water pollution leading to eutrophication and blocked drainages leading to localized flooding. The government efforts to deal with soil erosion as an environmental threat included a range of policy options addressing soil pollution, including regulatory instruments, whole farm planning, farmer self-help groups, co-operative agreements and grant aid. Adoption of participatory techniques in developing natural resource management solutions has proved increasingly successful over the years (Murray, 2000)

Environmental degradation in Asia is extreme. The high-growing economy has followed a grow-first-and-clean-up-later development strategy. The result, according to the Asian Development Bank, is that Asia is now the dirtiest continent on Earth (Rock and Angel, 2005). Deforestation, for one, is rampant. With 10 percent of the world's rainforests, for example, Indonesia loses as much as one million hectares of forest every year (Gordon, 1998). Likewise the loss of biodiversity is extensive. A recent survey in China, for instance, showed that between 20 and 40 percent of that country's species are threatened, with almost one falling extinct daily. The gravity of Asia's

environmental degradation has intensified over recent decades (Sonnenfeld and Mol, 2006). In response to this alarm, about 200 environmental NGOs have sprung up to champion for environmental conservation, policy adjustments and technology improvements have been adopted. It is a coincidence that poverty is at the same time a major concern in South Asia, accounting for up to 22 percent of poor people in the region but it containing more than 40 per cent of the world's poor, distributed disproportionately across regions and socio-economic groups, with women, minorities, people belonging to lower castes, casual and migrant laborers, youth and the unemployed as its main victims. It has been estimated that one-third of the population of the South Asian region is chronically poor (Chatterjee *et al.* 2004)

In South Asia most of the environmental issues arise from intensive modern food production systems which are often accompanied by numerous adverse impacts on soil systems like loss of soil organic matter (SOM), erosion by wind and/or water, reduced soil biological diversity, physical degradation, poor nutrient-use efficiency, groundwater pollution, declining water tables, salinization and water logging, greenhouse gas emissions, with accelerating effects on global warming, air pollution, loss of biodiversity, and decline in factor productivity. In addressing these challenges, the traditional farming practices are being replaced with new technology (Conservation Agriculture) focused on more ecologically-sound management of plants, soil, water and nutrients, supporting beneficial soil biological processes and specifically the elements of zero-tillage and maintaining residue cover on the soil. The zero-tillage option has been adopted by farmers for its extra yield obtained by planting closer to the optimal sowing time and the cost savings in land preparation and planting. Conservation agriculture has shown potential to benefit farmers due to it being environmentally friendly and efficient agriculture that can produce the extra food needed for the expanding population (Khan and Hashmi, 2004). By 2011, Asia had met the target of halving the proportion of people who live in extreme poverty with highest contributions from China and India. Extreme poverty rate in Eastern Asia therefore dropped from 61 per cent in 1990 to only 4 per cent in 2015 while Southern Asia's realized a decline from 52 per cent to 17 percent for the same period.

In Africa forests and woodlands occupy an estimate of 650 million ha (21.8%) of the total land area which accounts for 16.8% of the total global forest cover. Their distribution is uneven depending on the sub-region with North Africa having the least forest cover of only 7% of its total land area while Central Africa's forest cover contribute up to 44% of its total land area which is the highest in Africa and world's second largest continuous block of tropical rain forest (FAO, 2003, 2005). Forests in Africa account for 6% of the GDP, which is considered the highest globally. Africa's forests are valued as source of food, energy provider, timber and non-timber forest products which also contribute to wealth and health at household, national, regional and global levels (NEPAD, 2003). For example in Uganda forests and woodlands are recognized as important components of the nation's stock of economic assets. Most of Uganda' population is rural based, with over 80% dependent on agriculture and related activities for livelihoods (Uganda Bureau of Statistics (UBOS), 2002). Recent research indicates reductions in per capita agricultural productivity (Nkonya *et al.* 2004) with negative impacts on food security, household income, and overall livelihood conditions.

However, forest cover loss and degradation in Africa is an important topic at national, regional and global levels. Action Plan for World Bank Engagement Report, 2011 indicated that deforestation and degradation are major concerns especially in densely populated humid West African countries and Eastern and Southern Africa countries, a phenomenon that has been closely linked to poverty levels. Forest cover losses in most parts of Africa are mainly associated with expansion of plantation areas and clearing forests for low productivity agricultural practices. (FAO, 2005, SAIIA, 2009). In response to these environmental issues and livelihood challenges, various conservation initiatives and approaches have been employed. For example, in Ghana, Tourism/ecotourism has shown the greatest pro-poor impact on rural communities because the customer comes to the facility/product creating room for direct sell thus fostering the creation of the economic multiplier effect. Residents can now take control of their own destiny by embracing tourism development as a means to enhancing their livelihood (Kuuder *et al* 2012). In Tanzania, Community-Based Forest Management policy based on the assumption that formalized forest tenure by village communities results in increased incentives for sustainable forest management. It emerged that commitment to follow and practice policy depended on security of rights which in turn improved livelihood. Management appeared effective at the village scale (Rantala *et al* 2012).

In Kenya, conservation has not done well either. Our forests are faced with an annual loss of approximately 12000 hectares (Setonet *al.* 2012). Wakhungu (2015), asserted that Kenya is losing up to Ksh. 7 billion to deforestation annually due to the expanding population but with limited resources. Out of environmental degradation the country has always faced a number of related consequences like incidences of malaria, flood menace almost yearly, food shortage, increased aridity, and all coiling back to influence negatively on the livelihood of the common man (UNEP 2010). Forestry sector contribute up to 1% of the overall GDP. Wood fuel and charcoal represents more than 75% of domestic energy. Over 90% of rural households use firewood for cooking and heating while 80% of urban households depend on charcoal as a primary fuel source (ESDA, 2005, UN-REDD Newsletter, Nov. 2012). Conservation also stands as the mother of tourism, a key contributor to the economy and rural livelihood.

Major threats to Kenya's forest cover have been deforestation and degradation specifically from human activities and the growing population. UNEP/IISD, (2005), listed these four as the critical ecosystems deteriorating in Kenya; maintenance of biodiversity, food provision; water supply, purification and regulation, and energy resources. More than 2.9 million people live adjacent to forests, earning their livelihood directly from forests through collection of firewood, hunting and gathering for food, grazing lands, crop cultivation, source of building materials and water.

1.2 Statement of the Problem

Forest ecosystems are extremely important refuge for terrestrial biodiversity and a central component of earth's biogeochemical systems and a source of essential ecosystem services to human wellbeing including their key role in controlling the green house gas effects (Patrick Gonzaloz, 2005). In Kenya, forests alone contribute up to 1% of the overall GDP. 75% of domestic energy is from wood-fuel and over 90% of rural households in Kenya use firewood for cooking (UNEP, 2010 and 2012). A well conserved environment offers key ecosystem services which include maintenance of biodiversity, food provision; water supply, purification and regulation, and energy resources which form determinants of community livelihood (WRI, 2005).

Based on the values of the environment to human well-being, governments, Non-Governmental Organizations and communities have invested in varied conservation initiatives to help save and

protect the environment as well as improve people's livelihoods. Some of these initiatives include promotion of agro-forestry, environmental education programs, environmental research and technology and promotion of ecotourism among the communities. Previous researches indicate that such efforts have impacted positively in enhancing rural communities' knowledge and awareness of their environment and its values as well as equipping them with the necessary skills and techniques towards a sustainable co-existence with the environment (Kuuder *et al.*, 2012 and Mutisya, 2011).

However, contrary to this conservation knowledge, environmental awareness and benefits, environmental degradation and destruction have remained a key concern in the country and across the borders. Forest lands are replaced with farm, settlements and development projects, overexploitation of forest resources, tree felling for charcoal burning without replacement, degradation of farm lands and general pollution of the environment. Approximately Kenya losses up to 12000 hectares of forest to human activities annually (Seton *et al.* 2012), resulting into cut or reduced environmental services to humans and consequently impacting negatively on livelihoods characterized by increasing poverty levels among rural communities. Community livelihood still remains threatened (UNEP 2010).

It is on the above argument and the fact that not enough studies have been done on the same subject that the current research would seek to establish the possible relationships between environmental conservation initiative and household's livelihood of the rural community in Suba Sub-County in Homa –Bay County.

1.3 Purpose of the Study

The study aimed at establishing the relationship between environmental conservation initiatives and household's livelihood of the community in Suba Sub-County of Homa-Bay County.

1.4. Research Objectives

The study was guided by the following research objectives;

- i.** To determine the relationship between promoting Agro-forestry and household's Livelihood of the community in Suba Sub-County
- ii.** To establish the relationship between environmental education program and household's livelihood of the community in Suba Sub-County
- iii.** To establish the relationship between environmental research and technology and household's livelihood of the community in Suba Sub-County
- iv.** To determine the relationship between promoting ecotourism and household's livelihood of the community in Suba Sub-County
- v.** To determine the relationship between the combined environmental conservation initiatives and household's livelihood of the community in Suba Sub-County.

1.5. Research Questions

The study was guided by the following research questions.

- i.** What is the relationship between promoting agro-forestry and household's livelihood of the community in Suba Sub-County?
- ii.** How does environmental education program relate to household's livelihood of the community in Suba Sub-County?
- iii.** In what ways is environmental research and technology related with household's livelihood of the community in Suba Sub-County?
- iv.** What is the relationship between promoting ecotourism and household's livelihood of the community in Suba Sub-County?
- v.** What is the relationship between the combined environmental conservation initiatives and household's livelihood of the community in Suba Sub-County?

1.6 Hypotheses

The study was guided by the following hypotheses:

- i) There is no significant relationship between promoting agro-forestry and household's livelihood of the community in Suba Sub- County.
- ii) There is no significant relationship between environmental education program and household's livelihood of the community in Suba Sub-County.
- iii) There is no significant relationship between environmental research and technology and household's livelihood of the community in Suba Sub-County.
- iv) There is no significant relationship between promoting ecotourism and household's livelihood of the community in Suba Sub-County.
- v) There is no significant relationship between the combined environmental conservation initiatives and household's livelihood of the community in Suba Sub-County?

1.7 Significance of the Study

There is need to meet the requirement of the Kenya Constitution of achieving the 10% goal of forest cover of the total land area in pursuit of Vision 2030 goals under economic, social and environmental pillars. To be able to achieve this goal, there is need to improve on conservation approaches and initiatives paying more attention to integrated and more inclusive approaches to conservation of our environment which also include the local interests, knowledge and participation. Recommendations of this study can therefore help in developing a more integrated and effective conservation initiatives and approaches towards the conservation, protection and promotion of the environment as well as improve livelihood of the community in Suba Sub-County and in any other area where the study can be replicated.

1.8 Assumptions of the Study

The study was guided by the following assumptions; that the respondents were to give accurate and honest responses to the questionnaires and that the respondents were to provide the required information willingly without influence from social desirabilities or expectations.

1.9 Limitations of the Study

Limitations of the study are defined as the challenges anticipated or faced by the researcher during the study which could influence the scope of the study, data accessibility and anticipated occurrences. (Kombo and Tramp, 2006). The study used local community members; some who were illiterate while others were also the victims of forest destruction and degradation who may not be very willing to provide accurate information on the basis of fearing this may be used against them. As a result the information they would have provided would have not been very accurate. The researcher therefore prepared respondents and spelled any form of fear in advance and in a case of dealing with illiteracy challenge, the researcher recruited research assistants familiar with the locality and terrain of the study area who assisted such respondents in reading, interpreting and in helping fill the questionnaires. The researcher also expected challenge of finding respondents in their daily commitments, in farms and businesses that might have denied respondents ample time to respond to the interview sessions. Researcher therefore planned to leave questionnaires with the respondents for a period of one week to allow enough time to respond to questionnaires.

1.10 Delimitations of the Study

The study was confined within community in Suba Sub-County, Homa-Bay County. Suba Sub-County is one of the eight sub-counties of Homa-Bay County located towards South West. The Sub-County stretches from the main land to the borders of Lake Victoria covering an area of 1,056 Km². Suba Sub-County comprises of four administrative wards, namely Gwassi North, Gwassi South, Kaksingri West and Ruma-Kaksingri East wards with a total population of 65,161 persons out of which 51.2% are women. Geographically the study area is covered with hilly terrain with one major forest area-Gwassi Hills forest stretching across the sub county, although currently facing threats from destruction and degradation from human encroachment. Main economic activities of the community include peasant farming, fishing, charcoal burning trade and small scale livestock keeping. Majority of the community members are considered low income earners especially from farming and fishing practices. They are faced with low education, low nutrition and poor health cases prevalence (KNBS, 2009, Homa-Bay County Strategic Plan 2013-2017).

This research was restricted to households with expected respondents being strictly adults both males and females because of their experience and knowledge of both past and current state of the forest and also the various conservation initiatives that has been employed to conserve the forest.

1.11 Definition of Significant Terms

Promoting Agro-forestry

This is defined as the initiatives or activities by the rural community aimed at conserving and protecting the environment through planting of tree species together with crops in the same piece of land, in homesteads or along the boundary lines, including horticulture practices by the community.

Environmental Education Program

This is defined as long term plans and strategies by the local communities to allow individual members of the community to explore environmental issues engage in problem solving and take action to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions.

Livelihood of the Community

Community livelihood refers to the means by which it derives a just and dignified living. It is defined by accessibility of nutrition, education, shelter/ accommodation and health services like medication to its households.

Promoting Ecotourism

Promoting ecotourism refers to initiatives taken by local community in a move to conserve the environment, nature, traditions and culture for the purpose of encouraging responsible travel for educational activities with the aim of sustaining the well-being of the local people.

1.12. Organization of the Study

This study is organized in to five chapters. Chapter one of the study which is also referred to as the introduction include a brief background of the study, statement of the problem, purpose of the study, research objectives, research questions, significance of the study, basic assumptions of the study, limitations and delimitations of the study, definition of significant terms and organization of the study.

Chapter two contains literature review on the topic of the study; relationship between environmental conservation initiatives and household's livelihood organized into four main themes developed from the four objectives of the study. The themes include promoting agro-forestry and livelihoods, environmental education program and livelihoods, research and technology and livelihoods and promotion of culture and livelihoods. The chapter also contains the theoretical framework, conceptual framework, and the summery of literature review.

The third chapter constitutes the research methodology. This section covers research design for the study, target population, sample size and sampling techniques, data collection instruments, pilot test of the research instruments, validity of the instruments, reliability of the instruments, data collection procedures and data analysis techniques.

Chapter four presents data analysis, presentation, interpretation of the results and discussion.

Chapter five contains the summery of findings, discussions, conclusions and recommendations. This chapter also gives a clear conclusion and recommendation including suggestions for further research. Lastly will be section of references and appendices.

CHAPTER TWO LITERATURE REVIEW

2.1 Introduction

This chapter presents the reviewed literature related to the study organized into themes according to the research objectives. These are: Agro-forestry and livelihoods of the community, environmental education and livelihood of the community, Research and technology and livelihood of the community and Environmental policy framework and livelihood of the community. The chapter also captures theoretical framework, conceptual framework and summary of literature review.

2.2 Promotion of Agro-forestry and Livelihood of the Community

People living in or near forests earn on average about 25% of their income from forest resources. Roughly 10% of the world's tree cover is found on farms contributing to increased rural incomes, (Consultative Group on International Agricultural Research CGIAR (2010)). Agro-forestry system is also an essential source of fodder and non-timber forest products, and contributes significantly to the revenues of women-led households. The study reviewed identified lack of training for extension agents, poor management and governance issues as being main challenges hindering full exploitation of agro forestry for livelihood. In as much as this study tried to raise important issues touching on agro-forestry and livelihood of the community, it did not provide a researched solution to the issues raised (challenges). Researcher therefore sought to establish working approaches to management that are local community centered and also pro-conservation that would help realize full exploitation of agro-forestry for better livelihood.

El Salvador is one of the most densely populated and also the most deforested in Latin America. Research conducted by Blackman *et al.* (2012) on land cover change in Agro-forestry areas in El Salvador applied a spatial regression model to analyze clearing of trees in El Salvador's shade coffee growing regions during the 1990s and also examined land cover change in the shade coffee growing regions during the 1990s. The findings suggested that the relationship between proximity to markets and clearing in agro forestry systems is the opposite of that in natural forests. Forest clearing was associated with proximity to urban centers, proximity to roads, and land deemed more

suitable for conventional agriculture because it is flat, fertile, and has adequate drainage. However, the study did not dig deep into the factors behind conserving agro forests even near towns and not natural forests. This suggested an existence of a relationship between agro-forestry systems and the livelihood of the community that would make them prioritize agro-forestry over natural forests which the researcher sought to establish.

Pandey (2007), in his study on the contribution of agro forestry systems to biodiversity conservation, yield of goods and services to society, augmentation of the carbon storage in agro-ecosystems, enhancing the fertility of the soil, and providing social and economic well-being to people in India, asserted that agro-forestry as a traditional land-use adaptation could potentially support livelihood improvement through simultaneous production of food, fodder and firewood as well as mitigation of the impact of climate change. He also noted the need to strengthen agro-forestry management through innovative domestication of useful species and crafting market regimes for the products derived from agro-forestry and ethno-forestry systems. However, there have been no such studies done in the case of this study area, a factor that prompted further research to establish benefits of agro forestry systems among the rural community in Suba Sub-County (Ramadhani T. *et al* 2002).

India is particularly notable for ethno-forestry practices and indigenous knowledge systems on tree-growing. Agro-forestry systems in India include trees in farms, community forestry and a variety of local forest management and ethno-forestry practices. The farms often have an average of 20 *Acacia nilotica* trees per ha, of 1 to 12 years of age. These trees provide a variety of products including fuel-wood, brushwood for fencing, small timber for farm implements and furniture, and non-timber forest products such as gum and seeds. Some of the tested and found working combinations include *Acacia* and rice traditional agro-forestry system with an internal rate of return (IRR) of 33%, guava and Assam lemon-based agri-horticultural agro-forestry systems. However, it is important to recognize the geographical, economical and climatic differences between India where the study was carried and Kenya and specifically the proposed study area-Suba Sub-County. This research sought to assess the potential tree/crop combinations including agri-horticultural systems applicable in the proposed study area (Kamweti D. *et al* 2008).

Results of a review on Contributions of agro-forestry to ecosystem services in the Miombo eco-region of eastern and southern Africa by Gudeta *et al.* (2007), indicated that agro-forestry practices is a source of food, source of energy and fodder, contributed in regulating climate (microclimate modification, erosion control, mitigation of desertification, carbon sequestration and pest control) and supportive services like, soil fertility improvement, biodiversity conservation and pollination in the Miombo eco-region. The study also established that over 80% of the rural community in southern Africa depended on forests for medicinal plants for most of their health needs, a source of food such as honey and edible caterpillars and fuel wood for their energy needs which served over 90% of the people in the Miombo. The expectation of any normal human is that with such findings, agro-forestry would have been fully embraced by local communities and prioritized as a better option, however, this was not the case. Researcher therefore got interested to establish the possible causes for low uptake of agro-forestry among the rural community (Pannell D. 1999).

Maiwada, (2014) carried a study to investigate the role of selected agro-forestry tree species and how they promote livelihoods diversification among 340 smallholders living in 18 rural communities in North-Western Katsina State, Nigeria. The researcher argued that households modified their livelihood strategies in response to the selected trees' use and management. Modest empirical research was employed to investigate this argument so as to extend existing research focus on livelihoods diversification. The study utilized approaches based on modified sustainable livelihood framework to gather and analyze socio-economic data with a view of critically evaluating households' influence on the future of these trees. Findings of the study suggested that the selected trees found in agro-forestry systems contributed significantly to livelihoods diversification and diversified income sources among the rural communities through sale of fuel wood, traditional medicines, fruits, crafts and honey. However, the study failed to bring out rural communities' efforts in protecting and promoting such trees in their farms. Researcher therefore sought to establish rural community's initiatives in promoting agro-forestry.

Rayes (2008) investigated Agro-forestry systems for sustainable livelihood and improved land management in East Usambara Mountain, Tanzania. The aim of the study was to establish the possibilities to develop new profitable and sustainable agro-forestry systems for conservation and livelihood of communities living around East Usambara Mountain forest. The study used a sample

representing 10% of the total households in four villages bordering the Nature reserve and the forest, located in two different agro-ecological zones and using different cultivation methods. The study established that by improving agro-forestry methods, household livelihoods also improved with doubled annual gross income and 13 times the net income as compared to income from traditional practices, better food security, improved cash flow and improved support for forest conservation. However, the research focused only on specific agro-forestry methods like intercropping cardamom, pepper and grevillea assuming other options would work the same way. This study sought to determine other possible options or systems of agro-forestry that would work for the rural communities in Suba Sub-County.

Pailler *et al.* (2015) conducted a study on Impacts of Community-Based Natural Resource Management on Wealth, Food Security and Child Health in Tanzania. The survey involved a sample of 18 households from each of the 20 villages sampled in rural parts of Tanzania and through difference-in-differences estimation strategy, they determined the impact of three different CBNRM approaches, Joint Forest Management (JFM), Community-based Forest Management (CBFM) and Wildlife Management Areas (WMAs), on wealth, food security and health outcomes in Tanzania. The study established that community-based natural resource management (CBNRM) enhanced conservation and improved rural livelihoods through significant improvements in household food security. Wealthy households benefited more from CBNRM than poor households. Management approaches aimed at benefiting and empowering the poor more in Suba Sub-County therefore became the interest of the researcher.

Boffa *et al.* (2008) conducted a study on management of tree diversity in agricultural landscapes around Mabira Forest Reserve, Uganda, with an aim of establishing tree species diversity among farms, identify farm and farmer parameters which influence on-farm tree diversity and its management and to assess the contribution of agro-forestry farming systems surrounding the Mabira protected area to overall landscape tree diversity. Research was conducted in 15 villages randomly sampled among villages surrounding Mabira Forest Reserve. Diversity and management of woody species were surveyed in 105 farms around Mabira Forest in South-Central Uganda. The study indicated that farm management has a strong influence on tree diversity in the coffee-banana systems around Mabira Forest. There was an indication of relatively high number of

planted and exotic species at the levels of farm niche, farm and landscape. Trees in landscape mosaics enhance the ecological quality, provides habitat and greater landscape connectivity through buffer zones, corridors, and stepping stones for dispersal of plant and animal species. Agro-forestry also contributed to reducing pressure of local communities on adjacent forest areas.

2.3 Environmental Education Program and Livelihood of the Community

Environmental education is a permanent process in which individuals gain awareness of their environment and acquire the knowledge, values, skills, experiences, and also the determination which will enable them to act individually and collectively to solve present and future environmental problem as well as to meet their needs without compromising those of future generations (UNEP, UNESCO and OECD, 1992). Sonowal (2009) also defined environmental education as a process of developing a world population that is aware of, and concerned about, the total environment and its associated problems and which has the knowledge, attitudes, commitments and skills to work individually and collectively towards the situation of current problems and prevention of new ones.

Partridge (1999) in Germany argued that adult environmental education should disseminate knowledge about the environment's direct and indirect physical and related social impact, transmit knowledge on the interaction between local activities and their effects. Direct environmental impacts include deforestation and diseases caused by polluted water that affected daily life. Indirect environmental impacts may include increased soil erosion, a disproportionate workload for women, general depletion of resources such as food, animal fodder and water, reduction of numbers and diversity of wildlife and increased risk of bush fires and flooding. Adult education can take both political and socially transformative perspective; it is also key technique in raising environmental awareness and promoting environmentally supportive action. For the case of Kenya and specifically the current study area, adult education has not been rightly prioritized. This study sought to identify an appropriate approach to adult education geared towards livelihood as well as environmental conservation and protection.

In Fiji Wainimate in India, an association of traditional healers, nurses, environmentalists and community educators is known to promote the use of safe and effective traditional medicines and

the conservation of medicinal plants through environmental education and awareness program. The association achieves its objectives through established demonstration gardens where they grow medicinal plants and deal with traditional medicine. Workshops focus on traditional medicines used to treat common diseases, such as skin diseases. Traditional and herbal medicine has a long history among most of our local communities and even in the field of the modern medicine which also traces their source from the forest (Partridge, 1999). Such initiatives promote environmental conservation as well as improving community livelihood. And in agreeing with this study, researcher sought to establish the level of local community knowledge of the medicinal value of forests and the state of the traditional medicine among the local communities.

National Environmental Education Statement for Australian Schools (NEESTAS) (2005), Indicates that Australian government has employed a whole school system approach seeking to equip communities with environmental skills and capabilities, change attitudes and champion for right environmental values, knowledge, understanding, participation and ability to take right action. The approach took a nationally agreed description of the nature and purpose of environmental education for sustainability through all years of schooling, including a vision and a framework for its implementation. In the 1999 Adelaide Declaration by Australian Ministers of Education, the goal for environmental education in Australia was to produce ethical and responsible citizens with understanding of, concern for, stewardship of the natural environment, and the knowledge to contribute to ecologically sustainable development. However, this may not be the case in Kenyan environmental education system that is facing institutional and policy weaknesses. It therefore interested the researcher to establish possible factors behind low impact levels of the Kenyan environmental education system.

Pande (2001), in his study describes an experimental environmental education course in rural schools in India's central Himalayas, a course that was designed to introduce environmental and livelihood issues into mainstream curriculum. The program was initiated by the Uttaranchal Environment Education Centre in 1987 with the help of national and state departments of education. The course focused on land degradation, which is the region's major environmental problem. Students were introduced to how to manage their village ecosystem to ensure maximum sustainable productivity. The study established that a separate course on environmental education

is feasible and could be easily adapted to any other ecosystem, particularly mountain regions, where people are dependent on their surroundings for their daily survival needs. The study also established that the initiative could see rebuilding of the community, rehabilitating the land, and controlling population size, hence ensuring comfortable and secure life with reduced dependency on the government and other development agencies for subsidies and economic wellbeing. However, the study failed to provide reliable and working approaches to effective environmental education, an area which the researcher endeavored to establish to help encourage innovation and creativity towards conservation and livelihoods

Sonowal (2009), indicated that India, through its Honorable Supreme Court has made it a government policy to have environmental education (EE) introduced as a regular course in formal school education system. The course on environmental education was found to be intimately related to the life-supporting natural environment of the region. The students of different standards were given the very basic ideas of their land, plants, animals and utility and production capacity in a very simplistic manner. It was also found that the students were very much adept with such kind of information. However, this may not be the case in Kenyan environmental education that do not relate directly to the life-supporting natural environment of the region. In agreement with this study, this study sought to establish the relationship between the environmental education system and the livelihood of the rural community.

The Africa Environmental Education and Training Action Plan 2015-2024, acknowledges and gives more emphasis to strengthen environmental education and training covering formal and non-formal education, capacity-building and information networking components and to focus on technology enhancement in line with the 2012 Arusha Declaration 18. These efforts are aimed at enhancing conservation of the environment, societal and economic improvement of state of Africa for the benefit of Africa's people. The AEETAP seeks to: strengthen the capacity of formal education institutions and actors, to expand the relevance and use of indigenous knowledge in environmental education and training, integrate innovations in e-learning, curriculum, transformative learning, assessment and materials development into environmental education and training programs on the African continent. The findings of this study are intended to be applied

appropriately in pursuit of meeting the demands of this regional document for the sake of environment and livelihood of the communities.

Elfving and Ristimäki (2011) conducted a study on Environmental Education for Rural Development in Mecubúri District, located in northern Mozambique. The study explored environmental challenges and the environmental education in Mecubúri area with keen interest in understanding how rural farmers are able to use environmental education as a measure to act upon the environmental challenges in the area as well as to strengthen their livelihood assets. The research employed Participatory Rural Appraisal method in collecting empirical data. Ethnographic methods such as participatory observation and semi-structured interviews were also used to build the base for the qualitative primary data collection and the secondary data was collected through literature reviews. The study identified agricultural issues, uncontrolled bushfires, changes in rainfall and the increased prevalence of strong winds and cyclones as well as sanitation and hygiene as some of the main environmental concerns. The study also raised a concern on the effectiveness of the environmental education channels applied among the rural communities. It is upon this argument that this study sought to establish the effectiveness of the current modes and channels of environmental education among the rural community in the proposed study area.

Kimiti and Lydia (2013) researched on the Need to Integrate Themes of Environmental Education in the School Curriculum in Kenya. This was intended to help find a solution to the increasing pressure on environment from climatic variability and anthropogenic activities including deforestation, wetland and water catchment destruction, agro-chemicals use and urbanization among others. The study adopted descriptive survey design to investigate the need to establish the themes of environmental education integrated in the school curriculum and establish the strategies used to teach themes of environmental education in the school curriculum. The study revealed that the themes on environmental education already existing within the national curriculum, incorporated in subjects like geography, languages and religious education taught through lectures, field trips, discussions and guest speakers. Environmental education truly exist within the curriculum, however, its results or effects cannot be realized as expected among the products of the

system (graduates). It is based on this that this study endeavored to establish the relationship between environmental education approaches applied and livelihood of the rural community.

Mutisya (2011) investigated pupils' environmental awareness and knowledge as a springboard for action in primary schools in Kenya's Rift valley. The study was conducted using a sample of 276 standard eight pupils in eleven primary schools in the rural town of Narok. The researcher evaluated the pupils' awareness of key environmental issues in their local area and their knowledge about the causes, effects and solutions pertaining to these environmental issues. Descriptive research design was used and data collection was through questionnaire. The study established that most pupils were aware of the key environmental issues in their local area and that they also understood the causes of some of these environmental issues. The study further found that pupils had ideas about solutions to some of the environmental issues. Basing on such awareness and knowledge of the environment, this study sought to establish possible reasons behind their low applications by local community in conserving and solving environmental issues affecting them.

2.4 Environmental Research and Technology and Livelihood of the Community

Mbaiwaand Stronza (2010) conducted a study on the Community-Based Natural Resource Management (CBNRM) program in Botswana. The aim of the study was to achieve biodiversity conservation and rural development in rich biodiversity areas like the Okavango Delta. The study assumed that if rural communities can derive benefits from natural resources, they will also be able to use such resources sustainably. Based on the livelihoods framework, the study analyzed the effects of tourism development through CBNRM on rural livelihoods at Khwai, Sankoyo and Mababe in the Okavango Delta, Botswana. The study used both primary and secondary data sources. Study findings indicated that the three communities had shifted from their traditional livelihood activities such as hunting and gathering, livestock and crop farming to participate in tourism through CBNRM which was followed by an improvement in livelihood. Basic needs such as shelter, employment and income and social services like water supply systems, transportation, scholarships and payment of funeral expenses were made easy and cheaper due to income from CBNRM. The research findings indicated influence of technology in improving livelihoods. Although the research was conducted in Botswana, a country totally different from Kenya and

specifically the proposed study area both geographically, in climatic condition, socially and economically, this study sought to establish the technology uptake level among the local communities and its relationship with their livelihood.

Sherbinin *et al.* (2008), in their study on Rural Household Demographics, Livelihoods and the Environment, sought to establish linkages that existed among the three variables, (rural household demographics, livelihoods and the environment). Using the livelihood approach as an organizing framework, the study examined evidence on the multiple pathways linking environmental variables and the following demographic variables: fertility, migration, morbidity and mortality, and lifecycles. Research indicated strong evidence that dependence on natural resources intensifies when households lose human and social capital through adult morbidity and mortality, qualifying the evidence for the influence of environmental factors on household decision-making regarding fertility and migration. From this piece of research work, it is evident that for any sustainable environmental conservation, livelihood dimensions like human and social capital need to be taken care of, factors that will enable the local community find a reason to conserve environment. This study sought to establish community involvement in need analysis process before rolling out a given technology among the local community members.

Hegde (2008) carried a study on technology development and delivery for sustainable rural livelihood in India. He took keen interest in investigating public policies that could promote socio-economic and environmental sustainability. This was after establishing that rural economy in India depended largely on agro-based activities and that peasant farmers were faced with landlessness/small pieces of farm lands and lack of adequate inputs particularly irrigation, sources and appropriate technologies to optimize agricultural production. Development of watershed and efficient use of water resources was found to be one main reliable approach to solving farming problems in India's rural areas. For successful transfer of such new technologies, the researcher argued that there was need for serious planning in selecting appropriate technologies suitable for local conditions, a technology that is need based, easy to adopt and capable of generating employment and income, leading to sustainable livelihood. The technology should be launched as a part of the on-going development programs, involving efficient agricultural extension network to

ensure backward and forward linkages and also financial and technical support should be available to overcome the initial hurdles before wider replication.

Pert(2011), in his study entitled *Participatory Research in Conservation and Rural Livelihoods: Doing Science Together*, argues that researchers must take into account the biophysical and social contexts that may affect outputs and outcomes and that participatory research requires a great deal of flexibility. Farmers need not only to be considered as beneficiaries and recipients of knowledge, but should also be involved as collaborators at all stages of the research process, especially at the stage of problem identification and developing research objectives. Analysis of case studies from Indonesia, Zimbabwe, Cibecue, Sweden, Honduras, Kenya and Rwanda, leaves strong message that participatory research only realizes its full potential when it is accompanied by a shift in power to the local community, (power to define the research problem, the power to set the research agenda and the power to interpret the results). Researchers' presence should be invited rather than imposed, their focus is directed rather than directive and their function is facilitative rather than manipulative. This approach promotes self confidence of the rural communities as well as giving the research findings a local face hence more acceptable and applicable to the community.

2.5 Promotion of Ecotourism and Livelihood of the Community

Manu *et al.* (2012) conducted a research on Community-Based Ecotourism and Livelihood Enhancement in Sirigu, Ghana. A sample size of 440 respondents was selected from the community through both simple random and purposive sampling techniques. They found out that tourism/ecotourism has the greatest pro-poor impact on rural communities due to direct contact between the customer and the facility/product creating room for direct sell thus fostering the creation of the economic multiplier effect. Ecotourism also enabled residents to take control of their own destiny by embracing tourism development as a means of enhancing livelihood. Degraded farm lands due to overuse could now be rehabilitated because of alternative source of livelihood.

In Malaysia, (Sunget *al.*2012) carried a study to establish the challenge of developing and promoting sustainable tourism in Kg. Bundu Tuhan by means of investigation. Main purpose of the study was to identify existing tourism assets (both tangible and non-tangible) and converting them into profitable business towards improving livelihood of the community. The study used

qualitative approaches (case studies and surveys). The research established that that tradition and culture among others formed one of the main existing tourism assets among the rural community, and that this could help ensure equitable distribution of benefits and opportunities among stakeholders as well as improve the well-being of the local community.

Kuuder *et al.* (2013) conducted a research on livelihood enhancement through ecotourism using a case of Mognori Eco-village near Mole National Park, Damongo, Ghana. The study was aimed at developing a policy to ensure a collaborative community based wildlife management schemes with the aim of bringing benefits to a fringing community to help reduce poverty and improve livelihood. The study employed both purposive and simple random sampling methods of data collection among the community. The study revealed the impressive community's knowledge on conservation that had improved considerably while economically, some residents earned extra income which enhanced their livelihood. The community's sense of unity by way of cultural identity had also improved with no noticeable negative effects of host-guest interactions.

UNESCO, (2009) Culture, in all its dimensions, is a fundamental component of sustainable development. As a sector of activity, through tangible and intangible heritage, creative industries and various forms of artistic expressions, culture is a powerful contributor to economic development, social stability and environmental protection. As a repository of knowledge, meanings and values that permeate all aspects of our lives, culture also defines the way human beings live and interact both at local and global scales. Values and beliefs shape the relationship of a people to their natural environment and the ways they manage and impact it. Cultural values, local knowledge, and traditional practices of environmental management can be valuable resources towards achieving ecological sustainability. A variety of current environmental challenges such as depleting water sources, shrinking forest covers, and disappearing species, rooted in a disregard for the environment, may be addressed by positive practices embedded in local cultures that value a balance between natural and human worlds

Mbaiwa (2004) used the concept of sustainable rural livelihoods and income diversification to assess the role basket making as a cultural tourism activity on improving rural livelihoods in the Okavango Delta, Botswana. The study pointed out that research was necessitated by the

deteriorating livelihood of the community in this region out of decline in livestock and crop production due to shocks and natural causes such as drought, disease and changing flood levels in the Okavango River. The researcher argued that basket making which is a cultural tourism product has the potential to diversify rural incomes and improve livelihoods in the Okavango. Baskets are cultural tourism products that could raise income earning and employment opportunities for rural residents in the Okavango.

2.6 Theoretical Framework

Theoretical framework is a collection of interrelated ideas based on theories attempting to clarify why things are the way they are, introducing ideas and views of the research problems, allowing understanding realm of the problem, helping to conceptualize topic in its entirety and to acknowledge problem from a wider perspective for objectives (Kombo and Tromp, 2006). This research shall be modeled on the livelihood framework theory by Ashley and Carney (1999). The model represents the complex ways in which different elements that constitute livelihoods interact. This theory will enable the researcher describe into details the interaction that exists between the communities livelihood and the various conservation initiatives or approaches. The model bases its argument on three main pillars, namely livelihood strategies and activities, livelihood outcomes and livelihood security.

The livelihood strategies and activities of poor people are often complex and diverse. For rural people, agriculture and other natural resource-based activities may play an important role, but rural households also diversify into other activities, some of which are linked to agriculture and the natural resources sector, others which are not. Strategies may include subsistence production or production for the market, participation in labour markets or labouring in the home. Outcomes of livelihood strategies are divided between the effects on livelihood security and the effects on environmental sustainability. In relation to livelihood security; income level, income stability (or regularity), and degrees of risk are the defining variables. For instance, income level is obviously important to people, but to poor people income stability and risk avoidance may be as important, if not more so. Income in the livelihood does not just refer to monetary income but also to incomes in terms of food produced by smallholder farmers for home consumption.

The model also asserts that all livelihood strategies depend upon access to assets whether such access involves private ownership or other forms of access. Such assets include natural capital (land), physical capital, human capital (labor), financial capital and social capital

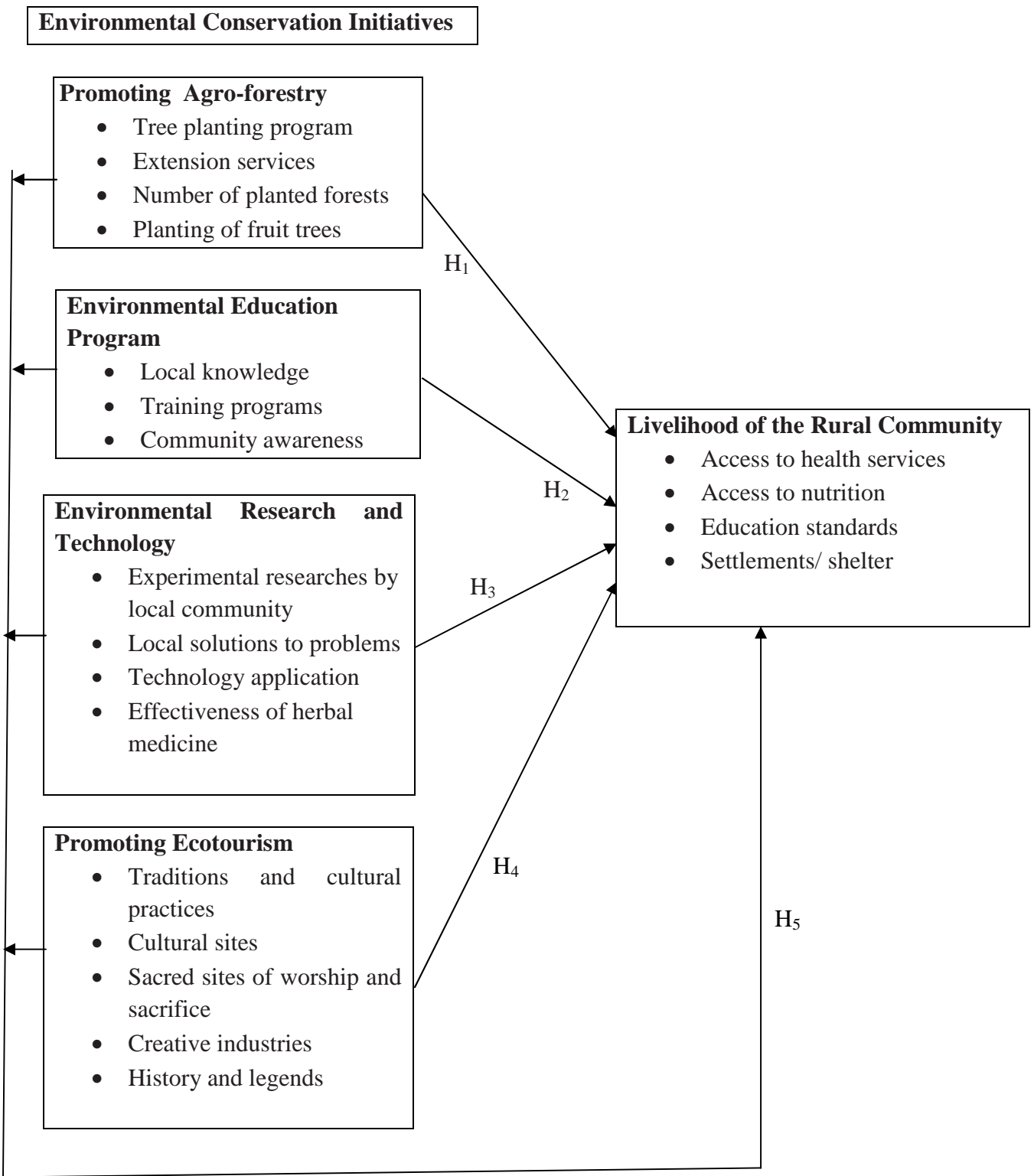
The livelihoods framework, therefore, offers a conceptualization that can help outsiders work together with the poor to identify their priorities and associated opportunities and constraints. It suits the current study as it seeks to describe human livelihood behavior in connection with his/her environment. The many livelihood strategies humans apply in keeping with the changing environment always yielded outcome, some of which are either harmful to the environment or are destructive to it. It is therefore important to take into consideration the livelihood aspect of the local community if sustainable environmental conservation initiatives are to be achieved. Conservation must be for the people, with the people and by the people.

2.7 Conceptual Framework

A conceptual framework is a hypothetical model identifying the concepts under study and their relationships (Mugenda and Mugenda, 2003). It provides a structural description of the relationship between the independent variable (environmental conservation initiatives) and the dependent variable (livelihood of the rural communities), which forms the main concepts of the study. Independent variable is divided into four main sub-variables grouped under it to the left side while the dependent variable is placed to the right hand side. The arrows are used as signs of direct relationship, indicating the connection between the independent and dependent variables.

Figure 2.1 Conceptual Framework
Independent variable

Dependent Variable



2.8 Summery of Literature

The literature reviewed covered the various environmental conservation initiatives by both the government and the non-governmental organizations and their contributions to the livelihoods of the local communities. The literature was reviewed in line with the four objectives of the study. On characteristics of livelihood, the researcher looked at the community's ease of access to nutrition (food), access to shelter/accommodation, access to education and access to health services including traditional medicine.

Under promotion of agro-forestry and livelihood, in the reviewed literatures, the scholars pointed out agro-forestry practices has a positive influence on the livelihood of the local communities through increased income, ensuring food security, micro-climate control, improved soil fertility hence boosted productivity, source of fuel, some tree species also formed medicinal banks for the community and also provided fodder for their livestock. However, the scholars also indicated that there was need to strengthen management and improve on training of the extension officers even at local community level.

Related literature on environmental education program and its contribution to livelihood of the community was also examined which included awareness activities, training programs and environmental education implementation strategies. The reviewed literature indicated that environmental education could make a positive impact on the livelihood of the local community through career opportunities, making informed environmental decisions and taking appropriate actions and improve environmental conservation. The scholars also indicated that for better results, environmental education needed to be fit into the main stream education system of the nation through curriculum development and be taught in schools from primary levels.

On the theme environmental research and technology on livelihood of the community, literature was reviewed with keen interest in covering areas like information gathering and dissemination, funding of conservation project, improved technology applications and improved species application out of research and technology. It was noted that research and technology had a greater positive influence on the livelihoods of the community. Through research, livelihood diversification and resilience programs could reach the community and be implemented, through

research and technology, an all inclusive/ collaborative management strategy could be implemented which yielded better results, managements and planning done from research findings gave better results and a local community face. Improved technology also increased efficiency and effectiveness hence benefiting the community the more.

Researcher also reviewed literature on materials related to promotion of ecotourism as a conservation initiative and livelihood of the rural community with more emphasis on traditions and cultural practices, cultural sites, sacred sites for worship and sacrifices, history and legends and traditional beliefs and how the above factors of conservation had contributed to livelihood. Scholars out of research findings consented to this fact and argued that ecotourism had shown results in both directions; in facilitating environmental conservation by the community themselves as well as directly impact positively on their livelihoods through diversification of income sources.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methods to be applied in carrying out the research. Sections covered include research design, target population, sample size and sampling procedures, data collection instruments, data collection procedure and data analysis techniques.

3.2 Research Design

The study adopted descriptive survey design involving both quantitative and qualitative approaches. Survey can be defined as a research method or strategy used in data collection from a large population. This design therefore fitted this study which as the researcher sought to use questionnaires to collect data for many variables in a large area of study. Descriptive survey design is also considered efficient way of collecting information from a large number of respondents of which this study targets, a flexible design as it allows a wide range of information to be collected. According to Mugenda, (2008), Descriptive design is applied when collecting information about people's attitudes, opinions and habits. The researcher sought to collect information on the background of the target population, livelihood status of the community, promoting agro-forestry, environmental education program, environmental research and technology and promotion of ecotourism among the rural communities through households.

3.3 Target Population

The study was conducted in Suba Sub-County of Homa-Bay County, among the local community households. The sub-county is made up of four administrative wards, namely Kaksingri East-Ruma, Kaksingri West, Gwassi North and Gwassi Central wards. It had a total population of 65,161 people of which 51.2% are women while 48.8 are men leaving in a total of 13,351 households (KNBS, 2009). However, this study focused on households who represented the true residents of the sub-county.

3.4 Sampling size and sampling procedures

This section discusses sample size and sampling procedures.

3.4.1 Sampling Size

According to Krejcie and Morgan, (1970) table, the study used a sample size of 375 households represented by 375 adult respondents. (See appendix III)

3.4.2 Sampling Procedures

Sampling refers to the selection of some part of an aggregate or totality on the basis of which a judgment or inference about aggregate or totality is made. It is the process of obtaining information about an entire population by examining only a part of it (Kothari, 2004).

Multi-stage random sampling method was used to identify the actual study area where respondents would be drawn. The respondents were specifically adults (men and women) aged between 15-49yrs. Multi-stage sampling is a complex form of cluster sampling where instead of using the entire selected cluster, the researcher randomly selects elements from each cluster at different stages (Mugenda, 2008). This method enabled the researcher to reduce unnecessary expenditure both financial and time and resource use following the vastness of the area to be covered by the study.

From the 13,351 households in Suba Sub-County, a sample size of 375 households was used for the study. This number was obtained using Krejcie and Morgan (1970), table of determining sample size for research activities. Actual study area where the sample size was obtained was arrived at through multi-stage random sampling process. Based on Mugenda (2008) theory of 10%-30% of the total target population being a sufficient representation of a population in a social science research, the current research adopted 30% of the four wards of Suba Sub-County to determine the number of wards to be used in the study (30% of 4=1). This implies that only one ward was used as a representative of the whole sub-county. The ward was randomly selected through a ruffle method containing the names of all the four sub-counties; that is Gwassi North, Gwassi Central, Kaksingri West and Kaksingri East-Ruma wards. Kaksingri West was sampled

The number of sub-locations where data collection will be conducted for the purpose of the study was arrived at in the second stage of sampling where the research adopted 20% of the total sub-locations in the selected ward. Kaksingri West ward which was the sampled ward had 5 sub-locations and 20% of 5 is 1 sub-location, which was also be identified through random sample by a ruffle method containing all the names of the sub-locations of the ward (Nyamarandi, Rangwa East, Rangwa West, Nyamrisra and Sindo sub-locations. Nyamrisra sub-location was sampled.

Nyamrisra sub-location has a total of 1168 households (KNBS, 2009). For the purpose of ensuring equal chance distribution across the sub-location the researcher adopted systematic random sampling where every third household was given questionnaires for the study. Each household was represented by an adult either man or woman head of the household. First respondent chance in a household was reserved for the man-head of the household and in the case where the man is missing then the woman head of the household took lead as the respondent. If both the man and the woman are missing, then the researcher proceeded to the next household.

To be able to choose the first household from where the study begun, the researcher took a position at the assistant Chief's office of the sub-location and using approximation picked on the closest household to the office which formed the first sample household for the study.

Table 3.1 Multi stage sampling procedure

1st Stage		2nd Stage		3rd Stage	
Wards of Suba	30% of	Sub-Locations	20% of 5=1	No. of	Sampled
Sub- County	4=1	of the Ward	(Ruffle	households of	households
	(Ruffle		Method)	Sub-location	(every 3rd
	Method)				household)
Gwasssi South		Nyamarandi			
Gwasssi North	Kaksingri	Rangwa East	Nyamrisra	1168	375
Kaksingri West	West	Rangwa West			
Kaksingri East/ Ruma		Nyamrisra Sindo			

3.5 Data collection Instruments

Research instruments are the tools used in the collection of data from the area of the study for the purpose of analysis to reach a conclusion, (Creswell, 2003). The researcher will use questionnaires as the main tool for data collection.

According to Mugenda and Mugenda (2003) questionnaires include all techniques of data collection in which each person shall be asked to respond to a set of questionnaire in predetermined manner. A questionnaire consists of a set of structured questions that respondents are expected to respond to accordingly and is usually applied in collecting information from a substantial number of people (Kothari, 1990). This study involved both structured and semi-structured questionnaires to allow collection of both qualitative and quantitative data to ensure relevancy of the research to its objectives. The method also enabled the researcher solicit a lot of information from respondents within a short time.

The questionnaires consisted of six sections namely; the background information of the household, livelihood status of the households, promoting agro-forestry, environmental education program, environmental research and technology and promotion of ecotourism among community households. Questionnaire questions were carefully structured to ensure the rights of the respondents and households are protected. Questionnaires were then pretested for validity and reliability before data collection thereby yielding consistent results. The researcher and the assistants personally administered the questionnaires and made clarifications on the spot in cases where respondents were in doubt.

3.5.1 Pilot Testing

Pilot testing refers to a trial test of the procedures and instruments before the actual application during the study. The purpose of the test is to be able to identify their weaknesses early enough thus can be adjusted to prevent costly errors hence confirming their validity and reliability. A pilot study was conducted in Sumba West sub-location of Kaksingri East/Ruma Ward using a sample size of 38 households (10% of 375 households sampled for the main study) represented by 38 adults sampled on the basis of household headship criteria for a period of one week. Research instruments were then adjusted accordingly.

3.5.2 Validity of the Study

Validity is the degree to which results or the findings of the study actually represents the phenomenon under study, (Mugenda and Mugenda, 2003). Data collection instruments for this study which included questionnaires was ascertained by experts such as research supervisors who also gave guidance to ensure the instruments were well constructed to address the information sought by research objectives. Validity of instruments was also ensured by use of simple language easily understood and interpreted by respondents and also by use of side notes as guidance to respondents. After data collection, all the questionnaires were again subjected to verification by the researcher to check if questions are properly answered.

3.5.3 Reliability of the Instruments

Reliability of a research instrument is its ability to produce same results if used again on a different occasion with the same objectives of the study, (Mulwa, 2006). Data collection instruments were tested for internal reliability through split-half technique of assessing reliability because it requires only one testing session and it also eliminates errors due to respondents ease in remembering responses from the first test. In the split-half method, the questions in the instruments were separated into two halves using odd and even numbers system. Each set were treated separately and scored accordingly. The two sets were then correlated to give an estimation of reliability. Using Pearson's' formula, it was be possible to adjust the correlation coefficient. According to the formula, reliability of the original test (r_{xx}) should be equal to twice the reliability coefficient obtained by correlating the scores of the odd statements with the scores of the even statements (r_{oe}) which should range between -1 to +1. Reliability value (r_{oe}) above 0.5 was considered average reliability while reliability value (r_{xx}) of 0.65 and above was considered a good reliability and values less than 0.5 was considered a weak reliability (Nachmias and Nachmus, 1999).

3.6 Data collection Procedures

Data collection exercise begun upon approval by the University of Nairobi to go to the field. Researcher obtained research permit from the Ministry of Higher Education, Science and Technology to conduct the study. The researcher recruited three research assistants specifically for collecting data who were then engaged in a one day relevant training on how to administer the instruments before the actual exercise. This was followed by introduction visit to local Chief and

Sub-Chief and making appointments. In order to administer the questionnaires effectively, the researcher and the assistants made a personal visit to all the selected households, making introductions and then explained the purpose of the research as well as clarify any arising issue from the questionnaires, before leaving questionnaires with the respondents for one week before collection. For questionnaires that had not been filled, more time (3days) was added. It is in the course of these visits that the researcher and the team also conducted observations and enquired of any other relevant information outside the questionnaires.

3.7 Data Analysis Techniques

After data collection, the questionnaires were coded and entered into the computer for analysis. The statistical package for social sciences (SPSS) version 22.0 was used to process and analyze data. Data was subsequently cleaned and edited, synthesized according to the emerging issues, variables and objectives of the study.

Quantitative data was analyzed using both descriptive and inferential statistics. Descriptive statistics involved calculating frequencies, percentages and means. The inferential statistics for the purpose of this study was by the aid of Pearson-Product Moment Correlation to be able to establish the level of relationships between the independent and the dependent variables while Multiple Linear Regression Model will be used to test the relationship between the combined environmental conservation initiatives and the livelihood of the community in Suba Sub-County.

According to Creswell (2008), a correlation coefficient ranging from -1.00 to +1.00 will be useful to describe and measure the degree and strength of relationship between the variables. Positive value helped identify a positive relationship while a negative value identified negative relationship and a 0.00 correlation coefficient denoted a no linear relationship. The closer the correlation coefficient was to 0.00, the weaker the relationship between the variables. Hypotheses were tested using Chi-Square P-value.

Multiple Linear Regression Model was specified as follows:

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \epsilon_i$$

Where:

y_i is livelihood of rural community

θ_0 is a constant

$\theta_1 x_1$ is promoting agro forestry

$\theta_2 x_2$ is environmental education program

$\theta_3 x_3$ is environmental research and technology

$\theta_4 x_4$ is promoting ecotourism

ϵ_i is the error term

3.8 Operationalization of Variables

The study used the indicator variables as a guide to data collection. The variables were operationalized to fulfill the objectives of the study.

Objectives	Variables	Indicators	Instruments	Measuring Scale	Data Analysis
<p>1. To determine the relationship between promoting Agro-forestry as an environmental conservation initiative and Livelihood of the community in Suba Sub-County</p>	<p>Independent variables Promotion of agro-forestry</p>	-Tree planting activities	Questionnaires	Ordinal	<ul style="list-style-type: none"> • Percentages • Frequency • Mean • Pearson-Product Moment correlation
		-Extension services	Questionnaires	Ordinal	
		-Number of planted forests	Questionnaires	Ordinal	
		-Horticulture practice	Questionnaires	Ordinal	
			Questionnaires	ordinal	

<p>2. To establish the relationship between environmental education program as an environmental conservation initiative and livelihood of the community in Suba Sub-County</p>	<p>- Environmental Education Programs</p>	<p>-Awareness campaigns -Training programs -Local knowledge -Skills for solving environmental issues</p>	<p>Questionnaires Questionnaires Questionnaires Questionnaires</p>	<p>Ordinal Ordinal Ordinal ordinal</p>	<ul style="list-style-type: none"> • Mean • Pearson-Product Moment correlation • Frequency tables • Percentages
<p>3. To establish the relationship between environmental research and technology</p>	<p>Environmental Research and Technology application</p>	<p>-Information gathering and dissemination -Local solutions to local problems -New technology application</p>	<p>Questionnaires Questionnaires Questionnaires</p>	<p>Ordinal Ordinal Ordinal</p>	<ul style="list-style-type: none"> • Mean • Pearson-Product Moment correlation • Frequency tables • percentages

<p>as an environmental conservation initiative and livelihood of the community in Suba Sub-County</p>		<p>-Improved tree and animal species</p>	<p>Questionnaires</p>	<p>ordinal</p>	
<p>4. To determine the relationship between promoting ecotourism as an environmental conservation initiative and livelihood of the community in Suba Sub-</p>	<p>-Promotion of ecotourism</p>	<p>-Traditions and cultural practices -Cultural sites -Sacred sites for worship and sacrifices -History and legends</p>	<p>Questionnaires Questionnaires Questionnaires Questionnaires</p>	<p>Ordinal Ordinal Ordinal ordinal</p>	<ul style="list-style-type: none"> • Mean • Pearson-Product Moment correlation • Frequency tables • percentages

County					
	Dependent Variable Household livelihood	-Access to adequate food -Access to education -Shelter/ accommodation -Access to health/ medical services	Questionnaires Questionnaires Questionnaires Questionnaires	Ordinal Ordinal Ordinal ordinal	<ul style="list-style-type: none"> • Mean • Pearson-Product Moment correlation • Frequency tables • percentages

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presents findings of the study which have been discussed under thematic subsections in accordance with the study objectives. Themes of this chapter include Demographic characteristics of respondents, community livelihood at household level, promoting agro-forestry and livelihood, environmental education and livelihood, environmental research and technology and livelihood and promoting tourism and livelihood.

4.2 Questionnaire return rate

A total of 375 questionnaires were developed and administered to respondents who were mainly the local community members at household level. All the questionnaires, the 375 were duly filled and returned for analysis which gave a questionnaire return rate of 100% which the study considered adequate for analysis. A 100% success return rate is attributed to well trained research assistants that also had enough time to administer questionnaires to each respondent in person and assisting in filling and interpretation of the questions to respondents where necessary.

4.3 Demographic characteristics of respondents

The study sought to establish the demographic characteristic of the respondents in terms of age, education, household size and occupation. The sub-sections below discuss further these characteristics in order to give a better understanding of the participants/respondents in this study.

4.3.1 Distribution of respondents by age

During the study, the researcher sought to establish the age of the respondents. This was necessary as it would reveal such cases like early marriages among community members characteristic of low living standards (poor livelihood conditions). Age also tells a lot about experience in life. Age group of above 40 years especially of men was believed to be a center of wisdom and information about the community. A team that can teach and champion for environmental conservation out of their own experiences in life while age groups within youth brackets may mainly depend on school

education and other relevant literatures for their environmental learning. Findings were as presented in table 4.1.

Table 4.1 Distribution of respondents by age.

Age groups	Frequency	Percentage (%)
10-19	6	1.6
20-29	81	21.6
30-39	180	48
40-above	108	28.8
Total	375	100.0

From the findings of this study, table 4.1 above, majority of the respondents were between age 30-39 years indicating that majority of the households are headed by youths who are considered more energetic, creative and industrious if well guided, followed by 108 (28%) who were 40years and above, a generation that have experienced the times when the climatic conditions were favorable and the present when climatic conditions are harsh and un-conducive for farming practices. Only 81 (21.6%) were between 20-29 years showing low early marriage cases prevalence in the area.

4.3.2 Distribution of the respondents by education level

Level of education defines level of development, understanding, creativity and reasoning among the community members. In areas where education levels of the members are high, and not just the basic education, the community is usually open to many sources of education and acquisition of knowledge and for this matter environmental knowledge and education unlike regions with low education levels. It is in this regard that the researcher sought to establish the educational levels of the respondents of the study.

Table 4.2 Distribution of respondents by education

	Frequency	Percentage (%)
Primary	151	40.3
Secondary	165	44.0
Tertiary	36	9.6
University	11	2.9
None	12	3.2
Total	375	100.0

The results of the study as shown in table 4.2 indicated that majority, 165 (44%) , of the respondents had only the basic education according to Kenyan system, that is secondary level, followed by 151 (40%) of the respondents attaining primary education alone, below basic education levels. Education at college level and above was represented by 12.5% only of the total respondents.

4.3.3 Distribution of respondents by occupation

The study endeavored to establish respondents' major means of earning household income (occupation). This was of importance to the study as it could reveal some crucial information on the economic status of the community, a factor that defines community livelihood. Findings of the study as shown on table 4.3

Table 4.3 Distribution of respondents by occupation

	Frequency	Percentage (%)
Student	9	2.4
Self employed	166	44.3
Formal employment	41	10.9
Unemployed	2	0.5
Farming	157	41.9
Total	375	100.0

Majority 166 (44.3%) of the respondents who were also the household heads are self-employed in activities like peasant fishing, sand mining and small businesses in the village. 157 (41.9%) of the respondents does peasant farming mainly for the purpose of food supply for their households. Main concern raised by the farming category is the unpredictable rainfall pattern that contributed to very low harvest in many occasions. It is therefore clear on how much the community is struggling to meet their basic needs like food. Among all the 375 respondents, only 41 (10.9%) were formally employed, majority being primary school teachers, an indication of high dependency ration within this community.

4.3.4 Distribution of respondents by household size

The researcher also sought to establish the average household size in terms of live members including relatives living within the households. This was important for the study as it would bring out dependency levels among the households. High dependency levels in many cases are threats to livelihoods especially in situations of scarce resources as seen in such localities. The findings of the study indicated that out of 375 households, on average each household consisted of five members.

4.4 Household Livelihood

Household livelihood refers to the means by which it derives a just and dignified living. It is defined by accessibility of nutrition, education, shelter/ accommodation and health services like medication to its households. Household livelihood being the dependent variable of the study, the researcher sought to establish the condition of household livelihood in terms of household income range, household income sources, accessibility of basic needs (food), main source of medication, accessibility of health facilities and accessibility of herbal medicine. The findings of the study are as discussed below.

4.4.1 Household income sources

The researcher sought to establish major sources of household income as this is a key contributor to livelihood of the people. Stable and dignified sources of income like formal and permanent employments are usually associated with better living standards. Household heads are in a position to plan for education for their household members, provide consistently for their basic needs like food and shelter. On the other hand casual jobs and peasant businesses are known for their low return rates and hence very unpredictable in terms of supplying for basic needs. Farm engagements and businesses usually are at the mercy of seasons and natural catastrophes. The study findings were as shown in table 4.4

Table 4.4 Household income sources.

	Frequency	Percentage (%)
Employment	19	5.1
Business	49	13.1
Farming	121	32.3
Employment/Business	12	3.2
Employment/farming	28	7.4
Business/farming	146	38.9
Total	375	100.0

It is evident that majority 146(38%) of the households in this area depend on small scale (peasant) farming and business as the major source of income. Mostly cultivated crops include maize, sorghum, beans, green-grams and cassava in small scales. Most prevalent businesses included small kiosks, fishing and sale of fish, charcoal burning, sand mining by the shores of the lake, firewood selling and odd jobs for a pay. This was followed closely by a group of up to 121(32.3%) of the respondents that mainly depended on farming as the main household income source, 49 (13%) of the respondents depended entirely on business as the main source of income while households whose income source was mainly employment was only 19 (5.1%), suggesting unstable income sources prevalence in this study area.

4.4.2 Household income range

Household income range is a key player in determining the livelihood standard of any household and in turn the community. High income earners are privileged to easily accessing basic needs and still remain with surplus to cater for their wants in life hence making themselves more comfortable, a life characterized by better education opportunities, better nutrition, good health care, good shelter and even luxurious living. On the other hand low income earners are faced with difficulty of balancing between the most important and just important among their basic needs. In many cases it is food that takes the first priority in their budget. This is evident in low living standards, poor shelters, poor nutrition and low education levels as it is not very much of priority. It is based on this argument that the researcher sought to establish the income range of the households of the community in the study area. Findings of the study were as shown in table 4.5.

Table 4.5 Household income range

	Frequency	Percentage (%)
10000	102	27.2
10000-20000	168	44.8
20000-30000	83	22.1
30000-40000	20	5.3
40000-above	2	0.5
Total	375	100.0

Majority of the households, 168 (44.8%) monthly income ranged between (Ksh. 10000-Ksh.20000) followed by 102 (27.2%) that earned monthly household income of below Ksh. 10000. In general up to 72% of the investigated households earn less than Ksh.20000 monthly, a figure that we can rate as low income earners. Only 5.8% of the respondents were earning above Ksh.30000, economically reflecting high dependency rates.

4.4.3 Accessibility of Nutrition

Accessibility of nutrition in this case refers to availability and affordability of food substances to the households in their right proportions. Food is life to any community and it is until it is enough and in surplus that business or trade can take place. Accessibility to nutrition will always define health status of a community and their economic levels. It is based on this argument that this study sought to establish how accessible nutrition is to the household. The results of the study were as table 4.6

Table 4.6 Household Food security

	Frequency	Percentage (%)
Always have enough food	81	21.6
Food supply very unpredictable	131	34.9
Getting food is very expensive	161	42.9
Mostly depend on relief food	2	0.5
Total	375	100.0

Majority of the respondents, up to 161(42.9%) consented to the fact that food is very expensive to get. They use a lot of energy and resources in producing food but the returns are usually not commensurate. This was followed by 131 (34.9%) of the respondents who confirmed that food supply is very unpredictable following the continually changing seasons and climatic conditions. Harvest is never a guaranteed phenomenon in this society. Only 81 (21.6%) of the respondents indicated that they had enough food throughout the year.

4.4.4 Major source of medication to households

One of the key livelihood variables or determinants is in the health status or component of the society. This can be seen in the ability of the household members to access and afford appropriate and effective medication and health services in general whenever there is need. The study sought to establish the major source of medication used by the households. The study findings are in table 4.7.

Table 4.7 Source of medication to households

	Frequency	Percentage (%)
Health facility	218	58.1
Herbal medicine	39	10.4
Both	118	31.5
Total	375	100.0

Most of the household represented by up to 218 (58.1%) of the respondents depended on health facilities for their medication while only 39 (10.4%) of the respondents depended on herbal medicine for medication. But in many cases, many of the households (118 (31.5%)) also applied both depending on the convenience.

4.4.5 Accessibility of health facilities

The study sought to find out how much accessible health facilities were to the community. Findings of the study are as shown on Table 4.8.

Table 4.8 Accessibility of health facilities

	Frequency	Percentage (%)
Very expensive	87	23.2
Expensive	215	57.3
Affordable	38	10.1
Not applicable	35	9.3
Total	375	100.0

Results indicated that getting health services from health facilities was considered expensive by the majority, 215 (57.3%) of the respondents and a further 87 (23.2%) of the respondents consenting that accessing health services from health facilities was very expensive. Many of the respondents confirmed further that health facilities were expensive in terms of time consuming/wasting waiting to be attended to and financially.

4.5 Promoting Agro-forestry and Household livelihood

Promoting agro-forestry according to the study referred to initiatives or activities by the rural community aimed at conserving and protecting the environment through planting of tree species together with crops in the same piece of land, in homesteads or along the boundary lines, including horticulture practices by the community. The study sought to establish the possible relationship, nature of the relationship and the degree of the relationship that existed between such initiatives and the household livelihoods. In endeavor to establish such relationship, researcher sought to know the most common farming type practiced by the local community (commercial or subsistent), method of farming (mono-cropping or mixed cropping), presence of horticultural practice (planting of fruit trees) and frequency of tree planting exercise by households. The findings were then correlated with household livelihood to establish the relationship. Results of the study were then discussed.

4.5.1 Type of farming practiced

The researcher sought to determine the type of farming practiced by the community as this would be handy in revealing economic status elements of the community as well as tell of the possibility of agro-forestry practices. Commercial farming is usually characterized by large scale farming normally mono-cropping: for example maize plantations, tea plantations and wheat fields, practiced by middle class people. Returns are always good indicating improved livelihoods. Subsistent farming is usually a characteristic of a struggling community who only cultivate for food. Contributing factors could be poor climatic conditions and poor soils that do not support good farming. It is in such conditions that agro-forestry practices become necessary to help diversify livelihood techniques. Findings of the study are in table 4.9,

Table 4.9 Type of farming practiced

	Frequency	Percentage (%)
Commercial farming	4	1.1
Subsistent farming	371	98.9
Total	375	100.0

Majority of the households up to 371 (98.9%) practiced subsistent farming and only 4 (1.1%) practice commercial farming. Subsistent farming suggests a low earning kind of community whose main agenda for farming is to get food for sustenance of households. It can also be attributed to poor rainfall patterns experienced in the area and even un-productivity of the land. Subsistent farming is also an indication of a community unable to grow enough crops for food and get surplus to sell. Food security is therefore very unpromising to the households.

4.5.2 Method of farming practiced

Method of farming for the purpose of this study referred to either practice of mono-cropping or mixed cropping. Mono-cropping is planting of a single crop type in a piece of land in a given season while mixed cropping is the act of cultivating a variety of crop types in a piece of land in given season. The main purpose of this question was to help researcher determine the prevalence of crop cultivation practice and the mode where mixed cropping would reflect maximized production opportunity scheme as well as conservation initiative where some of the crops are soil nutrient enriching like groundnuts (leguminous plants) and also controls soil erosion by improving ground cover. Results of the study, table 4.10,

Table 4.10 Method of farming.

	Frequency	Percentage (%)
Mono-cropping	97	25.9
Mixed-cropping	278	74.1
Total	375	100.0

Indicated that most of the households, 278 (74.1%) practiced mixed cropping and only 97 (25.9%) of the respondents practiced mono-cropping. There is therefore enough evidence of crop cultivation among the households and that most of them practiced mixed cropping as a means of increasing chances of harvest. In mixed cropping the most prevalent combinations were, maize/beans, maize/green grams, sorghum/maize.

4.5.3 Planting of fruit trees

Agro-forestry is evident where tree species, either fruit or woody species are planted along with crops or non-tree species. Planting of fruit trees is considered more beneficial especially in rural areas for its multiple benefits like wood, fuel, shade and food/fruits which if well harvested contribute considerably to livelihood of the community. Findings of the study, table 4.11,

Table 4.11 Planting of fruit trees prevalence

	Frequency	Percentage (%)
Yes	216	57.6
No	159	42.4
Total	375	100.0

It is evident that majority of the respondents, 216 (57.6%) had planted fruit trees and only 159 (42.4%) of the respondents did not have fruit trees in their household farms. This is an indication that there is promotion of agro-forestry among the households. Although, going by the percentages represented, it is also clear that fruit tree planting is only partially utilized.

4.5.4 Tree planting program.

Researcher sought to determine whether there was any program by the local community through by the household initiatives and how frequent the exercise took place in an effort to confirm further the existence of agro-forestry. The findings of the study as shown in table 4.12

Table 4.12 Tree planting program

	Frequency	Percentage (%)
Once in a while	97	25.9
Every rainy season	194	51.7
Annually	84	22.4
Total	375	100.0

Findings indicated that most households, up to 194 (51.7%) had a program of tree planting that largely depended on rainfall pattern and season. In the case where there was not rain throughout the year then there would not be any tree planting exercise. This also suggested that survival of the planted trees also largely depended on the rainfall patterns where short rains threatened the survival rates. 97 (25.9%) of the respondents planted trees only once in a while, while 84 (22.4%) indicated that they did tree planting in an annual basis. Based on the results demonstrated, it is evident that there is tree planting exercise taking place among the households, a point that confirms further promotion of agro-forestry.

4.5.5 Accessibility of extension services

Extension services for the purpose of this study is educating and assisting the local community members to apply scientific research and new knowledge to agricultural practices with an aim of achieving maximum benefits as well as conserve the environment. The study sought to establish if such services were accessible to the community members and if they were gaining from them in case they were available. Findings of the study as shown on table 4.13

Table 4.13 Availability of extension services

	Frequency	Percentage (%)
Yes.	109	29.1
No.	266	70.9
Total	375	100.0

Results revealed that extension services were available but only known to a smaller fraction of the respondents, only 109 (29.1%) while the remaining 266 (70.9%) of the respondents did not agree to the existence of extension services. This was an indication of poor awareness campaign by the extension officers.

4.5.6 Relationship between Agro-forestry and household livelihood

To be able to establish the nature and level of relationship between promoting agro-forestry and livelihood of the households, researcher correlated two agro-forestry indicators; that is method of farming and fruit trees planting prevalence respectively with household income range as a livelihood indicator. Results of the analysis are as in table 4.14

Table 4.14 Correlating farming methods and household income range

		Farming method	Livelihood
Farming method	Pearson Correlation	1	0.106*
	Sig. (2-tailed)		0.041
	N	375	375
Livelihood	Pearson Correlation	0.106*	1
	Sig. (2-tailed)	0.041	
	N	375	375

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

The results reveal a positive relationship of 0.106 between method of farming and household income range. Using a correlation coefficient range of -1.00 to +1.00 for description and 0.00 as an indication of a no relationship case, it is evident that there is a relationship between farming methods and income range of the households and that it is a weak relationship to the positive. Choice of farming method had a positive relationship with the household livelihoods.

On testing hypothesis on the significance of the relationship, Chi-square test at a 0.05 level was applied.

Table 4.15 Chi-Square Tests for significance level of the relationship between farming methods and household livelihood

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.607 ^a	4	.002
Likelihood Ratio	17.477	4	.002
Linear-by-Linear Association	3.619	1	.057
N of Valid Cases	375		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is .52.

The result indicated that there was a strong evidence of relationship between farming methods and household livelihood and that the relationship was significant. (Chi-square=16.607, df=4, p 0.05). Null hypothesis was therefore rejected.

Analysis result of correlated data between fruit trees planting prevalence, table 4.16,

Table 4.16 Correlating fruit trees planting prevalence and household income range

		Fruit trees planting	Livelihood
Fruit trees planting	Pearson Correlation	1	-0.258**
	Sig. (2-tailed)		0.000
	N	375	375
Livelihood	Pearson Correlation	-0.258**	1
	Sig. (2-tailed)	0.000	
	N	375	375

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

The results indicated a negative relationship of -0.258. Using a correlation coefficient range of -1.00 to +1.00 for description and 0.00 to describe the relationship case, there is an indication of a relationship between fruit trees planted by the community and the household income and that the relationship is to the negative implying that the fruit trees planted were not contributing considerably to the income of the households. Going by the accuracy level of 0.05, researcher also judged the relationship as being a weak relationship. Researcher then tested hypothesis using Chi-square test at a 0.05 level.

Table 4.17 Chi-Square Tests for significance level of the relationship

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	39.828 ^a	4	.000
Likelihood Ratio	42.585	4	.000
Linear-by-Linear Association	24.961	1	.000
N of Valid Cases	375		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is .85.

The result indicated that there was a very strong evidence of relationship between fruit tree planting and household livelihood and that the relationship was significant. (Chi-square=39.828, df=4, p 0.05). Null hypothesis was therefore rejected.

Based on the above findings and analysis of the study, researcher therefore concluded that there was a relationship between promoting agro-forestry and household livelihood and that the relationship is significant at the 0.05 level. The first null hypothesis of the study was therefore rejected.

4.6 Environmental Education program and livelihood

Environmental education is defined as long term plans and strategies by the local communities to allow individual members of the community to explore environmental issues, engage in problem solving and take action to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions. Evidence of environmental education taking place among the households was tested using indicators such as local knowledge level of their environment, respondents' awareness of their environment, practical environmental conservation skills among the respondents and availability of an environmental training program as a community initiative. Findings of the study are as discussed below under the subsections mentioned above.

4.6.1 Local knowledge level of their environment

Researcher sought to determine the level of knowledge of the respondents concerning their environment by requesting respondents to list at least three reasons why we need to conserve the environment. By giving only one reason would reflect poor knowledge, two reasons would indicate good knowledge, three reasons would indicate very good knowledge while no reason would indicate ignorance concerning environment by the respondent. Results of the study, table 4.18,

Table 4.18 Local knowledge level of their environment

	Frequency	Percentage (%)
Poor	65	17.3
Good	88	23.5
Very good	205	54.7
Ignorant	17	4.5
Total	375	100.0

Majority of the respondents, up to 205 (54.7%) had very good knowledge of their environment and could list up to the three required reasons for environmental conservation, 88 (23.5%) also had good knowledge of their environment and only 65 (17.3%) of the respondents had poor knowledge of their environment. Research also found out that despite the many awareness efforts by both government and non-governmental organizations, still there was a lot of respondents, up to 17 (4.5%) that could be counted as totally ignorant of their environment and why we need to conserve it.

4.6.2 Environmental awareness level of the local community

Researcher sought to establish the level of community awareness of their surrounding or environment. This was tested by requesting the respondents to list any three tree species they knew and their corresponding benefits. According to the researcher, ability to list all the three species and indicating their benefits would be an indication of very good awareness, ability to list two and their corresponding benefits would translate to good awareness while ability to list only one would reflect poor awareness. Result of the study, table 4.19,

Table 4.19. Environmental awareness level of the local community

	Frequency	Percentage (%)
Poor	17	4.5
Good	130	34.7
Very good	228	60.8
Total	375	100.0

228 (60%) of the respondents were very well aware of their environment, 130 (34.7%) were averagely (good) aware of their environment and only 17 (4.5%) of the respondents were poorly aware of their environment. It can be concluded that environmental awareness among the respondents was generally very good. Most common awareness channels suggested by the respondents included TV programs, radio programs, formal education curriculums, chief's barazas and legendary stories by the old in the community/ community elders.

4.6.3 Environmental training program

In endeavor to determine further the existence of environmental education program, the researcher sought to establish chances of training programs among the household members of the respondents. Respondents were asked if there were some of their household members that had attained any kind of formal environmental training apart from the normal school curriculum. The findings of the study were as shown in table 4.20

Table 4.20 Environmental Training program

	Frequency	Percentage (%)
Yes	49	13.1
No	326	86.9
Total	375	100.0

There was very little training programs taking place among the community members as reflected by the majority of the respondents, 326 (86.9%), disagreeing and only 49 (13.1%) of the respondents agreeing that there is some training taking place to their household members. It is therefore possible to conclude that there is at least an evidence of training taking place, although only very small fraction of the respondents benefit from the exercise.

4.6.4 Environmental practical skills

Generally education program is expected to achieve as one of its main objectives the impartation of the practical skills among the learners, which is the measure of its success. It is based on this argument that the researcher sought to determine the environmental practical skills of the respondents and especially in solving common environmental challenges. The respondents were then requested to list any two methods of soil erosion control that they have practiced and found effective. Ability to mention two correct methods was used as an indication of very skilled respondents, mentioning one correct one would indicate just skilled respondent while no answer meant unskilled respondent. Findings of the study, table 4.21,

Table 4.21 Environmental practical skills

	Frequency	Percentage (%)
Skilled	53	14.1
Very skilled	321	85.6
Unskilled	1	0.3
Total	375	100.0

Majority of the respondents, up to 321 (85.6%) were very skilled and had practiced soil conservation initiatives even at household level while 53(14.1%) of the respondents were also skilled and practiced soil erosion control measures. Only 1 (0.3%) of the respondents was found to be unskilled in terms of environmental conservation practical skills application.

4.6.5 Relationship between environmental education program and household livelihood

Researcher then sought to establish the possible relationship, nature and significance level of the relationship between environmental education program as an environmental conservation initiative and household livelihood of the community. To achieve this objective, two elements of strong representation of environmental education; respondents' environmental conservation knowledge and environmental awareness level of the respondents respectively were correlated with livelihood element; that is income range. Findings of the analysis are as presented on table 4.22 and 4.23 respectively

Table 4.22 Correlating Local conservation knowledge and household income range

		Conservation knowledge	Livelihood
Conservation knowledge	Pearson Correlation	1	0.270**
	Sig. (2-tailed)		0.000
	N	375	375
Livelihood	Pearson Correlation	0.270**	1
	Sig. (2-tailed)	0.000	
	N	375	375

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

Analysis result gave a correlation coefficient of 0.270, indicating a positive relationship between environmental knowledge level of the respondents and their household income range. Using a correlation coefficient range of -1.00 to +1.00 to describe the relationship, correlation coefficient of 0.270 indicates a weak relationship. Positive value of the correlation coefficient also signifies that the conservation initiative was impacting positively on the income levels of the respondents.

Researcher then tested hypothesis using Chi-square test at 0.05 level

Table 4.23 Chi-Square Tests for significance level of the relationship conservation knowledge level and household livelihood

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	58.407 ^a	12	.000
Likelihood Ratio	70.075	12	.000
Linear-by-Linear Association	27.167	1	.000
N of Valid Cases	375		

a. 9 cells (45.0%) have expected count less than 5. The minimum expected count is .09.

The result indicated that there was a very strong evidence of relationship between conservation knowledge level and household livelihood and that the relationship was significant. (Chi-square=58.407, df=12, p 0.05). Null hypothesis was therefore rejected.

Table 4.24 shows results of correlating environmental awareness level of the respondents and household income range,

Table 4.24 Correlating environmental awareness level and household income range

		Environmental awareness	Livelihood
Environmental awareness	Pearson Correlation	1	0.344**
	Sig. (2-tailed)		0.000
	N	375	375
Livelihood	Pearson Correlation	0.344**	1
	Sig. (2-tailed)	0.000	
	N	375	375

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

The results also gave a positive correlation coefficient of 0.344 indicating that there is a relationship between environmental awareness level of the respondents and their household income range. Using a correlation coefficient range of -1.00 to +1.00 to describe the relationship, it is evident that the relationship between environmental awareness level and household income range is a weak relationship closer to 0.00 which is a no relationship coefficient. Positive value reveals the significant positive contribution of environmental awareness level to household income range.

Researcher then tested hypothesis on the significance of the relationship using Chi-square test at 0.05 level.

Table 4.25 Chi-Square Tests for significance level of the relationship environmental awareness level and household livelihood

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	48.460 ^a	8	.000
Likelihood Ratio	54.812	8	.000
Linear-by-Linear Association	44.260	1	.000
N of Valid Cases	375		

a. 6 cells (40.0%) have expected count less than 5. The minimum expected count is .09.

The result indicated that there was a very strong evidence of relationship between environmental awareness level and household livelihood and that the relationship was significant. (Chi-square=48.460, df=8, p 0.05). Null hypothesis was therefore rejected.

Based on the results of the analysis, the researcher therefore concluded that there was a relationship between environmental education program and the household livelihood of the community and that the relationship is positive and significant at the 0.01 level. The second null hypotheses of the study was therefore rejected.

4.7 Environmental Research and technology and livelihood

Environmental research, for the purpose of this study was a term used to refer to the various ways and means through which the local community members through households get to identify most efficient and effective methods for sustainable coexistence with their environment. Technology refers to the various tested and found efficient techniques of solving environmental challenges. In determination to promoting environmental conservation, research and technology become of essence. Research help identify most effective and efficient means and methods of conservation

that are also acceptable to the society. Research is also vital in studying trends and patterns especially of weather and seasons which provides necessary information for future planning by the local community members. For example, some communities after a long time of experience associate some animal behavior like croaking of frogs with rainfall patterns, hence could take early precautions. It is based on this argument that the researcher sought to establish research and technology among the community members. To achieve this objective, the study enquired on effective methods of soil erosion control, technology application level among the households, the main source of medication for the households and accessibility of herbal medicine. The findings of the study are as discussed below

4.7.1 Effective method of soil erosion control (research)

The aim of testing respondents on the effective methods of soil erosion control was to establish the method the various households had tested through time research and found to be effective and efficient. Ability to mention any two methods was considered as strong research by the respondent while ability to mention only one indicated weak research on the environmental conservation initiatives. Findings of the study are as per table 4.26,

Table 4.26 Effective method of soil erosion control

	Frequency	Percentage (%)
Weak research	30	8.0
Strongly researched	345	92.0
Total	375	100.0

Majority, 345 (92%) of the respondents were able to mention all the two required answers indicating strongly researched conservation methods. This showed that there was environmental research taking place among the households. Only 30 (8%) of the respondents managed to mention only one answer indicating weak research. Researcher therefore concluded that there is research work going on among the households on environmental conservation, most of which was established to be taking place informally.

4.7.2 Technology application

Researcher sought to establish the level of technology application among the respondents. This was tested by enquiring about the common method of cultivation practiced by households, either modern or traditional methods. Results of the study are as shown on table 4.27.

Table 4.27 Level of Technology application

	Frequency	Percentage (%)
Modern cultivation methods	122	32.5
Traditional methods	253	67.5
Total	375	100.0

Majority of the respondents, 253 (67.5%), consented to be applying traditional methods of cultivation which included digging, ox-plough and use of local breeds in farming, and only 122 (32.5%) of the respondents confirmed to be applying modern cultivation methods of cultivation which included the use of machines, hybrid species and crop rotation methods in their farms. Results of the study implies that technology application among the households is still very low as the majority of the respondents still preferred their local and traditional methods of cultivation despite the researched and approved more effective and efficient modern technologies for cultivation.

4.7.3 Main source of medication for the household

By seeking to establish the main source of medication for the household, the researcher aimed at determining the level of research by the local community especially on the herbal medication, its effectiveness and efficiency which are the key reasons they could stick to it even in this error of modern health care system prevalence. Findings were then presented as below

Table 4.28 Main source of household medication

	Frequency	Percentage (%)
Health center/facility	292	77.9
Herbal medication	83	22.1
Total	375	100.0

From table 4.28, the study established that 292 (77.9%) of the respondents depended on health facilities for their household medication and only 83 (22.1%) of the respondents indicated that their households depended on herbal medicine for medication. Majority of the respondents preferred health facilities for medication possibly because of the geared campaigns by the government, NGOs and other agencies. This is also possible on the basis of professionalism and better results hospital facilities do give. However, there is a minority of up to 22.1% who seem to have learnt secrets of herbal medicine. In an interview with some of the respondents, they confirmed that herbal medicine was a more effective medication method for their households citing examples like in cases of dislocations and fractured limbs, stomach problems, skin problems and even tooth problems that herbal medicine could treat better and faster. Some of the very effective and mostly used herbal medicine mentioned included neem plant, aloe vera and locally made anti-venom in cases of snake bites.

4.7.4 Accessibility and effectiveness of herbal medicine

Researcher further sought respondents' opinion concerning effectiveness and accessibility of herbal medicine. This was aimed at establishing any further element of research initiatives by the local community especially on herbal medicine. Promoting herbal medicine utilization is a key environmental conservation initiative. Table 4.29 presents the findings of the study.

Table 4.29 Accessibility and effectiveness of herbal medicine

	Frequency	Percentage (%)
Very effective but expensive	30	8.0
Very effective and affordable	77	20.5
Not effective and expensive	268	71.5
Total	375	100.0

Majority of the respondents, 268 (71.5%) said that herbal medicine was not effective and expensive, 77 (20.5%) of the respondents consented that herbal medicine was very effective and affordable while 30 (8%) of the respondents said that herbal medicine was very effective but expensive. From the results it is evident that there is research by the local community members taking place. Although varied responses were given, all of them were assumed to have been as a result of some research over time, comparing between health facility medication and herbal medication. Majority of the respondents in their own opinion felt that herbal medicine was ineffective and expensive while only a minority felt herbal medicine was effective and affordable.

4.7.5 Relationship between environmental research and technology and household livelihood

In an effort to establish the relationship between environmental research and technology and household livelihood, the researcher correlated local experience (research) and choice of main source of household medication which were representative elements of research and technology and household income range as an element representative of livelihood. Results of the correlations were as presented in tables 4.30 and 4.31 respectively.

Table 4.30 Correlating Local experience and household income range

		Local experience/research	Livelihood
Local experience/research	Pearson Correlation	1	0.161**
	Sig. (2-tailed)		0.002
	N	375	375
Livelihood	Pearson Correlation	0.161**	1
	Sig. (2-tailed)	0.002	
	N	375	375

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

Results of the correlation analysis between local experience and income range gave a positive correlation coefficient of 0.161. Based on correlation range of -1.00 to +1.00 for describing the relationship, researcher described the relationship as being weak because it was much closer to coefficient of 0.00 which is a coefficient of no relationship. Existence of a relationship was also evident from the result. Positive value signified a positive influence local experience or research had on the household income range.

Researcher then tested hypothesis on the significance of the relationship using Chi-square test at a 0.05 level.

Table 4.31 Chi-Square Tests for significance level of relationship Local environmental experience and household livelihood

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.006 ^a	4	.040
Likelihood Ratio	12.256	4	.016
Linear-by-Linear Association	9.667	1	.002
N of Valid Cases	375		

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is .16.

The result indicated that there was an evidence of relationship between Local environmental experience and household livelihood and that the relationship was significant. (Chi-square=10.006, df=4, p 0.05). Null hypothesis was therefore rejected.

Table 4.32 Correlating Main source of medication and household income range

		Main source of medication	Livelihood
Main source of medication	Pearson Correlation	1	0.077
	Sig. (2-tailed)		0.135
	N	375	375
Livelihood	Pearson Correlation	0.077	1
	Sig. (2-tailed)	0.135	
	N	375	375

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

From the analysis results in table 4.32, correlation coefficient of 0.077 indicated an existence of a relationship between choice of main source of medication for a household and the income range, although a very weak relationship. Using correlation coefficient range of -1.00 to +1.00 to describe the relationship, researcher concluded that there was a weak positive relationship between the source of medication and household income range and that the relationship was significant at the 0.01 level.

Researcher then tested hypothesis on significance level using Chi-square test at a 0.05 level.

Table 4.33 Chi-Square Tests for significance level of the relationship main source of medication and household livelihood

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.391 ^a	8	.004
Likelihood Ratio	26.198	8	.001
Linear-by-Linear Association	2.239	1	.135
N of Valid Cases	375		

a. 8 cells (53.3%) have expected count less than 5. The minimum expected count is .03.

The result indicated that there was a strong evidence of relationship between main source of medication and household livelihood and that the relationship was significant. (Chi-square=22.391, df=8, p 0.05). Null hypothesis was therefore rejected.

Based on the results of the correlations and Chi-square test above, researcher concluded that there was a significant relationship between environmental research and technology as a conservation initiative and household livelihood although the relationship was weak. The researcher therefore rejected the third null hypothesis of the study.

4.8 Promoting ecotourism and household livelihood

Promoting ecotourism refers to initiatives taken by local community in a move to conserve the environment, nature, traditions and culture for the purpose of encouraging responsible travel for educational activities with the aim of sustaining the well-being of the local people. Ecotourism is characterized by promotion of cultural activities, conservation of cultural sites mainly for educational and selling of cultural products to tourists, preservation of sacred sites for ritual fulfillments and traditional worships and conservation of natural or man-made environment for tourist viewing. Promoting ecotourism is therefore a more environmental conservation friendly approach. It is based on this argument that the researcher sought to establish the existence and

promotion of ecotourism among the local communities. The results of the study are as discussed below under the various sub-headings.

4.8.1 Cultural activities practice

Cultural activities and practices may include such activities like basket making, pot making, curving, initiation ceremonies and fulfillment of rituals most of which are usually carried out in forests or require forest products. By encouraging communities to involve in cultural activities is in away helping them realize the importance of conserving their environment. It is also a means of providing or encouraging alternative sustainable livelihood techniques apart from farming and employment. Researcher therefore sought to establish existence and prevalence of cultural activities among the local communities. Findings of the study, table 4.24

Table 4.34 Level of Cultural activities practice

	Frequency	Percentage (%)
Yes	119	31.7
No	256	68.3
Total	375	100.0

Majority of the respondents, 256 (68.3%) were not involved in any cultural activity while only 119 (31.7%) of the respondents agreed to be involved in cultural activities. Mostly cited activities included pot making, rope making, curving and local brewing of alcohol. Although only the minority practiced cultural activities, it was enough evidence to show the existence of cultural activities practice and in terms of prevalence it is less popular to the community.

4.8.2 Presence of cultural sites

Cultural sites are special designated sites for display of culture and cultural products for educational purposes and tourists viewing and buying. Cultural products may include handwork products, traditional dances and songs, telling of stories about the community and legend

narrations. Such sites would represent avenues of environmental education and exchange of ideas. Opinion of the respondents were sought on this subject and the findings presented as in table 4.35

Table 4.35 Presence of cultural sites

	Frequency	Percentage (%)
Yes	96	25.6
No	279	74.4
Total	375	100.0

Majority, 279 (74.4%) of the respondents objected to have known any of such sites within their locality and only 96 (25.6%) of the respondents agreed to be aware of such sites within their locality. Going by the majority, researcher then concluded that cultural sites were not in existence in the locality, a possible indicator why cultural activities practice is low among the respondents.

4.8.3 Presence of sacred sites

Sacred sites refer to those places usually in forests where community members do carry out rituals like circumcision ceremonies (initiation ceremonies), worships like sacrifices to their gods, prayer mountains. An example of sacred sites is the Kayas in Mombasa and sections of Mount Kenya forest used by the Agikuyu community. In many instances the elders will always champion for the protection and preservation of such sites owing to their larger community importance. Usually many taboos and regulations are attached to such sites barring community members from accessing and altering the natural environment around them. It is on this argument that the researcher took more interest in this factor as a conservation initiative by local community. Findings of the study are in table 4.36,

Table 4.36 Presence of sacred sites

	Frequency	Percentage (%)
Yes	56	15
No	319	85.
Total	375	100.0

Most of the respondents, up to 319 (85%) objected to knowing any sacred site in their community and only a minority, 56(15%) agreed to be aware of sacred sites in their locality. Owing to the fact that sacred sites are usually a preserve for the community elders alone, expressing its secrecy, it is possible that there are sacred sites as indicated by the minority although not known to many of the community members.

4.8.4 Importance of sacred sites to the community members

Researcher also sought the respondents' opinion on whether the sacred sites were of any importance to the community or not. Findings of the study are presented in table 4.37

Table 4.37 Importance of sacred sites to the community

	Frequency	Percentage (%)
Yes	50	13.3
No	325	86.7
Total	375	100.0

Basing on the results of the study, table 4.37, majority of the respondents, up to 325 (86.7%) indicated that there was not importance the community was realizing from the sacred sites while only 50 (13.3%) agreed that there was some importance the community was getting from the sacred sites. This is an expression that incase the sites were in existence then they were not fully utilized for the community to realize results especially on promoting conservation of environment.

4.8.5 Relationship between promoting ecotourism and household livelihood

To be able to establish the existence, degree and nature of relationship between promoting ecotourism and household livelihood, the researcher correlated some of the elements of promoting tourism deemed to be strong representatives, i.e. cultural activities practice and presence of cultural sites and an element of livelihood (household income range). Correlation results were then presented in tables 4.33 and 4.34 respectively

Table 4.38 Correlating Presence of cultural activities and household income range

		Cultural activities	Livelihood
Cultural activities	Pearson Correlation	1	-0.294**
	Sig. (2-tailed)		0.000
	N	375	375
Livelihood	Pearson Correlation	-0.294**	1
	Sig. (2-tailed)	0.000	
	N	375	375

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

Table 4.38 present the correlated result between cultural activities and income range. Correlation coefficient of -0.294 as the result was enough indication of the existence of a relationship between cultural activities practiced and the household livelihood. Based on description range of correlation coefficient of -1.00 to +1.00, the relationship was described as being weak and negative, implying cultural activities practiced by the households had a negative influence on the income range of the households. Such case could mean the households spent more resources on activities whose returns were not commensurate.

Researcher then tested hypothesis to establish significance level of the relationship using Chi-square test at 0.05 level

Table 4.39 Chi-Square Tests for significance level of relationship farming methods and household livelihood

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	42.200 ^a	4	.000
Likelihood Ratio	44.654	4	.000
Linear-by-Linear Association	32.338	1	.000
N of Valid Cases	375		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is .63.

The result indicated that there was a very strong evidence of relationship between farming methods and household livelihood and that the relationship was significant. (Chi-square=42.200, df=4, p 0.05). Null hypothesis was therefore rejected.

Table 4.40 Correlating presence of cultural sites and household income range

		Presence of Cultural sites	Livelihood
Presence of Cultural sites	Pearson Correlation	1	-0.169**
	Sig. (2-tailed)		0.001
	N	375	375
Livelihood	Pearson Correlation	-0.169**	1
	Sig. (2-tailed)	0.001	
	N	375	375

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

Results of correlation analysis between presence of cultural sites and household income range, table 4.40, also gave a correlation coefficient of -0.169 showing the existence of a relationship between presence of cultural activities and household livelihood. The relationship was described as

being weak as it was much closer to 0.00 which represented a no relationship coefficient. The relationship was also found to be significant at the 0.01 level

To be able to establish the level of significance, the researcher tested hypothesis using Chi-square test at 0.05 level.

Table 4.41 Chi-Square Tests for significance level of relationship between presence of cultural sites and household livelihood

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.889 ^a	8	.061
Likelihood Ratio	17.096	8	.029
Linear-by-Linear Association	10.743	1	.001
N of Valid Cases	375		

a. 8 cells (53.3%) have expected count less than 5. The minimum expected count is .02.

The result indicated that there was an evidence of relationship between presence of cultural sites and household livelihood and that the relationship was not significant. (Chi-square=14.889, df=8, p 0.05). Null hypothesis was therefore retained.

Researcher then concluded that there was a relationship between promoting ecotourism in the community and household income range and that the relationship was a weak and negative one.

4.9 Relationship between Combined environmental conservation initiatives and household livelihood

Combined environmental conservation initiatives refers to a combination of promoting agro-forestry, environmental education program, environmental research and technology and promoting

ecotourism as environmental conservation initiatives. Researcher sought to establish the possible relationship between such combined conservation initiatives and household livelihood. Researcher applied key representatives of the various initiatives, namely fruit tree planting (agro-forestry), environmental awareness level (environmental education program), local experience/research (environmental research and technology) and cultural activities practice (promoting ecotourism) for independent variables and income range (household livelihood) as the dependent variable. To establish the relationship, researcher performed multiple linear regression analysis using the model stated below;

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \epsilon_i$$

Where:

y_i is livelihood of rural community

β_0 is a constant

$\beta_1 x_1$ is promoting agro forestry

$\beta_2 x_2$ is environmental education program

$\beta_3 x_3$ is environmental research and technology

$\beta_4 x_4$ is promoting ecotourism

ϵ_i is the error term

Results of the analysis was then presented on tables as shown below clearly indicating the constants and the regression coefficients

Table 4.42 Relationship between combined environmental conservation initiatives and household livelihood

Model		Un-standardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.757	.191		3.971	.000
	Env. awareness level	.513	.073	.344	7.076	.000
2	(Constant)	1.664	.272		6.108	.000
	Env. awareness level	.431	.073	.289	5.909	.000
	Cultural activities practice	-.414	.091	-.223	-4.552	.000
3	(Constant)	.971	.382		2.543	.011
	Env. awareness level	.410	.073	.275	5.628	.000
	Cultural activities practice	-.413	.090	-.222	-4.578	.000
	Local experience/research	.388	.151	.122	2.568	.011
4	(Constant)	1.303	.407		3.199	.001
	Env. awareness level	.359	.076	.241	4.724	.000
	Cultural activities practice	-.368	.092	-.198	-4.002	.000
	Local experience/research	.394	.150	.123	2.621	.009
	fruit trees planting	-.202	.090	-.115	-2.255	.025

According to the analysis results, it is clear that the highest contributor in the relationship between environmental conservation initiatives and livelihoods was the environmental awareness level of the community members with a coefficient (Beta) of 0.241 followed by local experience/research with coefficient of 0.123 while cultural activities practice and fruit trees planting contributed negatively to the relationship with coefficients -0.198 and -0.115 respectively. Results of the analysis therefore confirmed the existence of the relationship between combined environmental conservation initiatives and household livelihood of a community in Suba Sub-County and that the relationship is a weak one.

Analysis results further confirms the significance of the relationship as being very significant based on the significance levels which are all less than 0.05 which was the standard level for the purpose of the study.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides summary of the findings according to the themes derived from research objectives, drawn conclusions and the study recommendations based on the findings of the study.

5.2 Summary of the findings

The study sought to establish the relationship between environmental conservation initiatives and household livelihood of a community in Suba Sub-County in Homa-Bay County. The study focused on 375 respondents representing households as the sample size. Questionnaire return rate of 100% was achieved during the study and on background information of the respondents, the study established that the majority of the respondents, 180 (48%) were between age 30-39 years. Highest education level attained by most of the respondents according to the findings was secondary school level (165 (44%)). Respondents mostly involved themselves in self employment on activities like fishing, small businesses and sand mining as indicated 166 (44.3%) of the respondents and farming which was also indicated by 157 (41.9%) of the respondents. On average every household had a size of 5 members.

Research also sought to establish the livelihood status of the respondents using indicators such as food security, household income, household income sources, source of medication and accessibility of health services. Findings of the study showed that majority 146 (38.9%) of the respondents depended on farming and business as the main source of household income followed by 121 (32.3%) of the respondents who dependent solely on farming as the main source of household income. Study also established that for most households' income range was between (Ksh. 10000-Ksh.20000) as indicated by 168 (44.8%) of the respondents and another majority of 102 (27.2%) of the respondents who earned below Ksh. 10000 monthly as a household. Food security was found to be not guaranteed thus very expensive shown by the majority of the respondents, 161 (42.9%) while another 131 (34.9%) of the respondents also expressed that food supply was very unpredictable. Most of the households preferred health facilities for medication (218 (58.1%)) followed by 118 (31.5%) of the respondents choosing to apply both herbal and

health facilities for medication. However, majority of the respondents also confirmed that although they were using health Facilities but it was very expensive (215 (57.3%) of the respondents).

The study sought to determine the relationship between promoting agro-forestry and household livelihood of the respondents. Indicators for promoting agro-forestry such as cultivation method, farming type, planting of fruit trees prevalence, tree planting program and accessibility of extension officers were assessed then correlated with those of livelihoods. Findings of the study found out that most of the households 371 (98.9%) practiced subsistent farming mainly by employing mixed cropping (278 (74.1%)) in trying to maximize on production chances from their farms. Most prevalent combinations were, maize/beans, maize/green grams, sorghum/maize. The study also established that up to 216 (57.6%) of the respondents had planted some fruit trees in their farms indicating agro-forestry practice among the households while only 159 (42.4%) did not have fruit trees in their farms. Majority of the respondents, 194 (51.7%) said they usually plant trees in every rainy season along-side their farms, 97 (25.9%) of the respondents planted trees only once in a while and 84 (22.4) of the respondents deed tree planting in an annual basis. When asked of the accessibility of the extension officers, 266 (70.9%) of the respondents disagreed showing that the presence of extension officers were not being felt by the majority of the respondents.

In establishing the relationship, Pearson moments correlation analysis was used and relationship described within a correlation coefficient range of -1.00 to +1.00. Finding of the analysis indicated that there was a relationship between farming method and household livelihood with a correlation coefficient of 0.106 and a significance level of 0.041 showing that the correlation is significant at the 0.05level. By correlating fruit trees planting prevalence and household income, the finding further indicated a correlation coefficient of -0.258 indicating existence of a relation between planting of fruit trees and household income range.

To be able to respond to the second objective of the study; to determine the relationship between environmental education program and household livelihood, the researcher enquired of the environmental education indicators like local knowledge of the environment, environmental awareness, local practical skill on environmental challenges and training program. Results of the study indicated that most of the respondents, 205 (54.7%) had a very good knowledge of their environment while another 88 (23.5%) had a good knowledge of their environment. In terms of

environmental awareness, 60% of the respondents were found to be very aware of their environment while 34.7% were averagely aware of their environment. Awareness and knowledge of the environment was largely attributed to media factor and programs and less to training programs among the community members that was largely unpopular to the majority, 326 (86.9%) of the respondents. Test on practical skills towards solving environmental challenges was found to be very prevalent among the respondents, 321 (85.6%) who were very skilled while another 14.1% being averagely skilled.

To establish the relationship between environmental education program and household livelihood, researcher correlated two elements of environmental education and one element of livelihood. The correlation result gave a correlation coefficient of 0.270 between conservation knowledge and household income range indicating an existence of a relationship between the variables although a weak kind of relationship. Results of correlating environmental awareness and household income range also gave a positive correlation coefficient of 0.344 indicating a relationship existence.

The third objective was to determine the relationship between environmental research and technology and livelihood. In endeavor to respond to this objective, the researcher sought to establish respondents' proven effective methods of soil erosion control, technology application prevalence, the main source of household medication and accessibility of herbal medicine. Results showed that there was strong research work going on at local community level (92% of the respondents). In terms of technology application, majority of the respondents (253 (67.5%)) still preferred traditional cultivation methods to modern cultivation technology that was preferred by only 122 (32.5%) of the respondents. Majority of the respondents, 292 (77.9%) indicated health facility as the major source of medication to their households while only a minority of the respondents, 83 (22.1%) depended on herbal medicine as their household medication source. 268 (71.5%) of the respondents claimed that herbal medicine was not effective and was expensive, 77 (20.5%) of the respondents consented herbal medicine was very effective and affordable and 30 (8%) saying that herbal medicine was very effective but expensive.

To determine the relationship between environmental research and technology and household livelihood the researcher correlated two indicators of research and technology and one indicator of livelihood. Result of the correlation between local experience and household income range gave a

correlation coefficient of 0.161, indicating the existence of a relationship although a weak kind of relationship. Finding of correlating main source of medication and income range gave a correlation coefficient of 0.077, also indicating existence of a relationship although a weak one.

Fourth objective of the study was to determine the relationship between promoting ecotourism and household livelihood. Indicators of promoting ecotourism researched were cultural activities, sacred sites, cultural sites and benefits from sacred sites. Cultural activities were not a popular practice among the households. This was indicated by 256 (68.3%) who were not involved in any cultural activity and only 119 (31.7%) of the respondents being involved in cultural activities. 279 (74.4%) of the respondents objected to knowing any cultural site within the locality and only 96 (25.6%) accepted to be knowing such sites in the locality. When asked of presence of sacred sites in the locality, majority 319 (85%) said they did not know of any of such sites within the locality and only 56 (15%) of the respondents agreed to be knowing some sacred sites in the area. Majority of the respondents, 325 (86.7%) said the sacred sites were of no importance to the society and only 50 (13.3%) said the sacred sites were of some importance to the society.

To establish the relationship between promoting ecotourism and household livelihood, researcher correlated indicators of promoting ecotourism and that of livelihood and the findings of correlating cultural activities practice and household income range resulted into a correlation coefficient of -0.294 showing the existence of a relationship although a weak one and to the negative. When presence of cultural sites was also correlated with household income range the result also gave a negative correlation coefficient of -0.169 showing an existence of a relationship. Researcher then concluded that there was a relationship between promoting ecotourism and household livelihood although a weak kind of relationship which was also to the negative.

To establish the relationship between the combined conservation initiatives and household livelihood, researcher employed multiple linear regression analysis from which the results were as follows. The highest contributor in the relationship between environmental conservation initiatives and livelihoods was the environmental awareness level of the community members with a coefficient (Beta) of 0.241 followed by local experience/research with coefficient of 0.123 while cultural activities practice and fruit trees planting contributed negatively to the relationship with coefficients -0.198 and -0.115 respectively. Results of the analysis therefore confirmed the

existence of the relationship between combined environmental conservation initiatives and household livelihood of a community in Suba Sub-County and that the relationship is a weak one.

5.3 Conclusions

Based on the findings of the study a number of conclusions can be made as presented below.

One, that the households in Suba Sub-County community were faced with low livelihood levels characterized by low education levels as majority could only afford basic education up secondary school levels only, unpredictable food security dependent on unpredictable rainfall patterns of the area, expensive health care services in terms of distance, time and finances and low economic levels as shown by very low monthly average income range of Ksh. 20000 and below.

Researcher also concluded that there was a significant but weak relationship between promoting agro-forestry as an environmental conservation initiative by the locals and the livelihood of the community in Suba Sub-County. Weak relationship was concluded to be due to very little or absence of extension services to educate and guide the community on best and rewarding agro-forestry practices as well as alternative means of income generation so they could maximize productivity.

Based on the findings of the study, researcher also concluded that there was a significant and positive but weak relationship between environmental education program as a conservation initiative by the locals and the livelihood of the community. The weak relationship could be deduced from lack of formal training program/system within the community setup. This was evident where most of the community members who were found to be very knowledgeable and aware of their environment got it mainly from social media and other related media programs and not from a training program. Positive relationship indicated that the environmental conservation initiative as the independent variable influenced livelihood positively

Researcher concluded that there was a positive and significant but weak relationship between environmental research and technology and livelihood of the community in Suba Sub-County. Local community members through their own research initiatives were able to identify most effective solutions to their environmental challenges, identify most effective and reliable source of

medication for their households and concentrate in what they considered best technology. Modern technology consumption was found to be very low due to high costs of implementation and local community proven research findings that showed preferential to traditional methods and technologies. However, their own choices did not yield results still and only influenced their earning in small degree.

The study also concluded that there was a significant relationship between promoting ecotourism and household livelihood of the community in Suba Sub-County and that the relationship was weak and a negative one. This was concluded to be a sign of a very little effort to promote ecotourism in the community as it was evident when the majority of the respondents were not aware of any cultural sites, sacred sites and also not involved in any of the cultural activities which would have formed an alternative source of household income.

Researcher finally concluded that there was significant relationship between environmental conservation initiatives and household livelihood of community in Suba Sub-County and that the relationship was weak.

5.4 Recommendations

Based on the findings of the study, the research makes the following recommendations

1. To help reduce the livelihood burden of the community in Suba Sub-County, the cost of accessing health services at health centers needed to be reduced by bringing health services much closer to the community even through increased community health workers, more trainings on public health and sanitations
2. Agro-forestry is a proven method of environmental conservation through promotion of tree planting as well as a means of bettering communities' livelihood through diversified household income sources, a fact that was found not to be the case among the community in Suba Sub-County. Research therefore recommends that more extension services be intensified among the community members training, educating and helping community members embrace agro-forestry using the most current and reliable technologies that will give results.

3. Environmental education is expected to provide knowledge about the environment, create awareness and also provide practical skills on better environmental practices that promote sustainability. Research established that the awareness and environmental knowledge, (environmental education as an initiative) was not equally translated to improve livelihood of the community. Research therefore recommends change of approach to environmental education among the local community to a more integrated approach including both the local community and environmental education experts and giving priority to the interest of the community.
4. Environmental research and technology is a well known major tool and initiative for sustainable development of the community. If well guided and implemented research and technology should lead to improved and more reliable methods of earning household living among the local communities. For example, improved farming methods, improved seed species thus more income with little energy. Research established that the relationship between research and technology and household livelihood among the community members was only a weak relationship implying research and technology application by the community was not well guided. Research therefore recommends extensive mobilization and guidance of the community on best researched technology application
5. Ecotourism is an effective method of promoting environmental conservation as well as improving community livelihood. Research established that for the community in Suba Sub-County ecotourism was not given priority hence was not benefiting the local communities towards improving their livelihoods. Research recommends that much efforts be put towards promoting cultural activities, establishing cultural sites and making them known through awareness campaigns and identifying and promoting protection of sacred sites in the localities

5.5 Suggestions for further studies

The study suggested the following areas for further research

1. To investigate the opportunities and potentiality of promoting ecotourism among the community in Suba Sub-County. This proposal is to help identify unexploited and underutilized livelihood opportunities for the purpose of expanding the

community's income sources and level as well as promoting environmental conservation.

2. To research on the impact of agro-forestry on livelihood of the community in Suba Sub-County purposefully to help establish both short term and long term influences and impacts of agro-forestry on the community that could be easily assumed. Results of which will be helpful in advising accordingly and educating the local community members to embrace fully agro-forestry for poverty alleviation.
3. To research on the influence of choice of farming/cultivation technology on livelihood of the community. This is aimed at identifying most effective and appropriate technologies that would bring the required results to the community by increasing their income levels, hence the local community could be advised accordingly.
4. A study can also be conducted on the level of adoption of indigenous trees species in farms and their contribution to livelihood of the community.

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APENDICES

APENDIX I: LETTER OF TRANSMITTAL

SIMEON ODUNDO

BOX 2995-40100

KISUMU

TO;

THE SUB-CHIEF

NYAMRISRA SUB-LOCATION-KAKSINGRI WEST WARD

BOX

SINDO

RE: DATA COLLECTION FOR RESEARCH STUDY.

I am a student of the University of Nairobi, taking a Master of Arts Degree in Project Planning and Management. I am currently in the stage of conducting my research work on the Relationship between Environmental Conservation Initiatives and Livelihood (A case of community in Suba Sub-County-Homa-Bay County).

The study will involve data collection from households in Nyamrisra Sub-Location. I hereby make a request to your office to grant me permission to carry out the study within the Sub-Location.

Yours faithfully

Odundo Simeon-L50/76246/2014

ID. NO. 23524909

APPENDIX II: STUDY QUESTIONNAIRES

The purpose of this questionnaire is to collect information for the purpose of establishing the relationship between environmental conservation initiatives and livelihood of the community in Suba Sub-County solely for academic purpose.

PLEASE ANSWER THE FOLLOWING QUESTIONS BY PUTTING A TICK () THE RELEVANT BRACKET OR WRITING DOWN YOUR ANSWER IN THE PROVIDED SPACE

Example

1. Your name:
2. Gender : Male () Female ()

SECTION A: BACKGROUND INFORMATION

1. What is your age group? 10-19yrs [], 20-29[], 30-39 [], 40-above []
2. What is your marital status?
Single [] Married [] Divorced [] Separated []
3. What is your level of education?
Primary [] Secondary [] Tertiary college [] University [] None []
4. What is your occupation?
Student [] Self employed [] Employed [] Not employed [] Farming [] others
[.....]
5. What is the size of your household? (the number of your alive family members including yourself and relatives you live with)

SECTION B: PROMOTING AGRO-FORESTRY

1. What type of farming do you usually practice as a household?

Commercial farming [] subsistent farming (for food) []

2. Which farming method is common to your household especially during cultivation seasons?

Mono-cropping [] Mixed-cropping []

3. Are there some fruit trees you have planted in the farms and even in homestead compound?

If yes, please list some of them in the space provided.

Yes [] No []

.....

4. How frequent do you carry out tree planting as a household especially within the family land?

[] once in a while

[] every rainy season

[] annually

[] others (specify)

5. What benefits can you count that you have gotten from the trees you have been planting (if the answer was yes in 4 above)

a)

b)

c)

d) Not applicable.

6. Are there trained experts/ extension officer available and easily reachable to offer guidance and advice concerning better farming practices and methods in your locality?

Yes [] No []

7. If yes in (7) above, how have you benefited from their advice? (Briefly describe)

.....
.....

8. Are there other means of earning household income that you practice a part from farming?

List any three.

a)

b)

c)

SECTION C: ENVIRONMENTAL EDUCATION PROGRAM

1. Why should we conserve our environment?

a)

b)

c)

2. Name any three tree species you know and their benefits

	Tree species	Benefits
1		
2		
3		

3. Name any two methods of soil erosion control that you have practiced at household level

a).....

b).....

4. Are there some of your household members that have been trained in areas dealing with environmental conservation? If yes how many?

Yes No

5. In your own opinion, would you rate your own understanding of your environment?

very good Good Average Poor Very poor.

SECTION D: ENVIRONMENTAL RESEARCH AND TECHNOLOGY

1. According to your own judgment and experience, which are the two most effective methods of soil erosion control in your area?

a)

b)

2. Which method of cultivation do you practice in your farms?

Modern cultivation methods (use of machines, Hybrid seeds, crop rotation etc)

Traditional methods (digging , ox-plough, local breeds etc.)

3. Which is the main source of medication for your household?

Heath center

Herbal medicine

4. If herbal in (4) above, How effective and affordable is the medicine?

Very effective but expensive

Very effective and affordable

Not effective and expensive

Not applicable

SECTION E: PROMOTING ECOTOURISM

1. Are there some traditional/ cultural activities in which any of your household member is engaged in? (like basket making, making pots, curving and etc.)? if yes list .

Yes [] No []

a)

b)

2. If yes in (1) above, approximate on average, income gain from the activities to your household (in monetary terms) on monthly basis.

[] Less than Ksh. 2000 [] More than Ksh. 2000

3. Do you know of any cultural site within your locality?

Yes [] No []

4. If yes in (3) above, in what ways do you and your household benefit from these cultural sites?

[] We sell our handwork products (eg baskets) to them

[] Some of my family members entertain visitors and they get paid.

[] Employment opportunity

[] Others (specify)

[] Not applicable

5. Are there some sacred sites you know within your locality where traditional worships and sacrifices are done?

Yes [] No []

6. In your own judgment and opinion, are these sacred sites of any importance to the community and how? (Describe briefly)

.....

.....

4. In a scale of 1-3, prioritize the following expenditures in order of your monthly spending priority (where most important score 3)

	Food	Medication	Education
Score			

5. What would you say about food security to your household? (mark appropriately)

- we always have enough food supply throughout the year
- Food supply is very unpredictable
- Getting food is very expensive (we always have to buy)
- We mostly depend on relief food

6. What is the main source of medication in your household?

- Health facility
- Herbal medicine
- Both

7. If Health facility (in 6 above), how accessible and affordable are the service?

- Very expensive Expensive Affordable Not applicable

8. If Herbal medicine (in 6 above), how accessible and affordable are they?

- Very expensive Expensive Affordable Not applicable

APENDIX III

TABLE 3.1 Table for Determining Sample Size from a Given Population

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.



UNIVERSITY OF NAIROBI
COLLEGE OF EDUCATION AND EXTERNAL STUDIES
SCHOOL OF CONTINUING AND DISTANCE EDUCATION
KISUMU CAMPUS

The Secretary
National Council for Science and Technology
P.O Box 30623-00100
NAIROBI, KENYA

17th March, 2016

Dear Sir/Madam,

RE: ODUNDO SIMEON - REG NO: L50/76246/2014

This is to inform you that **Odundo Simeon** named above is a student in the University of Nairobi, College of Education and External Studies, School of Continuing and Distance Education, Kisumu Campus.

The purpose of this letter is to inform you that **Simeon** has successfully completed his Masters course work and Examinations in the programme, has developed Research Proposal and submitted before the School Board of Examiners which he successfully defended and made corrections as required by the School Board of Examiners.

The research title approved by the School Board of Examiners is: *“Relationship between Environmental Conservation Initiatives and Households Livelihood: A Case of Community in Suba Sub-County-HomaBay County”*. The Thesis is part of the pre-requisite of the course and therefore, we would appreciate if the student is issued with a research permit to enable him collect data and write a report. Research project reflect integration of practice and demonstrate writing skills and publishing ability. It also demonstrates the learners’ readiness to advance knowledge and practice in the world of business.

We hope to receive positive response so that the student can move to the field to collect data as soon as he gets the permit.

Yours Faithfully

Dr. Raphael O. Nyonje, PhD
SENIOR LECTURER & RESIDENT LECTURER
DEPARTMENT OF EXTRA-MURAL STUDIES
KISUMU CAMPUS



