# KWAME NKRUMAH UNIVERSITY OF SCIENCE ANDTECHNOLOGY

# KUMASI

## COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

## FACULTY OF RENEWABLE NATURAL RESOURCES

DEPARTMENT OF AGROFORESTRY



# THE EFFECT OF FOREST PLANTATIONPROJECTS ON THE LIVELIHOOD OF FOREST-FRINGE COMMUNITIES IN NORTHERN REGION OF GHANA

## (A CASE STUDY IN KENIKENI AND YIRADA FOREST RESERVES)

BY

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BY

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## DECLARATION

I hereby declare that this submission as Master of Science (MSc)Degree thesis is the result of my own investigation and that to the best of my knowledge contains no material previously published by another person nor material which has been accepted for the award of any degree except where due acknowledgement has been made.



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## DEDICATION

This thesis is dedicated to my late father, my mother, my wife and my dear children.



## ABSTRACT

Agroforestry projects have been practiced in the Northern Region of Ghana since the introduction of agroforestry initiatives in the 1980s. The study was a case study with the main aim of providing information on the effects of plantation projects on the livelihood of the Forest-Fringe communities in Northern Region. The effect of these plantation projects on the livelihoods of rural households' in the area is limited making it difficult for one to ascertain or recommend their importance for further improvement for the peoples' livelihoods. It was in the light of this that the research was conducted. The study area wasconducted in two districts of the Northern Region of Ghana. Results of the study indicated that the agroforestry plantation project have great potentials of contributing to households' income (25 percent), food (3 percent) as well as access to education (1 percent). It was found out that the plantation was the only source of accessible land for the landless inhabitants including landless female-headed households in the area. Statistically gender of household heads with main livelihood before the introduction of the plantation project showed that there were significant differences between the variables (Pr = 0.001). Lack of access to education was also found to be the major cause of illness and other livelihood problems which affect agroforestry of rural households in the area (Pr = 0.001). Agriculture is the main source of livelihood of rural residents of the area; therefore it is recommended that the government of Ghana through the Ministry of Lands and Natural Resources (MLNR) and the Ministry of Food and Agriculture (MoFA) can collaborate to promote modern agroforestry methods to improve on agricultural production in the area. To achieve this, existing agroforestry technologies have to be improved, followed by the introduction of modern and more beneficial agroforestry technologies like entomoforestry to improve household's income levels. Adventist Development and Relief Agency (ADRA)and

other developmental NGOsshould be encouraged to channel their resources towards improving the livelihood conditions of the people in the forest-fringe communities in this part of Ghana.



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## ABBREVIATIONS AND ACRONYMS

| | | |
|---|---|---|
| ADB | – | Asian Development Bank |
| DFID | – | Department for International Development |
| FAO | – | Food and Agriculture Organization |
| FC | – | Forestry Commission |
| FIMP | – | Forest Inventory Management Project |
| FSD | – | Forest Services Division |
| GCARD | – | Global Conference on Agricultural Research for Development |
| GEF | – | Global Environment Facility |
| GNA | – | Ghana News Agency |
| IDS | – | Institute of Development Studies |
| $Km^2$ | – | Square kilometer |
| KNUST | – | Kwame Nkrumah University of Science and Technology |
| MLFM | – | Ministry of Lands, Forestry and Mines |
| MLNR | – | Ministry of Lands and Natural Resources |
| MTS | – | Modified Taungya System |
| n | – | Sample size |

| | | |
|---|---|---|
| N/A | – | Not Applicable |
| $NWFP_S$ | – | Non Wood Forest Products |
| ODI | – | Overseas Development Institute |
| SLF | – | Sustainable Livelihood Framework |
| SPSS | – | Statistical Package for the Social Sciences |
| TIDD | – | Timber Industry Development Division |
| UK | – | United Kingdom |
| WD | – | Wildlife Division |



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# CHAPTER ONE

## 1.0 INTRODUCTION

### 1.1 Background to the Study

Savannah woodlands in Ghana, as in many areas in Africa provide valuable environmental benefits to people especially rural residents. These resources however, are depleting at a faster rate resulting in approximately 80 percent loss in the forest cover. Rural livelihood problems in Northern Region have increased as a result of various pressures on the people (Ledger, 2009). The area has suffered from southern drift of desertification after a long period of drought and inappropriate farming practices like shifting cultivation. Important tree species suitable for industrial purposes or export are absent especially in the drier savannah areas of Ghana. However, the northern tree species are of much value to the people as they provide shade, fodder, building materials, fuel wood and cash. Tree species in the area look smaller than those of southern Ghana (Forestry Commission, 2002).

Subsistence agriculture is the main stay of livelihoods of the rural residents in the Northern Region of Ghana. Maize (*Zea mays*), sorghum (*Sorghum bicolor*), pearl millet (*Pennisetumamericanum*), and rice (*Oryzasativa*) are the main cereal crops cultivated by the people. Legumes like beans (*Phaseolussp*), groundnut (*Arachishypogaea*) and bambara beans (*Vignasubterranea*) are cultivated in addition to root and tuber crops such asyam (*Dioscoreaspp*), sweet potato (*Ipomeabatatas*) and cassava (*Manihotesculenta*) (Ansah, 2000).

Policies and practices relating to forest in Ghana have shifted gradually to embrace modern agroforestry practices for substantial land-use (Asare, 2004). Many projects that have been

introduced into communities of the northern savannah zone of Ghana have their objective to improve the livelihood and health of the rural residents (GEF, 2002). With a population of more than 21 million people, Ghana is known to be among the first countries in the sub-Saharan Africa to have reached and even surpassed the 1996 World Food Summit goal of reducing by half the undernourished people by 2015. However pockets of food insecurity still remain in certain areas of Northern Region (WFP, 2005).



Land tenure and land laws of Northern Region are closely linked to the indigenous system of ownership within the country. In Ghana, land is communally owned and held in trust on behalf of the people through the skin or the stool. Land ownership exerts substantial control in deciding whether an area should be set aside as a reserve or not (Ansah, 2000).

The Ministry of Lands, Forestry and Mines (MLFM) and the Forest Services Division (FSD)engaged in the development of the savannah woodland in the three northern Regions. The FSD of the Forestry Commission (FC) implemented a comprehensive set of forest protection strategies with the help of the Department for International Development (DFID), United Kingdom (UK) under the Forest Inventory and Management Project (FIMP) to improve people's livelihoods. This strategy was expected to bebeneficial to the rural people as well as the country(GEF, 2002).

'Livelihood' deals with people, their resources and the way they use these resources (such as land, crops, seed, labour, knowledge, cattle, money, social relationships), (Carney, 1998). The most widely accepted definition of livelihood is that of Chambers and Conway (1992) which says 'livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living'. Livelihoods cannot be disconnected from the issues

and problems of access as well as changing political and socio-cultural circumstances. Livelihood as definedin this project is used descriptively for the household which means the human group which shares the same hearth for cooking (IDS, 1991).

The livelihood of many people in rural areas is dependent on forest resources (Carney, 1998). However their continuous use without proper management has resulted in the natural forest becoming poorly stocked with species to meet the demand of the human population. In 1968, the Forestry Department of Ghana embarked on a large-scale reforestation to convert reserves or sections of reserves into plantations of fast growing indigenous and exotic species to supplement future supplies from the natural forest (Food and Agricultural Organization, 1985) in order to meet the livelihood demands of people.

Academic and scientific investigations on the environmental effects of monoculture tree plantations acknowledge that tree and forests are important to nature and human society (Sargent and Bass, 1992). Extensive tree plantations have emerged in a number of regions as an alternative system of land-use across the world. Land size in the tropics cultivated for wood production has more than doubled over the past twenty years (Sargent and Bass, 1992).This trend is attributed to the realization both of government and the private sector of the importance of forestry to support the cultivation of trees to augment the supplies of logs from the natural forests. The expected result will be reduction of pressure on logs existing in the forest and forest degradation will also be reduced and employment provided for rural residents.

In a number of countries across Africa, the governments have offered effective tax and investment incentives for plantation programmes such that vast tracts of unoccupied and degraded areas in the tropics will have to be planted with trees. Plantation forestry in a country

like Ghana is viewed as a means of economic development as it generates revenue and foreign exchange from the exports of forest products (Evans and Turnbul, 2000).

In the Northern Region, the government is actively promoting Plantation Development in both Off-Reserve and On-Reserve forests as means of arresting land degradation and providing jobs for people (Huxley, 1999). To facilitate afforestation and economic development in the area, governments, both past and present have allocated funds (GNA, 2009) to raise 50 hectares of forest trees annually from each of the seven active plantation sites in On-reserve sites in the region. The study site covers the two main reserves; each has 350 hectares of planted teak (*Tectonagrandis*) trees.



**1.2 Problem statement**

Forest Plantation Programmes in the Northern Region of Ghana have come a long way since the introduction of agroforestry initiatives in the 1980s (Asare, 2004). However secondary data sources of information including that of the Forest Services Division show that there is limited information on the effect (e.g. income, food, and access to education) of forest plantations on the livelihood of rural people living in the study area.It is therefore very difficult to ascertain the contribution of plantations on the livelihoods of people in the study area and to make recommendations for further improvement. The livelihood of the people is currently dependent solely on the existing natural resources in the area (Carny, 1998). The research was aimed at addressing this information gap (household income level, food security and access to education).

## 1.3 Justification

Plantation programmes in reserve areas of Northern Region have resulted in significant social, financial, natural, physical and human changes which affect the livelihood of rural households. A better understanding of these livelihood changes of the people with regards to the use of the existing natural resources within their jurisdiction will provide a clear picture of the costs and benefits of the project in the area. It will also assist the various stakeholders and decision makers in the allocation of resources for more efficient National Plantation Development Programmes in the Northern Region. Knowledge of livelihood strategies of the people is significant in the formulation of policies for further plantation programmes in the area.

Evaluation of rural livelihoods using the Sustainable Livelihood Framework (SLF)(Norman and Philip, 2003)are currently utilized, the level of education and skills of the people, their coping abilities to shocks and stresses and their views on plantations.

To obtain sustainable human development of rural households, the income and wealth status of the people including many other valued and valuable items would have to be assessed (Grima et al., 2003). It is equally necessary to also capture the importance of plantations in this study to assist in providing a clear picture of sustainable human development of the rural residents in the Northern Region. It was hoped that at the end of the research, gapsin the plantation programme would have been known.

## 1.4 Aim, Objectives and Research Questions

The overall aim of the study was to assess the effects of plantation projects on the livelihood of the fringe communities in Kenikeni and Yirada Forest Reserves of Northern Region of Ghana.

Specifically the study sought to:

1. Determine the contribution of forest plantation projects in addressing household needs.
2. Assess the effect of plantations on female-headed households' agricultural activities.
3. Identify the major livelihood problems of rural households in forest plantation areas.
4. Recommend measures that will help in solving the major livelihood problems of rural households in plantation areas.



Research Questions

1. What is the contribution of plantations in Kenikeni and Yirada forest reserves to the livelihood of the rural people living around these reserves?
2. What effects do plantations have on female-headed households' agricultural activities?
3. What are the major livelihood problems of rural households in the plantation areas?
4. What measures should be put in place to solve the major livelihood problems of rural households in the plantation areas.

# CHAPTER TWO

## 2.0 LITERATURE REVIEW

### 2.1 Sustainable Livelihood Framework (SLF)

In line with the SL Framework, livelihood is defined as 'the activities, the assets and the access to resources that jointly determine the living gained by an individual or household (Ellis, 1999). The tendency for rural households to engage in multiple occupations is often been made to connect this behaviour in a systematic manner to rural poverty reduction policies (Ellis, 1999).

Research and Applied Developmental Organizations including the Department of International Development (DFID) use an established model known as the Sustainable Livelihood Framework (SLF) to analyze causes of poverty, people's access to resources, livelihood activities and their relationships (Adato and Meinzen-Dick, 2009).The framework (Figure 2.1) can be applied to various scales of livelihoods analyses, for individual livelihoods, households, community, or even a nation (Scoones, 1998).

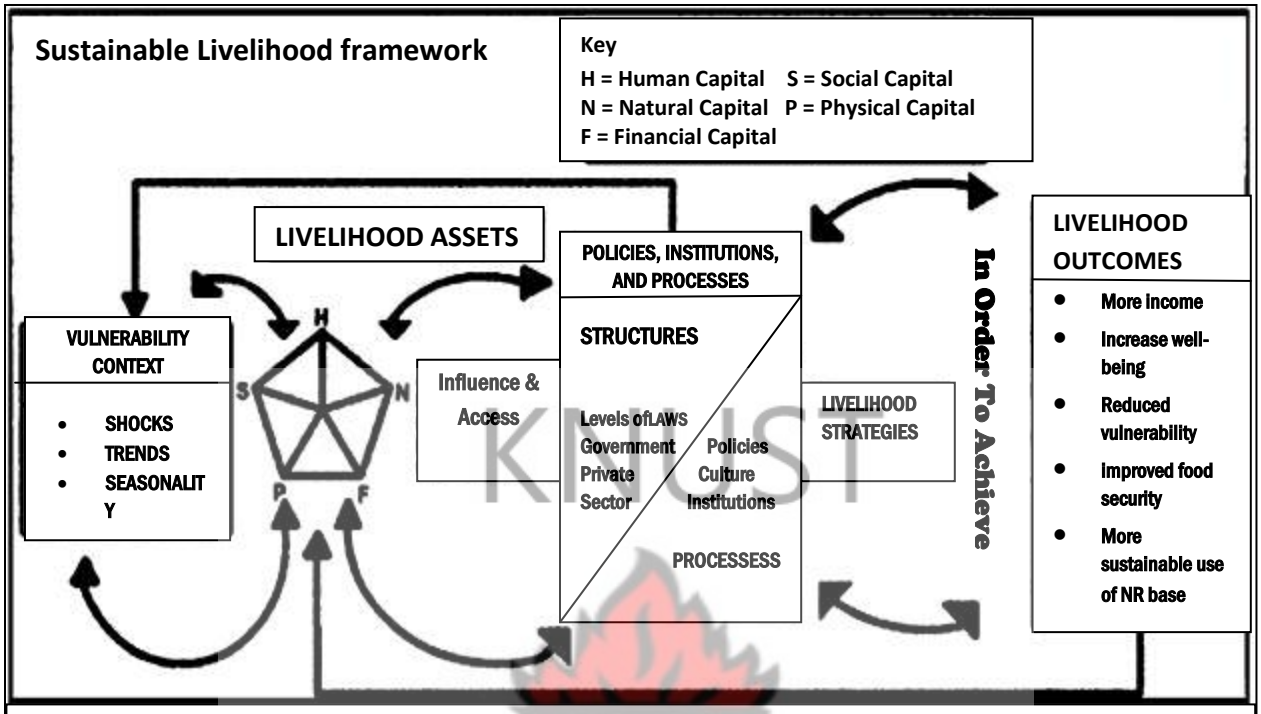


**Figure 2.1: DFID Sustainable Livelihoods Framework adopted from Scoones (1998)**

A household is deemed sustainable when it can cope and recover from stresses and shocks maintain and enhance it capabilities and assets while not undermining the natural resource base. Assets are very complex, highly diverse, sometimes sensitive and quantitative in nature (Landry, 2009). The major components of the SLF are shown in Figure 2.1 and are described in the sections that follow.

### 2.1.1 Vulnerability Context

The SL Framework in Figure 2.1 refers to the vulnerability context within which rural households operate. It reflects on the absence of safeguards against unforeseen events such as social conventions (funerals, dowry, and weddings), disasters, physical incapacity (sickness, child-bearing and accidents), unproductive expenditure and exploitation. Such

possibilitiesusually force poor rural households to require the sale or loss of an asset to be able to cope, which even makesthem poorer and more vulnerable (Landry, 2009).

Vulnerability has two aspects: external which are usually the stresses and shocks in which people are subjected to and the internal whenthey have the capacity to cope.

i. Stresses are pressures which are typically continuous and cumulative, predictable and distressing, such as illnesses, seasonal shortages, rising populations or declining resources.
ii. Shocks are impacts which are typically sudden, unpredictable and traumatic such as fires, floods and epidemics.

Livelihood sustainability includes the ability to avoid or usually to withstand and recover from stresses and shocks (IDS, 1991).

### 2.1.2 Livelihood Assets

Livelihood assets from the SL Framework deals with five core assets/capitals (livelihood platform or capital assets framework) that rural households access and utilize for their diverse livelihood strategies which provides sustainability for their livelihoods (FAO, 2009). The members of a particular household combine their capabilities, skills and knowledge with different resources at their disposal to create activities that will enable them to achieve the best possible livelihood for themselves. Anything that goes into creating their livelihood can be thought as a livelihood asset (Norman and Philip, 2003).

Five livelihood assets are identified to be key components to a livelihood platform. The assets include the following;

1. Natural Capital: This refers to the natural resource stock from which resource flows and services important to livelihoods are derived. Natural capital includes
    i. Public natural capital e.g. land, trees, pasture and water.
    ii. Public, communal or privately owned
    iii. Intangible natural resource which are public goods e.g. atmosphere, biodiversity (FAO, 2009).



For people living in rural areas, their natural capital of obvious importance includes assets such as land, water, forest resources and livestock (Norman and Philip, 2003).

2. Human Capital: refers to the skills, knowledge and ability to labour in good health that together enables people to pursue livelihoods. Education can help to improve people's capacity to use existing assets better and create new assets and opportunities (Norman and Philip, 2003).

Indicators of human capital of rural people include;

- Acute malnutrition rates (weight/height)
- Stunting growth (age/height)
- Incidence of disease (e.g. cholera, HIV/AIDS)
- Number of people in household, age and sex
- Number of health facilities
- Educational levels, type of education and skills (number of primary schools, access to schools) (FAO, 2009).

3. Financial Capital: The financial capital available to rural households may come from the conversion of their production into cash in order to cover periods when production is less or to invest in other activities (Norman and Philip, 2003).

Financial resources that people use to achieve their livelihood objectives includes flows and stocks that contribute to production and consumption; Cash or equivalent that enables people to adopt different livelihood strategies like cash income through wage labour, self employment and/or salaried employment. Percentage population with access to loans/credit, wage rate and other employment opportunities are all indicators of financial capital(FAO, 2009).

4. Social Capital: It refers to the social resources upon which people draw in pursuit of their livelihoods. Social capital is developed through social networks or connectedness, formalised groups, relationship of trust, reciprocity and exchange. It also includes political capital in the form of social organization (FAO, 2009).

Social acceptability of agroforestry is closely linked to the economic feasibility of the system. Mostly acceptability relies on direct economic output from the system. Two factors become very important in agroforestry development- experts view on farmers perceptions of tree planting and governments policies in relation to agroforestry implementation. The issuance of money, passing of laws, tax collection prevention (or permitting) and access to reserved forest affects the lives of people (Nair, 1993).

5. Physical Capital: It refers to basic infrastructure and producer goods needed to support livelihoods. Basic infrastructure refers to the physical environment that helps people to meet their basic needs and be more productive in livelihoods. Producer goods however refer to productive capital that enhances income and personal consumption. Indictors of physical capital are:

i. Availability, condition and access to public physical capital such as transportation networks (roads and public transport systems), water and sanitation supply, shelter and communication system.

ii. Availability and access of household to own physical capital like bicycles and agricultural implements (FAO, 2009).



### 2.1.3 Policies, Institutions and Processes

Policies, institutions and processes in the SL Framework refer to the formal and informal organisations that shape livelihoods by influencing access to assets, livelihood strategies, vulnerability and the terms of exchange (Landry,2009).Institution affects various livelihood assets or capitals by influencing how, where, when and by whom they are used. For instance, an environmentally protected area like a game reserve or park which represents a particular type of local institution could link with the livelihoods of people living in an area. Access to natural resources like households going in for hunting, fire wood and wild fruits collection may be regulated or stopped. People may have limited access to traditional religious sites or burial grounds that have a particular cultural importance impacting on the people social capital (Norman and Philip, 2003).

### 2.1.4 Livelihood Strategies

Livelihood strategies refer to the various ways that households try to improve or sustain their livelihood (Landry, 2009). Poverty is the result of unsatisfactory livelihood strategies based on insufficient livelihood assets. Households are vulnerable to shocks and changes and/or policies, institutions and processes. Taking account of the livelihood assets of households, the vulnerability context in which they operate, and the policies, institutions and processes around them, they tend to develop the most appropriate livelihood strategy possible. Their strategies may lead to more or less satisfactory livelihood outcomes (Norman and Philip, 2003).

The most common livelihood strategies identified within the framework include; agricultural intensification, migration and livelihood diversification. Agricultural intensification is when households derive more of their livelihood from agriculture. Livelihood diversification on the other hand is when households earn income through other activities apart from agricultural land or migration of people elsewhere to seek employment either temporarily or permanently (Landry, 2009). The search for more secure livelihood drives many migratory movements and is most common where life is at stake. Mobile livelihood can be poverty reducing and involves the redistribution of resources within a family or household (Waddington, 2003).

### 2.1.5 Livelihood Outcomes

Outcomes are the final livelihood results. Researchers are often interested in the different types of impact on household livelihoods (Landry, 2009). Rural households usually take into account their insufficient livelihood assets and the vulnerability context in which they operate in line with policies and other institutions to develop strategies that will provide satisfactory results (Norman

and Philip, 2003) like better yields and income. For certain households the livelihood outcome may be to migrate in order to solve the problem. This may be beneficial if in the process there is improvement in their access for instance to education and it may also have negative consequences like difficulty to solve an ill health problem (Waddington, 2003). Ghanaian households adopt different livelihood strategies with many spending up to 50 percent of household income on food (Diao, 2010).



## 2.2 Rural Livelihoods

There are various ways by which rural households derive their livelihood. However majority of the rural people in Northern Region derive their livelihood from agriculture (Ellis, 1999).

### 2.2.1 Rural Household Access and Use of Forest Resources

Forest and natural resources form the backbone of Ghana's economy. The Forestry Commission (FC) is the public body in Ghana responsible for the regulation of the utilization of the forest and wildlife resources. It is also responsible for the conservation and coordination of policies relating to forest and wildlife resources. The Commission embodies various public institutions and agencies which independently implement the functions of protection, management and regulation of forest and wildlife resources. Three agencies currently form the divisions of the Forestry Commission. They are the Forest Services Division (FSD), the Wildlife Division (WD) and the Timber Industry Development Division (TIDD). These institutions and agencies have their specific mandate and vision. The vision of Forestry Commission is to be a corporate body of excellence in the sustainable development and management of Ghana's forest and wildlife resources (Ardayfio-Schandorf, 2007).

In rural communities, both men and women collect and process forest products for household and commercial uses. They enter the forest when they participate in forestry activities like boundary cleaning, afforestation and patrols or they obtain permit from the FSD. Illegally some rural households also enter the forest without permission. Usually rural people collect Non Wood Forest Products (NWFPs) for household uses and for income generation purposes. These products are in the form of seeds, leaves, roots, tubers and mushrooms which are used in the diet of many households. Households also collect firewood for consumption and the excess for sale (Ardayfio-Schandorf, 2007). Involvement of farmers in on-farm tree planting at the farm or community level will itself change the social interactions within the family and among community members (Huxley, 1999).

Problems that have bedevilled the area (Northern Region of Ghana) since the 1970s include conflicts, hunting and inappropriate farming practices. Annual burning of the savannah forest land by farmers and hunters is known to provide the people short term benefits but long term deprivation (Forestry Commission, 2002). Domestic usage of firewood in Northern Region is now a major cause of concern. Attention at the world level has shifted from industrial usage of wood to fuel wood and subsistence timber needs of the least developed countries like Ghana. Annual consumption of wood in round wood measure is around 3.7 billion $m^3$in which more than half is used for fuel (Sargent and Bass, 1992).

### 2.2.2 Female-Headed Farm Households

Female-headed households in Northern Region are female headed typically by default. Many of female-headed households do not have their spouse present in the household or are widowed. Female-headed households typically are more mature households (FAO, 2002). In Ghana, most

rural communities have gender disparities in land access, tenure security and sustainability which impact mostly on the female-headed farm households. This often tends to make female-headed household poorer and at a more disadvantage than households headed by men (Ardayfio-Schandorf, 2007).Many farms managed by women are less than a half of a hectare. Women have less access to farm equipment and own fewer cattle and small stock than male-headed households (Ardayfio-Schandorf, 2007).



Female land ownership ranged between a low of threepercent in the small-scale commercial sector in Zimbabwe to a high of 25percent in Tanzania and Congo. Women holdings ranged from one-half the size of male holdings to approximately 72percent of the size of male holdings in Morocco and Tanzania respectively. Sixty percent of women in Congo cultivate less than one hectare of land. Eighty six percent of women-headed households in Zimbawe have less than the sample-mean arable land holdings (Ardayfio-Schandorf, 2007).

Cultivated lands owned by women are acquired through one or more of the following; personally owned, husband's land, gift from husband, family land, government land, communal land, squatter land and rented land. Gender of household heads affects household needs in agriculture and in other programmes (Ardayfio-Schandorf, 2007).

### 2.2.3 Household Participation in Afforestation

Different social groups in local settlements have different conflicting interest with regards to degraded forest lands. Migrants who have limited and share-cropping access to community lands outside forest reserves participate in the Modified Taungya System (MTS). Similarly, the landless indigenes in the local communities' especially young people who are yet to inherit any

family land see participation in the Modified Taungya System as a means of establishing themselves easily. Women farmers in forest-fringe communities are often allocated smaller portions of the degraded forest lands because they are viewed as less capable as theycombine household chores with farming. However, it is observed that when women get money they spend higher proportion on food and healthcare of the children contributing to family welfare and long-term poverty reduction. When status improves, children's health and nutrition status improves (Ardayfio-Schandorf, 2007). Peopleshould be appropriately motivated to get vulnerable people in local communities especially women to be part of forest conservation activities, (Tanvir et al., 2007).

The Northern Region like in other areas of Ghana and the world has a proportion of individuals who are migrants from other places. Seasonal unemployment situation due to drought conditions in northern Ghana often compel some members of rural households to migrate to the southern part of the country for minor jobs (Kavaarpuo, 2010). The fact is many of the rural residents are poor and in attempt to better their living conditions migrate to places where they can obtain better natural biological resources. Benefits of migration are dependent on the individual's resources and strategies (GCARD, 2010).

Poor households often embark on migration in response to vulnerability or as a strategy to manage risk and reduce vulnerability (Waddington, 2003). Many households in Northern Region are poor because of their larger sizes (Ekbom and Bojo, 1999). In an attempt to provide solution to rural household's poverty situation, many poor parents produce many children to secure income at old age and also to provide labour for the collection of essential goods such as firewood and fodder for the household. Resource-induced migration has become so pertinent that victims are labelled environmental refugees (Ekbom and Bojo, 1999).

### 2.2.4 Gender Gaps of Rural Households in Forestry

Gender gaps in Northern Region like in other places of Ghana and the world is an integral and inseparable part of rural livelihoods. Men and women have different assets, access to resources and opportunities. Rarely do women own land in Northern Region of Ghana. Women may also have lower education and less access to productive resources and decision making. Literacy can enhance the adoption of innovation which can contribute to special livelihood needs (nutrition and health) of rural households (GCARD, 2010).The higher the educational attainment, the lower the likelihood of poverty for all households and for female-headed households with occupation and geographic residence held constant (Nair *et al.*, 2004). However access to education by women is usually restricted by domestic burdens and the need to work (GCARD, 2010). Education of the head of a household may be irrelevant if he uses the knowledge of other more educated household members. However educational levels of rural households affect their livelihood choices (Nair *et al*., 2004). Gender diversification to plantation establishment is more of an option for rural men than for the women who are confronted with narrower range of capital markets and lower wage rates than the men (Ellis, 1999).

Power is the ability to negotiate and influence outcomes in a particular environment and is gained through education and other forms of training. Knowledge and perception of forests by men and women are varied. This is reflected in the type of products men and women gather or collect from the forest. Women perceive the forest as sources of goods and services to meet household needs and so products collected usually end up in the house either directly or indirectly. Men on the other hand perceive it as a source of finance and end up using their earnings privately (Ardayfio-Schandorf, 2007).

### 2.2.5 Rural Household Structure

In Northern Ghana and as in other places around the globe, the oldest male person of a household becomes the head. Households could be described as nuclear or non-nuclear. A typical nuclear household consist of one male adult, his wife and children where by virtue of age and role the adult male (husband) is head. Non- nuclear household basically is one that consists of three generations, including one of the couple's parents and/or grand children. Here the title of household head may be transferred onto the adult son (FAO, 2002). New household heads are also initiated through marriage. Women normally marry men who are older than them making the men automatically heads of their nuclear households (FAO, 2002).

The proportion of female-headed households in Northern Region is 14.1 percent which is much higher than the national average of 11.0 percent(2000 Population and Housing Census) (Bole DMTDP, 2006-2009). Among the districts, Bole and Sawla/Tuna/Kalba Districts have an average of 16.7 percent of female- headed households. The composition and structure of households generally in Ghana is traditional and the size is dependent largely on the headship of the household. The average household size in Northern Region is 7.4 members which is relatively high due to the housing structure where a particular household may have several round huts belonging to different members of household on the same compound.

### 2.3 Impacts of Plantations on Society

Plantations form part of local land-use and livelihood systems. Poor rural communities closer to plantations are able to improve their economic values (Hawthorne and Abu-Juam, 1995).

According to Sargent and Bass (1992), the impact of plantations on society will normally depend on:

i. The size of the plantation
ii. The plantation boundary configuration with respect to adjacent land uses.
iii. The rate of plantation establishment
iv. The particular type and objectives of the plantation, especially tree species used, and their familiarity to the community
v. The degree of lifestyle change that the plantation objectives entail, notably through employment and changes in social benefits.
vi. The relative economic, political and legal power of local people and the developer.

Traditionally, the natural environment including the land formed the basis of farming, hunting and gathering economies in reserved areas (Chowdhury, 2010). Three hundred and fifty hectares each of well established teak (*Tectonagrandis*) trees in the two reserved areas of the study are expected to increase plant population by 50 hectares every year (Forestry Commission, 2002). Plantations can have serious adverse effects on livelihood where it leads to the transformation of the forest ecosystems with initial resilient and diversified tree species into vulnerable artificial single stands (Gyasi, 2010).Despite these negatives, plantation systems are admirable in developing strategies to accelerate agricultural production and to generate other important socio-economic benefits including employment, income, agro-industrial growth and modern infrastructure in rural areas (Gyasi, 2010).

Assessment of the impact of plantations is hampered by the lack of rigorous procedures and methodologies (Nair, 1999). Nevertheless, Sargent and Bass (1992) reported the following impact of plantations:

i. Impact on the local land-use pattern and the configuration of the plantation with other land-use systems e.g. the precise pattern of plantations in land-use that determines potential benefits like watershed and soil conservation, windbreaks, transport, infrastructure and welfare facilities.

ii. Impact on social and environmental resources like water supply and landscape; and products like fuel, fruit, nuts, fodder and game. Plantations established on deforested or degraded land may greatly increase useful services and benefits.

iii. Impact on local infrastructure like roads and worker housing which is required for plantations, especially in remote areas and in the tropics. Many large tropical plantations have made major investments in housing.



## 2.4 Agricultural Practices of Rural Households

Subsistence farming is the means of livelihood of local residents in most rural communities in Northern Region of Ghana. Maize, sorghum, pearl millet and rice are the main cereal crops cultivated by the people. Legumes like beans, groundnuts and 'bambara' beans are cultivated in addition to root and tuber crops (yam, sweet potato and cassava) (Ansah, 2000). Ninety percent of household's agricultural income in the Northern Zone comes from stable crops and livestock (Diao, 2010).The slow pace of technological change in agriculture has levelled off crop yields especially in the area. Gains and losses in agriculture of households have also resulted in diversification. Negative effects of diversification however is associated with the withdrawal of

critical labour inputs from family farm, while the positive effects include the alleviation of credit constraints and a reduction in the risk of innovation (Ellis, 1999). The condition of a farmer's family resources and support affects his yield and success in farming. Labour inputs are a major consideration for diversity of jobs to be done. For instance a household may have access to wood fuel but without labour it would be difficult to carry it out if other task takes precedence (Huxley, 1999).



Poor migrants from remote areas are less likely to re-invest urban earnings in agriculture while better off migrants from nearby or high potential areas are more likely to do so. It was realised that where on-farm diversification even occurs, it can generate many of the same beneficial effects on off-farm diversification. The effects of diversification of agriculture on environmental resource management are mixed and context-specific. The growth of non-farm income sources might be expected to reduce the need for landless rural dwellers to carry out extractive practices in local environments for survival. On the other hand, for settled agriculturists non-farm earning opportunities can result in neglect of labour intensive conservation practices if labour availability is reduced. Diversification contributes positively to livelihood sustainability because it reduces proneness to stress and shocks. However, sustainable rural livelihood need not equate with the sustainability of all components of underlying ecological systems due to substitutions that occur between assets during processes of livelihood adaptation over a period of time (Ellis, 1999).

## 2.5 Land Tenure and Land Laws of Northern Region

Ownership of land and forest is closely linked to the indigenous system of land ownership within the country. Land ownership in Ghana is categorized into two broad classes. Customary land and Public land. Customary lands are lands owned by stools, skins, families or clan. This is usually held in trust by the chief, head of family, clan, or fetish priests for the benefit of members of that group. Private ownership of land can be acquired by way of a grant, sale, gift or marriage. Public lands on the other hand are lands which are vested in the president for public use. Ownership is by way of outright purchase from customary land owners or private individuals. Whichever type, land ownership exerts substantial control in deciding whether an area should be set aside as a reserve or not (Ansah, 2000).

Some aspects of traditional land tenure systems may be normative rather than practical with the aim of maintaining social harmony or sustaining the identity of a particular group or community. Traditional land tenure system establishes ways of behaving over land, for instance, elements in the tenure system may ensure that agricultural production is sustainable within local circumstances. Traditional system may not be codified or written down anywhere but may be constantly adapted to varying circumstances. Migration may change the roles of people, meaning that the institutions may be relatively invisible and apparently unstructured (Norman and Philip, 2003).Land in terms of sustainable livelihoods framework is a natural capital and improved access to natural capital is an important element of strategies to minimize household poverty (Landry, 2009).

## 2.6 Poverty in Northern Region

Ghana is among the first countries in sub-Saharan Africa to have reached and even surpassed the 1996 World Food Summit Goal of reducing by half the undernourished people by 2015. Though between 1990-92 and 2001-2003, the number of hungry people fell from 5.8 to 2.4 million, pockets of food insecurity still remain in certain areas of Northern Region (WFP, 2005).



Accelerating agricultural growth will result in spill over effects on non-agricultural sectors in the country and this will bring about national poverty reduction in both the urban and the rural areas (Diao, 2010) (Table 2.1). Agricultural growth in itself addresses livelihood needs through employment and better household income earnings (Pain and Lautze, 2002). By 2015 the national poverty rate is expected to fall from about 28.5 percent to about 18.3 percent under the agricultural scenario compared to about 20.2 percent in the base-run. Rural poverty is expected to fall from about 41.0 percent to about 26.7 percent under the agricultural scenario as compared to a base-run of 29.6 percent (Diao, 2010) (Table 2.1).

In Northern Region of Ghana, majority of the households have larger sizes with single mothers and old people. Rural households are usually poor because of their larger sizes. The poorer the household the more they produce children in order to secure current and future livelihood (Ekbom and Bojo, 1999). However poverty reduction is the result of increased incomes and lowered food prices driven by productivity growth in the agricultural sector. Growth in total income of rural households is accelerated by rapid increases in agricultural income (Dao, 2010).

**Table 2.1: Poverty reduction under the agricultural growth scenario**

| | Initial poverty rate 2005/2006 | Poverty rate under Base-run **2015** | Poverty rate under Agricultural growth scenario **2015** |
|---|---|---|---|
| **National** | **28.5** | **20.2** | **18.3** |
| Urban | 13.4 | 7.6 | 7.1 |
| Accra | 10.6 | 6.1 | 5.6 |
| Coast | 5.5 | 2.7 | 2.1 |
| Forest | 6.9 | 3.3 | 3.0 |
| South Savannah | 21.6 | 12.9 | 12.9 |
| North Savannah | 31.9 | 23.4 | 22.4 |
| **Rural** | 41.0 | 29.6 | 26.7 |
| Coast | 24.0 | 13.5 | 11.5 |
| Forest | 27.7 | 17.8 | 14.3 |
| South Savannah | 36.7 | 19.7 | 16.1 |
| North Savannah | 68.3 | 58.1 | 56.1 |

Source: Diao (2010)

The forest-fringe communities of Northern Region can be described as living in extremely isolated self-contained households which make them tend to be subsistence with their survival strategy focussed on self-sufficiency rather than trade related exploitation. Access to cultivable land is a very critical factor in the survival of rural households (Landry, 2009). Most of the poor rural household's income level in the Northern Region of Ghana is below the nationally defined poverty line. More targeted policies and investments are urgently needed to fight poverty in Northern Region (Diao, 2010).

The government has identified forestry as a key sector to poverty reduction and therefore expect to meet its objectives through natural resource development. By developing the forest plantation sub-sector, various levels of the project will involve the ethnic minority populations in the project provinces (ADB, 2005). This will help in reducing the vulnerability of households principally in two major dimensions: The first been external through public actions like flood prevention, disaster preparedness and off-season public works to provide employment. The second been internal through private action in which a household adds to its portfolio of assets and repertoire of responses so that it can respond more effectively with less loss (IDS, 1991).



# CHAPTER THREE

## 3.0 RESEARCH MATERIALS AND METHODS

### 3.1 Profile of the Study Area

The study area involved two Forest Reserves- Kenikeni and Yirada forests found in the North-Western part of Northern Region in the Sawla/Tuna/Kalba and Bole Political and Administrative Districts. The two districts (Sawla/Tuna/Kalba and Bole Districts) have a total area of 9401 $Km^2$ (13.4%) out of 70384 $Km^2$ of Northern Region.

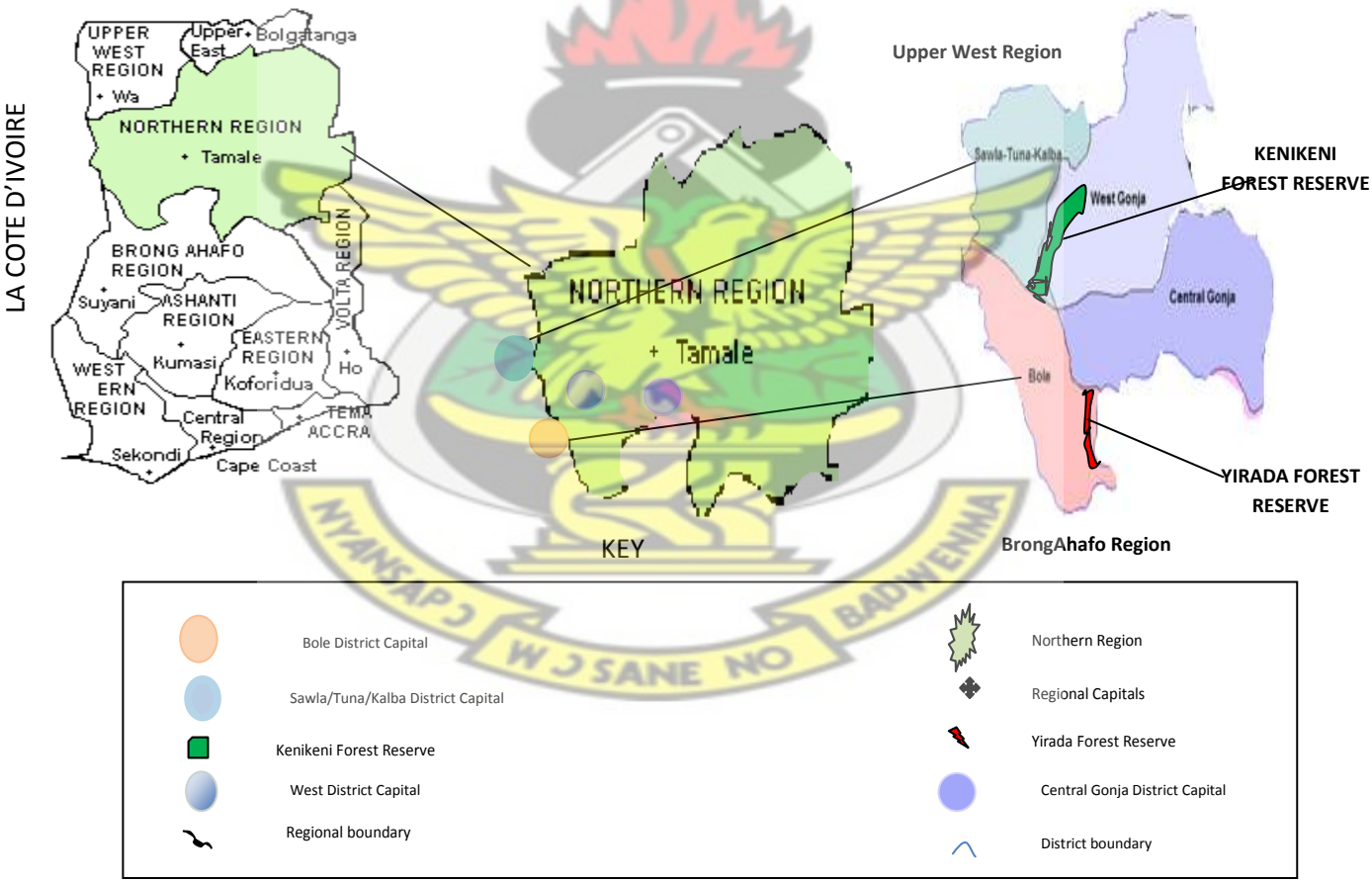


Figure 3.1: Map of Ghana showing Northern Region and the two Districts in the Study Area.
Source: http://www.ghanaweb.com/GhanaHomePage/geography/region.php, 2011.

The study area shares borders with Upper West Region at the north, West Gonja District at the east, La Cote'Ivoire at the west and BrongAhafo Region at the south. Total population of people in the study area according to the Population and Housing Census (2000)(Bole DMTDP, 2006-2009)was 159,815 out of the total population of 1,820,806 of Northern Region. Major tribes in the area are the Gonja, Vagla, Brifor and Mo. Climatic conditions are the tropical continental type with a general flat topography. Vegetation type is Guinea Savannah woodland with trees widely spread (2000 Population and Housing Census) (Bole DMTDP, 2006-2009).



### 3.2 Biophysical Characteristics

#### 3.2.1 Relief and Drainage

The topography of the study area is generally flat with few areas having a diversity of patterns in terms of height. The area is drained by streams, dams and dugouts which serve numerous needs of human beings and animals (Agyare, 2004).

#### 3.2.2 Climate and Vegetation

Climatic conditions of the area are the tropical continental type with one rainy season in a year occurring between May and October. The highest rainfall is experienced between July and September. Monthly rainfall ranges between 200 mm to 300 mm. The period between November and April (dry season) is characterised by cold harmattan winds and warm periods (Kavaarpuo, 2010).

The vegetation is principally the savannah woodland with trees such as sheanut (*Veteleriaparadoxa*), dawadawa (*Parkiabiglobosa*), teak (*Tectonagrandis*), Kapok

(*Ceibapentandra*) and mango (*Mangiferaindica*). Tall grasses and shrubs are common with other thorny species. The natural vegetation in the area especially around settlements has disappeared as a result of interferences by man and animals through inappropriate cultivation, grazing and exploitation for firewood (Kavaarpuo, 2010).

#### 3.2.2.1 Temperature



The area experiences extremes of temperature. The coldest nights in the year are experienced in the months of December, January and February. During these months, the air becomes dry and the atmosphere hazy with blurred vision due to fine dust particles in the air. Day temperatures are between 28 ºC and 40 ºC. Under cloudless skies, night temperatures can go below 18 ºC making the night very cold (harmattan period) (Agyare, 2004).

#### 3.2.2.2 Winds

Two dominant winds influence the climate in the study area- the rain bearing winds (south west winds) from the Atlantic Ocean and the dry winds from the Sahara desert. The southwest winds cause rain to fall in the study area from May to October while the dry winds from the Sahara desert cause harmattan which usually carries thick haze of dust which usually obscures the sun and affect visibility.

### 3.2.3 Geology and Soil

The study area is characterised predominantly by light textured horizons in which sandy loamy soils are the commonest. They contain abundant coarse materials like stones and gravel which adversely affect soil physical properties like water holding capacity. These soils are fertile for agricultural activities (Agyare, 2004).



## 3.3 Research Design

The study employed a combination of methods. These were:

1) Secondary data
2) Reconnaissance survey
3) Pre-test of questions
4) Household interviews

### 3.3.1 Secondary Data

A considerable amount of literature and secondary sources of information on the livelihood assets (physical, social, financial, natural and human capitals) of people especially those in rural areas were consulted. The secondary data was gathered between May and October, 2010 from the following sources: Libraries (KNUST Main library, Faculty of Renewable Natural Resources, Forest Services Division libraries) and Internet sources.

### 3.3.2 Reconnaissance Survey

A reconnaissance survey was undertaken to ascertain the existence of communities round the fringe borders of the reserves in the study area. This was done to help cross-check the information obtained from secondary sources. The exercise also helped the researcher to

establish contacts with some key personalities within the communities. With the help of assistants, ittook four days (27th to 30th December, 2010) to complete the survey.

### 3.3.3 Pre-test of questions

A questionnaire was drafted after the reconnaissance survey and discussed with researchers including lecturers who are knowledgeable about the design of questionnaire and interview schedules. The draftedquestionnaire was then pre-tested in the study area. This helped to ensure that all relevant issues pertaining to study objectives have been included before the actual survey of the study area. The pre-testing also helped to establish the actual time needed to administer each questionnaire. Corrections and amendments at the end were made to the data collection tool. With the help of assistants, the study took a period of two weeks (8th and 22nd January, 2011)to complete collectingthe data. Community heads were first consulted to enable entry into the community for the survey.

Language was no hindrance as the researcher was already familiar with the languages that are spoken in the study area. The questionnaire was administered in the Nyange and Joribiyir communities in the Sawla/Tuna/Kalba District. These communities were found to possess similar characteristics of the study area and were therefore believed to provide a complete picture of what prevails in the communities round the study area. The direct interview method was used throughout using a semi-structured questionnaire which had opened ended and closed form of questions. The method was preferred to using other survey methods because of the complex nature of the issues in which information is needed on them.The livelihood framework was used as a guide during the design of the Household Survey Questionnaire.

Questions for the household data assessed the asset or capital status of households which included; natural, physical, human, financial and social capitals of the people. They were formulated to understand how households cope with shocks, trends and seasonality.

Appendix one show supplementary answers to opened ended and closed form of questions. Through this it was realised that the questions were too many and had to be reviewed before the actual interview could be carried out. An interesting observation during the survey was that most of the respondents were expecting gains in the form of money from the researcher.



### 3.3.4 Household Interviews

After pre-testing the questionnaires, more detailed information was collected at the household interviews using a semi-structured questionnaire. This was done between 15th and 30th March, 2011. From the two districts, a sample size of 100 households was selected with 35 households from Sawla/Tuna/Kalba District and 65 households from Bole District of the study area. The sample size selection was done using a sample size selection chart. Systematic and purposeful sampling methods were employed in the selection of the households and household members' specifically household heads in the study area. Two forest fringe communities in the Sawla/Tuna/Kalba District were chosen for the survey because of their involvement in forest plantation activities of the reserve. In the Bole District three communities were also chosen based on the same reason. The fringe-communities of the reserves in the two different Political and Administrative Districts are presented in Table 3.1.

**Table 3.1: Thenames of the forest-fringe communities, their locations, their total number of households and sample size**

| Forest Reserve | Forest District | Political and Administrative District | Forest-fringe Communities | Total Number of Households | 10% sample size of the total households of each community |
|---|---|---|---|---|---|
| **Kenikeni** | Bole | Sawla/Tuna/Kalba | Jentilpe | 152 | 15 |
| | | District | Nasoyiri | 206 | 20 |
| | | Sub-total | 2 | 358 | 35 |
| **Yirada** | Bole | Bole District | Banda-Nkwanta | 456 | 45 |
| | | | Jougboi | 90 | 9 |
| | | | Cherenyuo | 110 | 11 |
| | | Sub-total | 3 | 656 | 65 |
| | | Grand Total | 5 | 1014 | 100* |

100* = Approximated base sample size at 20% variability



### 3.4 Definition of the Household and Household-head

Household used in this thesis refers to the human group that shares the same hearth for cooking. The male or female adult who heads the household is the household head (Norman and Philip, 2003).

### 3.5 Exclusion Criteria

- Individuals who belong to a different household
- Other members (wife, husband or children) standing in for the household head.
- Information of household shocks/stresses more than a year.

### 3.6 Study Variables



The following key variables were studied:

**Dependent Variables**

These were the variablesthat were measured or on which changes were affectedlike the benefits of the plantation to rural households, respondent's farm location, their farm sizes, knowledge of crops cultivated on the plantation farm, and the respondent's household shocks/stresses.

**Independent Variables**

These were variables that were changed in order to affect the dependent variables in the study (Norman and Philip, 2003). The independent variables that were considered in the study included gender, age, educational level of the respondents, household size and respondent's place of origin (Table 3.2). There were so many males than were females and many of the respondents were between 30-45 years age class. Illiterates dominated the study.

**Table 3.2: Independent variables, operational definitions, means of measurement, objectives**

| Independent Variable | Operational Definition | Scale of Measurement | Objective Addressed |
|---|---|---|---|
| Gender | Male / Female respondent | Nominal | 1 and 2 |
| Age | Age group from birthday in complete years | Interval | 1 |
| Education | Highest formal education attained | Nominal | 3 |
| Origin | Native or Migrant | Nominal | 4 |
| Household size | Number of people belonging to a household | Interval | 2 |



### 3.7 Sample Size Selection

Selection of the sample size for the study was based on the number of households which included both participants and non-participants in plantation activities in the two selected districts of the experimental area. Sample Size Selection Chart (Watson, 2001) with a variability level of 20 percent was employed in the selection of a total of 100 respondents (35 from the Sawla/Tuna/Kalba District and 65 respondents from the Bole District) from the study area. Selection of different numbers to represent the two Districts was based on variation in the total number of households in the two areas. This is presented in Table 3.1.

### 3.8 Data Analysis

The data analysis for the study was done using the Statistical Package for the Social Scientist (SPSS) version 16. Hypothesis test was performed on contingency tables to decide whether or not effects were present. The statistical test also chi-square was used to compare the observed data with the data that was expectedaccording to the specific hypothesis of the study.The chi-square compared tallies or counts of categorical responses between five independent variables. The chi-square test of significance determines whether or not it is worth the researcher's effort to interpret a contingency table. Significant result of the test always meant that cells ofcontingency tables should be interpreted. Non-significance meant that no effects were discovered and chance could explain the observed differences in the cells. This means, an interpretation of the cell frequencies would not be useful.

The basic descriptive statistics and frequencies obtainedat the end were presented in tables, figures, graphs and charts.

### 3.9 Limitations to the Study

The major limitation of the study was the absence of trust between the researcher and the opinion leaders in the fringe communities of the National Forest Plantation Project. Many of the respondents did not believe the exercise was for academic purpose and were therefore expecting financial returns for the information that they provided. The expectation turning out to be free giving of information made most of them reluctantto provide enough information on the project. A good level of trust should have been established between especially the opinion leaders of these fringe communities before conducting the research. The study was constraint by

timelooking at the period left for the completion of the study to go back to establish that trust with the people. The study did not also target the main participants of the National Forest Plantation Project in the area with the information. It would have been more appropriate to use purposeful sampling method for the households and household heads. The above mentionedfactors could affect the true picture of the results of the studyin the area. In spite of these setbacks, the results obtained can be applied in the study area.



# CHAPTER FOUR

## 4.0 RESULTS AND DISCUSSION

### 4.1 Socio-Demographic Characteristics of Respondents

Factors considered under the socio-demographic characteristics of respondents included gender, age, educational level,and origin.



#### 4.1.1 Gender and Age of Respondents

Figure 4.1 is a graphical presentation of the gender of respondents in the study area. Seventy three percent of the respondents were males and 27 percent were females.

The low percentage of female-headed households was probably due to the fact that in the Northern Region of Ghana and as in other places, the oldest male person of a household becomes the head. As headship in most nuclear households is initiated through marriage, most females marry men who are older than they are thereby making these men automatic heads of these nuclear households (FAO, 2002).

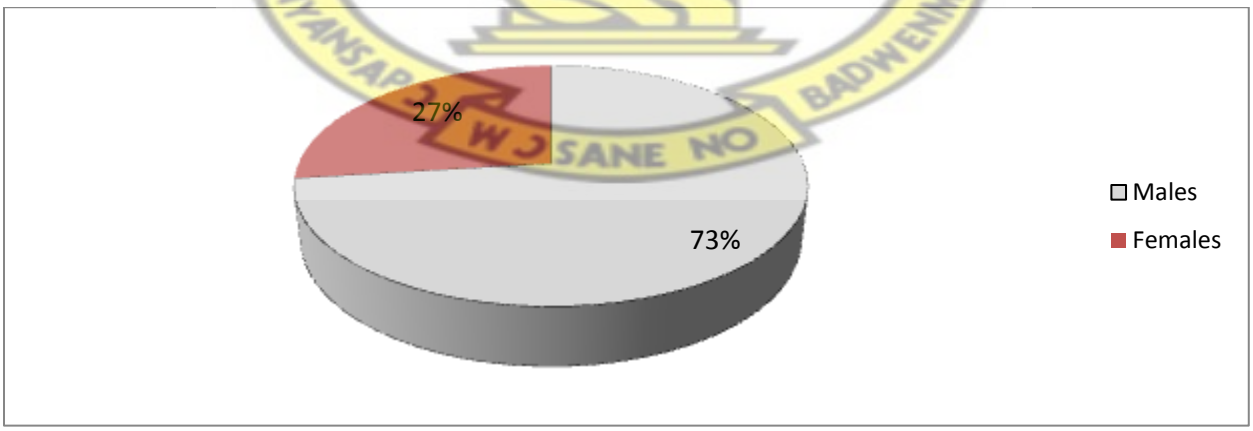


**Figure 4.1: Proportion of Males and Females(N = 100) as respondents**

The gender distribution of the respondents in the study area has some implications on agroforestry technology development. This is because gender disparities affect land access, tenure security and sustainability (Ardayfio-Schandorf, 2007) which impact mostly on the female-headed households than the male-headed households making female-headed households more vulnerable to shocks/stresses. Rarely do women own land in the Northern Region of Ghana (GCARD, 2007). So majority of the household heads been males in the area indicated that many of the householdshave access to land except few households like those headed by females in the area.In relation to the use of land, landownership according to Ansah (2000) exerts substantial control in deciding whether an area should be used for agroforestry activities or not.The implication of many household-heads been males is that many households have land to practice agroforestry technologies. In the absence of access to land, members of both male and femaleheaded households migrate to places with biological natural resources (Ekbom and Bojo, 1999) including plantation areas to gain access to land for their livelihoods. The study revealed that significant differences existed between gender of respondents' and households' main livelihood before the introduction of plantation in the area (P. value=0.001) as presented in Table 4.1. This means that the plantation has enabled some householdslike the female-headed households who because of gender disparity is unable toaccess landis able to access land for better livelihood of their households in the area.

**Table 4.1: Respondent's gender characteristics with dependent variables**

| Independent Variable | Dependent Variables | |
|---|---|---|
| | **Livelihood Needs (n=100)** | **Chi-square (P-value)** |
| Gender | Agricultural supplies | 5.0075; P = 0.171 |
| 1= Male and | House material | 6.3622; P = 0.042 |
| 2 = Female | Energy source | 1.7552; P = 0.416 |
| | Reliable source of income | 0.0970; P = 0.755 |
| | Main livelihood before Plantation | 17.1963; P = 0.001 |

P= 0.001 for gender with main livelihood before plantation

With age, 42 percent of respondents were in the 30-45 years age class, 32 percent were in the 46-60 years age class and 23 percent were above 60 years. Only three percent of the respondents were below 30 years (Figure 4.2).

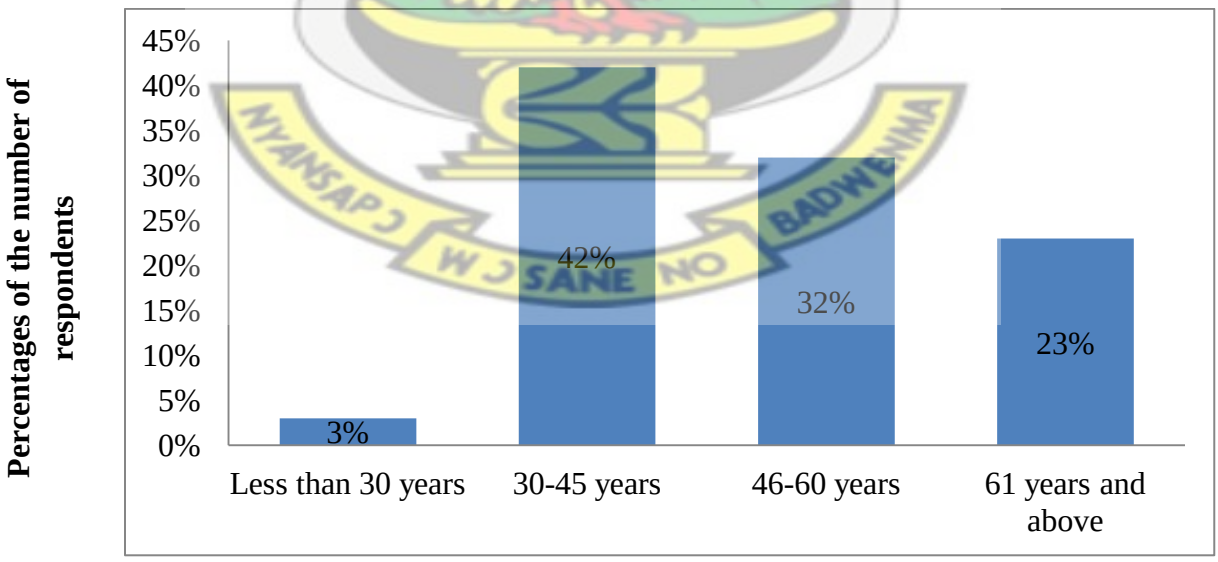


**Figure 4.2: Respondents Age Class**

The age distribution indicated that majority of the respondents were of the middle age class. According to Ellis (1999) many people of this class have access to land resources through individual ownership or communal land use or through inheritance from family members. It therefore means that land is available for majority of thehouseholds to carry out their agricultural activities. So diversification to work with the plantation because of cultivable land is an option and not a must to this category of households. Households-heads of the other age classes especially those below 30 years who have limited or no access to land resources may be compelled to work with the plantation in order to gain access to cultivable land for their family livelihood. However the results indicated low percentage of young people as household heads in the area. The low percentage may be due to migration out of the communities because most of them may be having fewer resources and therefore tend to seek greener pastures. Statistically, age showed no significant differences with households' health, children's education and other income resources (Table 4.2).



**Table 4.2 Age characteristics with dependent variables**

| Independent Variable | Dependent Variables | |
|---|---|---|
| Age<br>Under 30 yrs(3%)<br>30-45 yrs(42%)<br>46-60 yrs (32%)<br>61yrs and Above (23%) | Livelihood Needs (n=100) | Chi-square (P-value) |
| | Health | 16.0630; P = 0.066 |
| | Children Education | 9.4896; P = 0.393 |
| | Other income sources | 15.9817; P = 0.014 |

P> 0.001

### 4.1.2: Educational Levels of Respondents

Out of 100 respondents, 77 percent had no formal education, 14 percent had basic education, eight percent had formal education up to the secondary level and one percent had tertiary education (figure 4.3).

The results revealed that majority of the household heads in the study area were without formal education. This can affect agroforestry technology adoption and other special needs of households in the area (GCARD, 2010) even though Nair et al. (2004) said it may not be true for all illiterate household heads because some may use the knowledge of their more educated household members for their household livelihood. It is however necessary for household heads to attain higher levels of education in order to reduce household'spoverty levels (Nair et al., 2004).

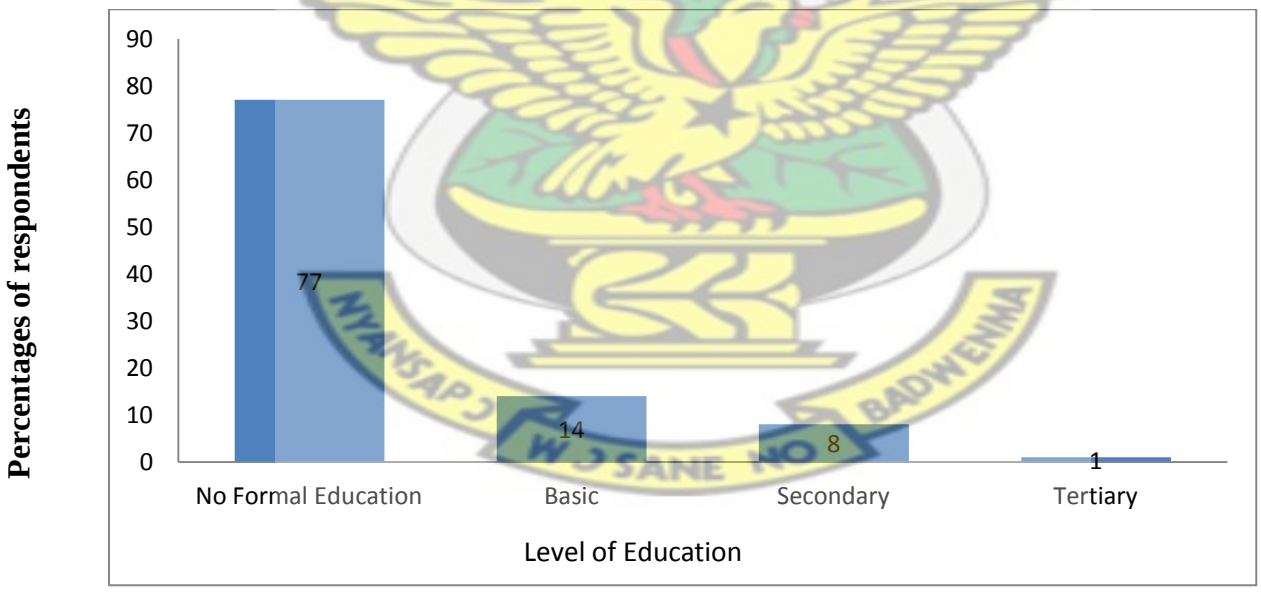


**Figure 4.3: Educational level of respondents**

As indicated above, the high level of household heads without formal education in the study area shows a high level of threat to the adoption of agroforestry technologies. It especially so for

those without educated individuals in their families as reported by Nair et al. (2004). Poor adoption of agroforestry technologies will consequently result in low crop yields and this will affect the livelihood conditions of households in the area. The statistical test showed significant differences (Pr =0.001) between respondents' educational level and the death of household members (Table 4.3). This may probably be due to the gap between when the agroforestry technology was absent and the periodthat it was introduced in the area. The introduction of the project in the area gave households the opportunity to attain formal education better as compared to the time when it was absent. Other reasons may be due to themonthly remunerations participants receivefrom the project. Households working with the plantation project can therefore afford their members education better than those not working with the plantation because of the monetary benefits they derive.



**Table 4.3: Educational characteristics with dependent variables**

| **Independent Variable** | **Dependent Variables** | |
|---|---|---|
| Education (Basic, Secondary, Tertiary and None) | (**n=100**) Chi-square (**P-value**) | |
| | Death | 34.6663; P = 0.001 |
| | Plantation | 18.5066; P = 0.030 |

P= 0.001 for Education with Death

### 4.1.3: Origin of Respondents

Fifty percent of the respondents in the study area were migrants and 50 percent were natives (Figure 4.4). The study results indicated the presence of migrants in the area. The high percentage of migrants in the areacould be an indication of the vulnerability situation of

households'. This is because according to Waddington (2003), many households migrate in response to vulnerability or as a strategy to manage risk and reduce vulnerability. As reported by Kavaarpuo (2010), rural farmers of Northern Ghana move southwards during the dry season when there is virtually no work for them todo to seek other alternative means of livelihood. Migration is however towards areas with better natural biological resources that will meet their livelihood needs (GCARD, 2010).




**Figure 4.4: Origin of Respondents**

Seventy two percent of the migrants in the area werefrom outside the district and 28 percent came from within the district (figure 4.5).Migration of rural households to forest-fringe communities for farming is mainly to have access to better resources like productive land rich in nutrients as reported by GCARD (2010) to enhance output from agriculture production. The study area shares borders with BrongAhafo Region in Ghana meaning it possess some environmental conditions of this region. The National Forest Plantation Project in the area can provide participants with cultivable land to cultivate crops. The qualities of the land in the study area are probably the main factors attracting these migrants to settle in these communities.

Migration however has a bad side. Migrants at times suffer discrimination in their new environments and are unable to see their children through formal education (GCARD, 2010). This could be one of the major causes of high illiteracy rate in the area.

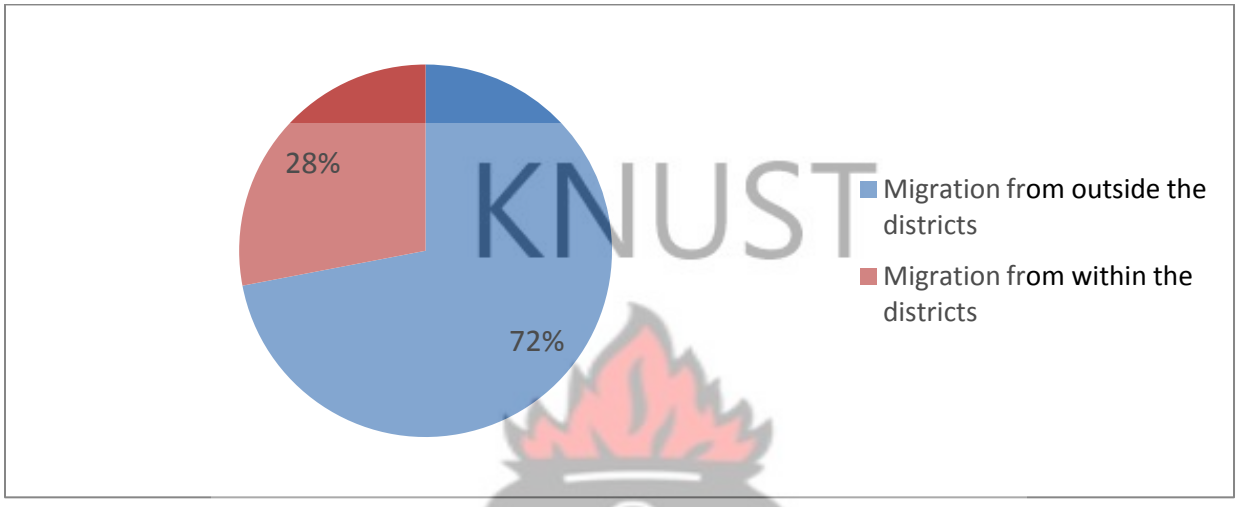


**Figure 4.5: Migrants place of origin**

### 4.1.4: Respondents' Household Size

Twenty one percent of the respondents had 7-8 members in their households. Seven percent of the respondents had above 20 members in their households. One percent of the respondents had 1-2 members in their households (Table 4.4).

In line with Ekbom and Bojo (1999), households with larger sizes are poor and they are poor because they are large. The study has however discovered that the larger household sizes rather contributed immensely tohousehold's livelihood. The larger the household size the greater the strength of the household labour for farming. With enough labour resources, households are able to increase the acreages of their crop farms thereby producing enough food to feed the whole family. As reported by Huxley (1999), rural household size is the source of labour inputs

necessary for performing a diversity of household tasks. So the overall success of a particular household in farming is principally dependent on the availability of household labour resources.

**Table 4.4: Respondents household sizes**

| Household Size | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| 1-2 | 1 | 1 | 1 |
| 3-4 | 9 | 9 | 10 |
| 5-6 | 15 | 15 | 25 |
| 7-8 | 21 | 21 | 46 |
| 9-10 | 14 | 14 | 60 |
| 11-12 | 12 | 12 | 72 |
| 13-14 | 9 | 9 | 81 |
| 15-16 | 2 | 2 | 83 |
| 17-18 | 5 | 5 | 88 |
| 19-20 | 5 | 5 | 93 |
| 20+ | 7 | 7 | 100 |
| Total | 100 | 100.00 | |



### 4.2: Respondents Livelihood Assets

#### 4.2.1: Financial Assets of Respondents

Figure 4.6 shows that 58 percent of the respondents ranked farming as their main source of household income, 24 percent ranked petty trading as the next most important source of income, 11 percent ranked plantation project, four percent ranked formal employment and three percent ranked other different sources.

The research results are in line with the findings of Diao (2010) who said the main source of rural household income in the northern part Ghana is farming. About 90 percent of households' agricultural income in Northern Ghana comes from stable crops and livestock. Most rural households in the area practice subsistent agriculture which often results in low agricultural productivity. This makes them vulnerable to stresses/shocks and are unable to address their basic

livelihood needs including sending their members through formal education. Education can bringabout poverty reduction amongst rural households (Nair et al., 2004). Also achievement in agricultural growth can result in spillover effects on the non-agricultural sectors (Diao, 2010) and this can help to accelerate poverty reduction in the study area. The Plantation Project has been beneficial to the people. Agricultural practices by the participants of the plantation are now easier because of the various assistances they receive which help to reduce cost involve in production.Participants receive basic working tools like hoes and cutlasses from the plantation and these in a way serve as initial capital for their agricultural activities. Money that would have been spent by households in buyingthese farm inputsissaved. Apart from these benefits that participants receive, they also receive monthly wageswhich serves as a reliable household strategy in meeting households' needs. Households in the study area require this agroforestry technology because of the multiple benefits it gives to themi.e. money and raw materials for household fuel wood, charcoal production and opportunity for savings. The technology also has the potential of discouraging households from encroaching on the forest resources of the reserve in the area. In the case of fuel wood the technology can include woodlots establishment to provide wood resources for the communities round the reserve. The agroforestry technologies will be better for the landless and especially the landless female-headed households who lack access to so many resources including land in the communities to better their livelihood conditions (FAO, 2009).

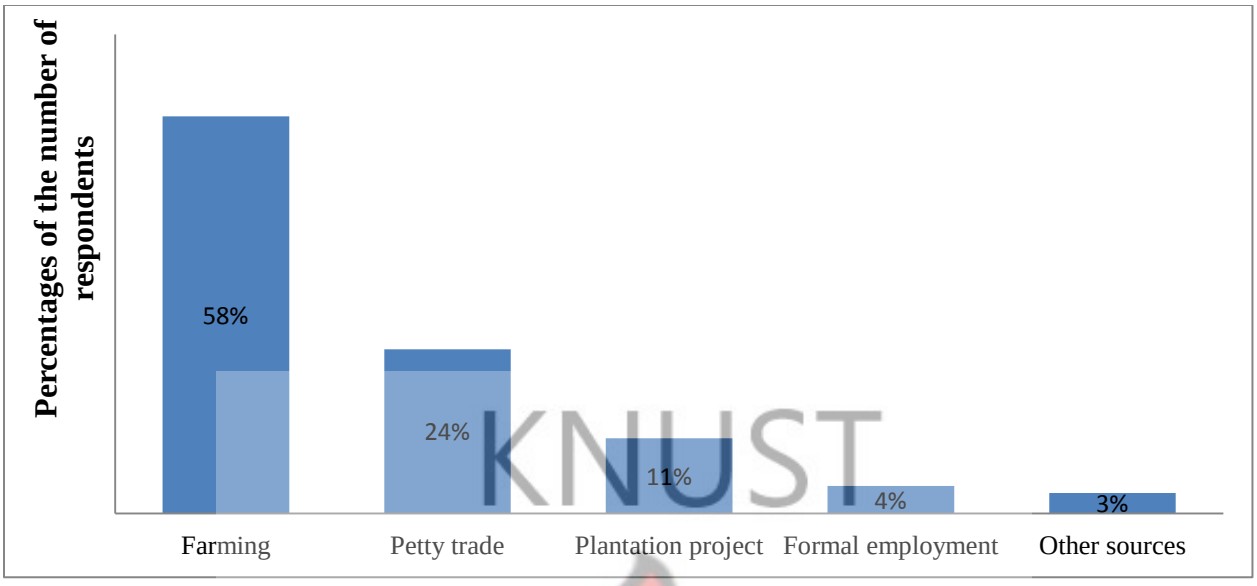


**Figure 4.6: Household income sources**

The respondents in the study area spent 34 percent of their income on education, 27 percent on food, 21 percent on agricultural supplies, 14 percent on health, one percent on savings and three percent on other sources (figure 4.7).The findings of this research arein contrast with the report of Diao (2010)who said thathouseholds spend higher percentage of their income on food but in this study households rather spent higher on education. This may be due to previous investments in tools, seeds and other farming inputs which havelong term duration accounting for the low expenditure. It means that households spend less money on farm inputs used in food production as compared to the education of their members in school.It also shows the level of commitment of households toeducate their members through formal education in the area.It further means that households in the area are aware of the contributionof education to their livelihoods and are therefore willing to get their members educated. As reported by Norman and Philip (2003) educationimproves human capacity of people to utilize existing assets to better their livelihood through the creation of even new ones.

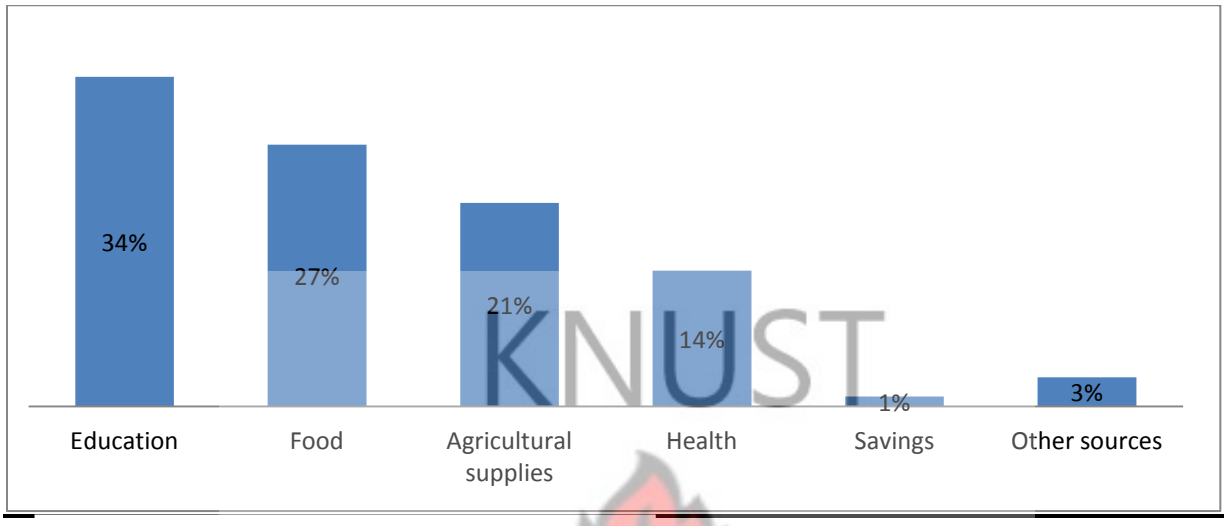


**Figure 4.7: Areas where income is spent**

Statistical test showed significant differences in the sources of income of respondents and household needs (Pr = 0.001).

### 4.2.2: Human Assets of Respondents

In this study human capital is measured by total amount of education obtained by the household head. The educational distribution of household heads (Table 4.5) has indicated serious threats to agroforestry technology adoption which can result in low households' agricultural productivity. As reported by Philippot (2010), education is a factor which affects people's efficiency in production. This has made households to attachimportance to education taking advantage of the presence of the National Forest Plantation Project in the area.The plantation helps participants to obtain monthly income for their member's education.Chi square test of the educational level of respondents in the study area however showed no significant differences among the variables (Pr>0.001).

**Table 4.5: Respondents educational levels**

| Educational Level | Farmers | Non-Farmers | Total |
|---|---|---|---|
| Basic | 14 | 0 | 14 |
| | 100.00 | 0.00 | 100.00 |
| Secondary | 8 | 0 | 8 |
| | 100.00 | 0.00 | 100.00 |
| Tertiary | 1 | 0 | 1 |
| | 100.00 | 0.00 | 100.00 |
| None | 62 | 15 | 77 |
| | 80.52 | 19.48 | 100.00 |
| Total | 85 | 15 | 100 |
| | 85.00 | 15.00 | 100.00 |



### 4.2.3: Natural Assets of Respondents

Figure 4.8 showed that 36 percent of the respondents ranked government land as the most important land class for their households, 33 percent ranked community land, 29 percent ranked family land and two percent ranked individual land as the most important land classes for their households.

The results showed that there is a decline in resources necessary for households in the area and that they are aware of the abundance of these resources in the forest reserve. It means that forest reserves in the area in comparison with community lands or family landscan be a better source of livelihood asset. Community lands may be accessible to households but they lack the necessary resources that households need for their livelihoods. The National Forest Plantation Project apart from the above mentioned resources to rural households can serve as important habitats for

wildlife animals. Rodents such as rats serve as an important delicacy for the people in the area. The benefits of the agroforestry technology in the area cannot be over emphasized. As reported by Sargent and Bass (1992), plantations increase useful services and other benefits like fruits, nuts, fodder, game and fuel wood for people.

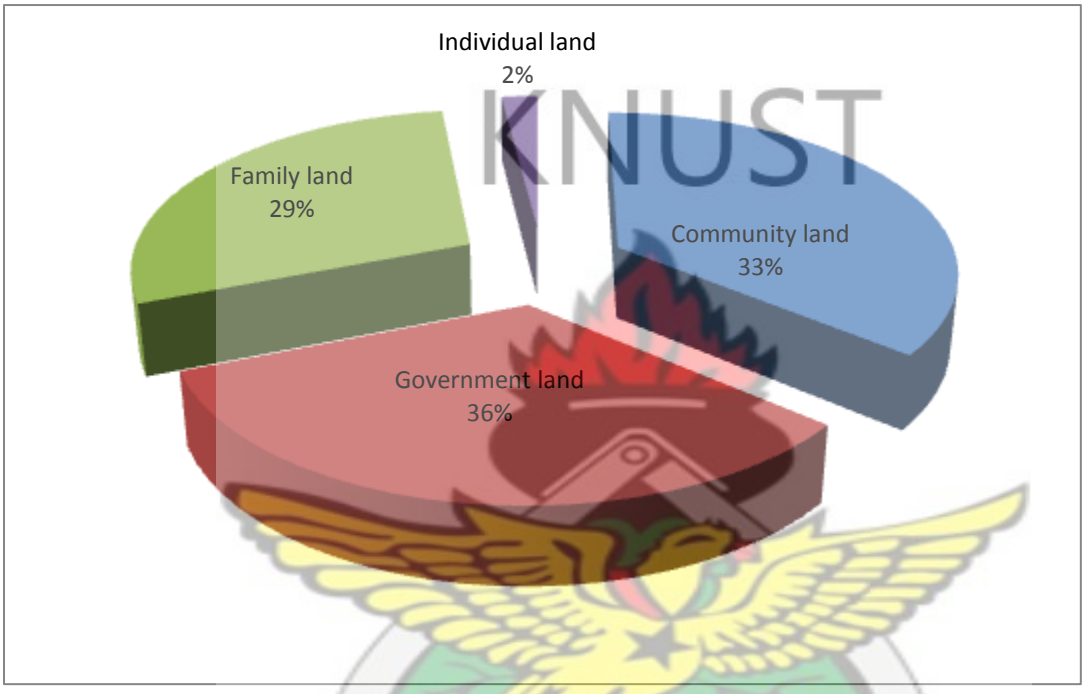


**Figure 4.8: Land Classes of Households in the Study Area**

The study also revealed that 85 percent of the respondents were farmers and 15 percent were non farmers. The non-farmers were engaged in petty trading and other artisanal works.

The occupational distribution of the respondents actually confirmed the report by Diao (2010)that majority of the households are farmers. The common agricultural practice of the households is subsistence farming whichdoes not provide them with enough income (Ansah, 2000). An alternative method for small farm holders like the National Forest Plantation Project could help them to acquire the necessary capital of going into large scale commercial farming. It

was realized in this research that adopting new but beneficial agroforestry technologies would not be a problem since the people arefarmers.

From the study, about 46 percent (36.5 percent males and 9.4 percent females) of the farmer respondents cultivated on-reserved land (government plantation) and 54 percent (42 percent males and 11.8 percent females) cultivated off-reserved land (Table 4.6).

The proportion of both on and off-reservesmale-headed farm households were higher than that of the female-headed farm households.It was obvious from the study that majority of the respondents were males. The low percentage of female household heads to male heads has attested that maleheads dominatedthe households in the study area(FAO, 2002). The few female household heads identifiedthroughthis research were as a result of default of either the death of the male head or vacation due to one reason or the other. Female headed households in the study area may lack certain resources including access to farm equipment and land as reported by Ardayfio-Schandorf (2007) but majority of them has access to these resources because of the default nature of their headship in the study area. For instance, a female-headed household by default of the death of a husband may have the opportunity of owning the resources that the late husband left behind. Female-headed householdswho howeverlack access to resources like land in the community can fall on the Forest Plantation Project to assist them to acquire land for households' agricultural activities. Thisis easily achieved through participation in the plantation project as reported by Ardayfio-Schandorf(2007). It means that by participating in the project the economic and social needs of female headed households who lack farm resources like land can be catered for. The National Forest Plantation Project is therefore a sure means of bettering female headed household livelihood conditions especially those who lack land resources(Sargent and Bass, 1992).

Table 4.6: **Respondents farm locations**

| GENDER | PLANTATION AREA | OUTSIDE PLANTATION AREA | TOTAL |
|---|---|---|---|
| Male | 31 | 36 | 67 |
| | 36.5% | 42.3% | 78.8% |
| Female | 8 | 10 | 18 |
| | 9.4% | 11.8% | 21.2% |
| Total | 39 | 46 | 85 |
| | 45.9% | 54.1% | 100.00 |



From the research, 62 percent of the respondents' households use firewood as domestic source of fuel energy, 7 percent used charcoal and 31 percent used both firewood and charcoal as their main sources of domestic fuel energy for their households (Figure 4.9).

The information indicatedthat there is the absence of alternative sources of household energy to fuel wood in the area and this has accounted for the over reliance of households on forest resources for charcoal and fuel wood to satisfy their domestic energy needs. This poses a serious threat to the management of the forest resources for posterity in the area. Households in future will be compelled to enter the reserve illegally for forest resources when finally those resources in the off-reserve forest get depleted through mismanagement. It is necessary to start looking for alternative household energy sources throughplantations by establishing multipurpose woodlotson community lands.When this is properly done households would stop theindiscriminate destruction of the natural forest for charcoal and otherwood resources. Sargent

and Bass (1992) reported that there is the need to control the use of wood resources for fuel especially for people of the least developed countries.

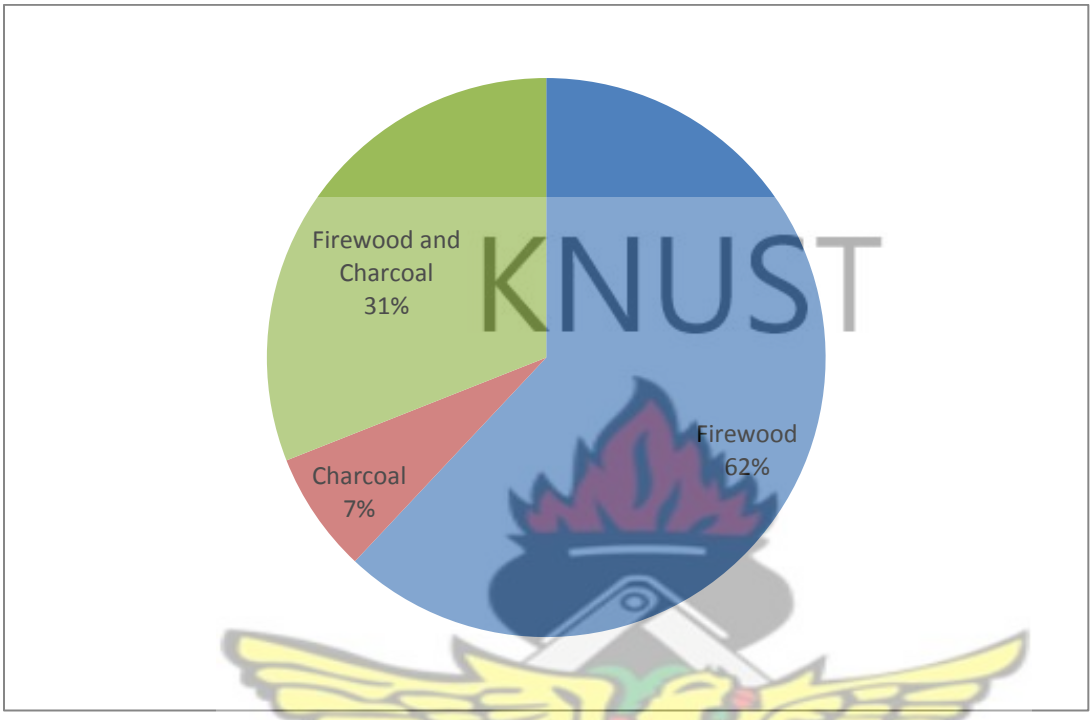


**Figure 4.9 Households Energy Sources in the Study Area**

The results presented in Table 4.7 showed respondent's process of acquiring firewood for their households. It was found out that 63 percent collected firewood or burnt charcoal for their household use, 21 percent collected firewood/burn charcoal and also bought some for household use. Sixteen percent of the respondents bought all the firewood or charcoal that they used.

These results show that wood resources are really in abundance in off-reserve forestand are within the reach of households in the area. The over dependence of households on wood resources for their domestic energy uses is dangerous to the management of the forest reserve in the area. This can result in serious depletion of off-reserve forest wood resources. The aftermath effects would beland degradationand illegal harvesting of on-reserve forest wood resources. As

aforementioned, the National Forest Plantation Programmein the area can provide some of the households' energy needs like wood found in the plantations. Participating and acquiring firewood from the plantation will control indiscriminate destruction of forest crops. The use of alternative energy sources like the use ofLiquefied Petroleum Gas (LPG) and kerosene stoves is possible with the presence of the National Plantation Project. Households can afford any of these methods if they participate and receive monthly remunerations from the Project. Plantations as reported by Huxley (1999) can help in reducing pressure on the use of biological natural resources including firewood in an area.



**Table 4.7: Respondents' process of acquiring fuel wood**

| Fuel wood Acquisition | Number of respondents | Percentage | Cumulative percent |
|---|---|---|---|
| Collect firewood/ burn charcoal | 63 | 63 | 63 |
| Buy and collect fuel wood/ burn the rest of fuel wood | 21 | 21 | 84 |
| Buy all firewood/ burn charcoal | 16 | 16 | 100 |
| TOTAL | 100 | 100 | |

Table 4.8 shows that 56 percent of the respondents obtained firewood from off-reserve land for their household use. Eighteen percent obtained firewood from both off-reserve and on-reserve lands. Seven percent obtain firewood from on-reserve land within the plantation field and only three percent obtained firewood in on-reserve land but outside the plantation area.

The above distribution of respondent's sources of household's firewood shows that majority of the households obtained their firewood from off reserved forest land. This may be because of the

rules governing entry into reserved lands. Some fuel wood acquisition activities could be done freely on-reserve.Alternative sources of acquiring rural household energy arerequired because non participants of the plantation illegally fetch firewood from the reserved forest for their domestic use.This behavior is showing a future threat to the resources in the reserve if measures are not taken. To stop this, prolific and fast growing species like neemshould be used as the forest crop. Participants of the plantation project only harvest dry wood for firewood from the reserve for their household use (Ardayfio-Schandorf, 2007).



**Table 4.8: Sources of respondents firewood**

| Where Firewood is Acquired | Number of Respondents | Percentage | Cumulative Percentage |
|---|---|---|---|
| On-reserve plantation farm | 7 | 7 | 7 |
| On-reserve outside plantation farm | 3 | 3 | 10 |
| Off-reserve farm | 56 | 56 | 66 |
| Both off and on-reserve farm | 18 | 18 | 84 |
| N/A | 16 | 16 | 100 |
| TOTAL | 100 | 100 | |

Table 4.9 shows respondent's average farmland sizes in the study area. Sixty nine percent of the respondents in the study area had their average farmland sizes been 0.4-2.0 hectares, 25.9 percent had between the sizes of 2.4-4.0hectares and 4.7 percent reported having above 4.0 hectares.

The results have provided apicture of the households' farm holdings in the area. Majority of them practiced subsistence agriculture as reported by Ansah (2000). Subsistence agriculture

provides households with less income making them vulnerable to shocks and stresses. They continue to remain subsistence farmers unable to increase their capital to go into large scale commercial farming. The National Forest Plantation Project is a reliable rural livelihood strategy to raise the income status of vulnerable households through monthly remunerations and free access to farming logisticslike cutlasses, hoes and wellington boots.

**Table 4.9: Average farmland size of respondents in the study area**



| Farm Size | Number of Respondents | Percentage | Cumulative |
|---|---|---|---|
| 0.4-2.0hectares | 59 | 69.4 | 69.4 |
| 2,4-4.0hectares | 22 | 25.9 | 95.3 |
| Above 4hectares | 4 | 4.7 | 100 |
| Total | 85 | 100.00 | |

Results of the study revealed that most (74.1 percent) of the respondents have their farms between 1.6-8.0 kilometers from the house. About fifteen percent have their farms less than a kilometer from their homes whilst 10.6 percent have their farms beyond 8 kilometers (Table 4.10).

The results show that nearby lands are low in plant nutrients to give good crop returns. Householdsare compelled to movelonger distances away from the immediate surrounding lands for their agricultural activities. Farms establishedat a distance of 1.6 kilometersand beyond are safe from the destruction of domestic animals. At such a distance households are able to cultivate larger parcels of land than closer distances because of competition for land. This shows why some households illegally farm on reserve land.Soils of reserve lands are fertile for

differentkinds of crops. Involvement of many households in the plantation would mean that they would benefit from cultivating on fertile land in the reserve to improve their livelihood. If the plantation project is expanded,many household members would be employed and this will consequently reduce encroachment on the reserve. The distance of 1.6-8.0 kilometers traversed by most of the households to off-reserve farms is the same distance to the plantation site.

**Table 4.10: Distances of respondents Farms**



| Farm Distance | Number of Respondents | Percentage | Cumulative |
|---|---|---|---|
| Less than 1.6 km | 13 | 15.3 | 15.3 |
| 1.6-8.0 km | 63 | 74.1 | 89.4 |
| Above 8.0km | 9 | 10.6 | 100 |
| Total | 85 | 100.00 | |

### 4.2.4 Physical Assets of Respondents

From the study, 55 percent of the respondents live in mud-houses, 31 percent live in mud-brick houses and 14 percent live in block houses (Table 4.11).The results on the physical assets of respondents' households indicated that majority of the households in the area have not benefitted much from the Plantation Project to the extent that they are unable to put up block houses for themselves. The possible reason could be that majority of the households in the area are not involved in the plantation work and so do not receive the direct benefits like the monthly remunerations that could have helped them to put up good houses. So many mud buildings still dominate the area(Bole DMTDP, 2006-2009) due to low income levels of the households. Though many households have the desire to work with the plantation there are limited vacancies

for them. The programme should be expanded to employ many households in the area. The working conditions of the project should be improved for households' to be able to improve their living standards.

**Table 4.11: House features of respondents**

| House | Number of Respondents | Percentage | Cumulative Percent |
|---|---|---|---|
| Made with mud | 55 | 55.0 | 55.0 |
| Made with brick | 31 | 31.0 | 86.0 |
| Made with block | 14 | 14.0 | 100.0 |
| Total | 100 | 100.0 | |



### 4.2.5: Social Assets of Respondents

The study revealed that 37 percent of the respondents received some other forms of assistance from organizations or government different from those received for plantation activities. Thirty percent of the respondents received nothing. Eleven percent of the respondents received other forms of assistance including wellington boots and tools from the National Forest Plantation Project. Respondents that received wellington boots only, tools only, and money only were in each case only one percent (Table 4.12). Results on the social assets of respondents showed that majority of the households in the area benefitted from social networks and this according to Nair (1993) affects the households' livelihoods. Households havereceived various forms of assistance from various organizations including the Plantation Project. The Plantation Project in the area can offer the most needed assistance to households because of its bearings with their main

occupation which is farming. The plantation supply participating households withbasic farming logistics like cutlasses, hoes, mattocks and wellington boots for farming. Money that would have been spent in acquiring these farming inputswould be saved or diverted into other livelihood projects. For many households to benefit from this kind of assistance, then the Plantation Project has to be expanded to employ many household members in the area. As reported by Nair (1993) the issuance of money and other inputs affects rural peoples' lives.



**Table 4.12: Assistance received from government/organization by respondents**

| Type of Assistance | Number of Respondents | Percent |
|---|---|---|
| Did not receive assistance | 30 | 30.0 |
| Farm training and seeds | 1 | 1.0 |
| Others | 37 | 37.0 |
| Wellington boots, tools and others | 11 | 11.0 |
| Wellington boots | 1 | 1.0 |
| Tools | 1 | 1.0 |
| Money | 1 | 1.0 |
| Wellington boots and tools | 18 | 18.0 |
| Total | 100 | 100.0 |

### 4.3: Respondents Shocks and Stresses

Various shocks/stresses were reported by respondents in the study area (Table 4.13). Among the shocks/stresses of the respondents, illness was the most (21 percent) mentioned stress of the people and it was followed by crop failure (15 percent). The rest of the respondents shocks/stresses mentioned were below 12 percent with the least been pests (3.8 percent) which lower their crop yields.



The study has revealed that illness is the major stress of households. This is probably so because of the lower educationalattainment of the households in the area (GCARD, 2010). The lower educational attainments by majority ofhouseholds in the area have resulted to unsatisfactorily livelihood strategies causing household poverty. The National Forest Plantation Project can be a panacea to reducing stresses/shocks of households because of the numerous benefits including cash that come to those who participate in it. When income levels of households improve high illiteracy levels will fall because they will be able to access formal education (Nair et al., 2004). Household's poverty levels continue to rise because of the lower returns they receive from subsistence agriculture.The income sources of subsistence farmers are not regular making it difficult for them to overcome household challenges. Workers of the plantation however receive incomeregularly at the end of every month and this helps them to be more sustainable in terms of their livelihoods as compared to the non-workers households.Households of workers can afford the registration fee of the National Health Insurance Scheme and their members' education. Many household's stresses/shocks as reported by FAO (2009) are therefore due tothe lack of finance to create and enhance the otherlivelihood assets for the sustenance households' livelihood. It is important to expand the size of the plantation in the area to employ members ofmany households in the study area.

**Table 4.13: Respondents shocks and stresses**

| Shocks/Stresses | Number of Respondents | Percentage |
|---|---|---|
| Hunger | 29 | 10.9 |
| Crop loss | 40 | 15.0 |
| Illness | 56 | 21.0 |
| Death | 20 | 7.5 |
| Loss of job | 15 | 5.6 |
| Shortage of labour | 21 | 7.9 |
| Theft | 14 | 5.2 |
| Bushfires | 27 | 10.1 |
| Pests | 10 | 3.8 |
| Damage to dwelling structure | 35 | 13.0 |
| Total | 267* | 100.00 |

267* is total of multiple variables



**4.4: Respondent's coping strategies to shocks and stresses**

Table 4.14 presents the coping strategies adopted by the respondents' households against household shocks and stresses. Twenty six percent of the respondents reported adopting coping strategies different from those selected for the household survey. About twenty six percent also reported selling crops in order to solve their household's shocks/stresses. Twenty seven percent sold labour. About 15.8 percent sold animals, 3.8 percent sold physical assets and 1.5 percent relocated through migration in order to solve their household shocks/stresses.

The results meant that most of the respondents' shocks/stresses requirefinancial solution. Currently they rely heavily on agricultural output to solve their problems. Households need to be

taught to use modern agroforestry technologies. The agroforestry technologyof this project could be expanded to enable a reasonable number ofhouseholds to take it as part of their householdlivelihood strategy to solve their problems. Rural households' farming activities which is mainly subsistence is unable to provide them with regular source of income for livelihood. This has made them vulnerable to shocks and stresses with most of thehouseholds turning to sell labour to cope up with the situation. Other measures that areused during such periods includeborrowing money from village money lenders whose interest rates are often too high to settle and selling of the few household's resources. The general livelihood strategy for rural people as reported by Landry (2009) is also agriculture and this could be made sustainable through the plantation project. Households can be encouraged to work with the plantation by given them adequateremunerationevery month.

**Table 4.14: Respondents coping strategies to shocks and stresses**

| Shocks | Coping Strategies | | | | | | |
|---|---|---|---|---|---|---|---|
| | Sold physical asset | Sold labour | Sold animals | Sold crops | Migration | Other | Total |
| Hunger | 2 | 10 | 6 | 16 | 1 | 19 | 54 |
| | (3.7%) | (18.5%) | (11.1%) | (29.6%) | (1.9%) | (35.2%) | (100%) |
| Crop loss | 2 | 13 | 7 | 7 | 1 | 10 | 40 |
| | (5.0%) | (32.5%) | (17.5%) | (17.5%) | (2.5%) | (25.0%) | (100%) |
| Illness | 1 | 6 | 5 | 6 | 0 | 11 | 29 |
| | (3.4%) | (20.7%) | (17.2%) | (20.7%) | (0.0%) | (37.9%) | (100%) |
| Death | 1 | 7 | 7 | 4 | 0 | 3 | 22 |
| | (4.5%) | (31.8%) | (31.8%) | (18.2%) | (0.0%) | (13.6%) | (100%) |
| Loss of job | 0 | 9 | 2 | 4 | 0 | 0 | 15 |
| | (0.0%) | (60.0%) | (13.3%) | (26.7%) | (0.0%) | (0.0%) | (100%) |
| Shortage of labour | 0 | 3 | 5 | 7 | 0 | 7 | 22 |
| | (0.0%) | (13.6%) | (22.7%) | (31.8%) | (0.0%) | (31.8%) | (100%) |
| Theft | 1 | 0 | 3 | 4 | 0 | 2 | 10 |
| | (10.0%) | (0.0%) | (30.0%) | (40.0%) | (0.0%) | (20.0%) | (100%) |
| Bushfires | 0 | 12 | 2 | 7 | 1 | 6 | 28 |
| | (0.0%) | (42.9%) | (7.1%) | (25.0%) | (3.6%) | (21.8%) | (100%) |
| Pest | 0 | 4 | 1 | 3 | 0 | 4 | 12 |
| | (0.0%) | (33.3%) | (3.0%) | (25.0%) | (0.0%) | (33.3%) | (100%) |
| Damage to dwelling structures | 3 | 9 | 4 | 10 | 1 | 7 | 34 |
| | (8.8%) | (26.5%) | (11.8%) | (29.4%) | (2.9%) | (20.6%) | (100%) |
| Total | 10 | 73 | 42 | 68 | 4 | 69 | 266 |
| | (3.8%) | (27.4%) | (15.8%) | (25.6%) | (1.5%) | (25.9%) | (100%) |

### 4.5: Respondents' main reason for working with the Plantation Project

Respondents gave various reasons why their households would participate in the National Forest Plantation Programme. Eighty-eight percent participated because of income. Eight percent of the respondents said their main purpose has been to gain access to land forfarming activities and 4 percent said they haveparticipated with the main objective of helping to preserve the environment in the area (Table 4.15).



The results of the study shows that majority of the households are financiallyhandicapped as reported by Ekbom and Bojo (1999). Their subsistence agricultural activities are unable to fetch them enough income to meet their livelihood needs. For many households, participation in the plantation will provide themregular source of income to meet their livelihood needs (Ardayfio-Schandorf, 2007).So households should be encouraged to carry out agroforestry technologies on the Plantation Project's land. The survival strategy of the people now is subsistence as reported by Landry (2009) and this is focused mainly on self-sufficiency rather than on other investments. They can go beyond that through the agroforestry activities in the plantation. Developing the forest plantation sub-sector will therefore contribute significantly in providing sufficient solution to household needs in the area (ADB, 2005).

**Table 4.15: Respondents main reason for participating in the Plantation Project**

| Reasons | Number of Respondents | Percent |
|---|---|---|
| Land for farming | 2 | 8.0 |
| Income | 22 | 88.0 |
| Preservation of environment | 1 | 4.0 |
| Total | 25 | 100.0 |



### 4.6: Food crops cultivated on the Plantation Project's farm

The results of the study, Table 4.16, indicated eight percent of the respondents said cereals were the only crops cultivated on the plantation farm. Three percent mentioned of only leguminous crops. Twenty percent of the respondents reported having no knowledge of any of the crops that were cultivated on the plantation field. The rest of the respondents reported knowing more than one crop cultivated at the site. Twenty nine percent said cereals, roots and tubers were cultivated on the plantation field. Fifteen percent reported cereals, legumes, roots and tubers. Eight percent reported cereals and legumes, and 4 percent reported legumes, roots and tubers. The remaining reports as indicated in Table 4.16 were less than 3 percent each.

From the results of the study majority (74 percent) of the respondents mentioned the staple crops cultivated by the participants of the plantation in the study area. As reported by Ardayfio-Schandorf (2009) the plantation contributes to the production of local crops in the area. The Plantation Project has also provided some landless households' access to land for their

agricultural activities. This makes the programme not only good for the landless natives but also for the landless youth and migrants in the area.

**Table 4.16: Food crops grown on the plantation field**

| Crops cultivated | Number of Respondents | Percent | Cumulative Percent |
|---|---|---|---|
| Cereals | 8 | 8.0 | 8.0 |
| Cereals, legumes, roots and tubers | 15 | 15.0 | 23.0 |
| Cereals, vegetables, roots and tubers | 1 | 1.0 | 24.0 |
| Roots, tubers and vegetables | 1 | 1.0 | 25.0 |
| Cereals, legumes and vegetables | 2 | 2.0 | 27.0 |
| Roots and tubers | 2 | 2.0 | 29.0 |
| Legumes | 3 | 3.0 | 32.0 |
| Cereals, roots and tubers | 29 | 29.0 | 61.0 |
| Cereals and legumes | 8 | 8.0 | 69.0 |
| Cereals and vegetables | 1 | 1.0 | 70.0 |
| Roots, tubers and legumes | 4 | 4.0 | 74.0 |
| Don't know | 26 | 26.0 | 100.0 |
| Total | 100 | 100.0 | |

### 4.7: Benefits of the National Forest Plantation Project in the study area

Ninety eight percent of the respondents reported that their households benefitted from the National Forest Plantation Project. Only 2 percent said they have not benefitted from the project. Twenty five percent of the beneficiary respondents reported that their households received money from the project. Three percent of them said they received food, 28 percent had food and income from the plantation. Thirty two percent had income, food and education. Nine percent had income and education and only 1 percent mentioned food and education as what they have benefited (Table 4.17).

The result as indicated shows that the plantation has a lot of benefits to offer rural households. The major source of rural households is agriculture (Diao, 2010) which is subsistence and unable to give enough income. The monthly remunerations of the plantation can improve on the income status of households to take care of their member's education and other livelihood problems. The plantation contributes a lot to rural households' livelihoods like their natural, human, financial, physical and social capitals in the area. Households through the plantation project can obtain fertile land for their agricultural activities. The availability of land resources according to Norman and Philip (2003) contributes immensely to people natural capital which can help address some major household needs like food and income. Educated household members can pursue better livelihood conditions and can make good use of existing natural resources in an area (Norman and Philip, 2003). Improvement in the agroforestry technology will therefore bring about improvement in the assets of households of the people and contribute to an improvement of theirliving conditions (FAO, 2009).

**Table 4.17: Respondents' households benefit from the Plantation Project**

| Benefits | Number of Respondents | Percent |
|---|---|---|
| Income | 25 | 25.0 |
| Food | 3 | 3.0 |
| Food and income | 28 | 28.0 |
| Food and education | 1 | 1.0 |
| Income and education | 9 | 9.0 |
| Income, food and education | 32 | 32.0 |
| Have not benefitted | 2 | 2.0 |
| Total | 100 | 100.0 |

# CHAPTER FIVE

# 5. CONCLUSIONS AND RECOMMENDATIONS

## 5.1 CONCLUSIONS

The overall aim of this study was to identify the effects of Plantation Projects on the livelihood of the fringe communities in Kenikeni and Yirada Forest Reserves of Northern Region of Ghana. The following conclusions are drawn based on the specific objectives of the study.



### 5.1.1Contributions of Forest Plantation Projects in addressing household needs

The Plantation Project in the area contributes to household income, food and their access to formal education. These are factors that improvehousehold's agricultural activities. Formal education of households enhances better adoption of agroforestry technologies for higher agricultural production. The benefits of Plantation Projects havethe potential of reducing poverty, migration and other household livelihood problems. Statistical test conducted however indicated that, there were no significant differences of the plantation with income, food and educationof households in the area (Pr>0.001). The observed differences could be explained as due to chance.

### 5.1.2 The effect of plantation projects on female-headed households' agricultural activities

The plantation project in the forest-fringe communities of Northern Region serve as an alternative source of land for the landless households including the landless female-headed households in the area. The Plantation Project is viewed as a reliable source of income for households especially the female-headed households to solve their household's stresses/shocks and also pay for their member's education. The benefitsin the form of money and access to parcels of Plantation Projects' land by households of landless female heads for their agricultural activities would

greatly improve the adoption of modern agroforestry technologies for improved land use in reserve areas. Statistical test revealed that significant differences existed (Pr=0.001) between gender and main livelihood before plantation. This means that the result is worth the researcher's interpretation. The plantation is a useful technology that contributes significantly to resources like land which greatly affects the gender of household heads in the study area.



### 5.1.3: The major livelihood problems of the forest-fringe communities in Northern Region

Households suffer various shocks and stresses. Illness and poverty pose the highest stress in the study area. The smaller agricultural holdings of households in the study area are unable to yield enough income for them to manage risk or reduce vulnerability to shocks and stresses. These results affect the ability of households to see their members through formal education.Lack of formal educationaffects theirhealth and the adoption of agroforestry technologies for sustainable land use in the area. It was found statistically that significant differences (Pr=0.001) existed between respondents' household educational level and householdmember's death. Meaning that the plantation has a positive effect on the health status of households in the area.

### 5.1.4: Solutions to the major problems of the forest-fringe communities in Northern Region

Agriculture is the major livelihood strategy of households in the area. However households' subsistence agricultural system does not fetch enough returns for livelihood sustenance. The alternative source of earning regular financial returns for households' livelihoodis the agroforestry technology in the form of the National Forest Plantation Project. The Plantation Project has the greatest potential of transforming rural households' subsistence agricultural activities in the area into large scale commercial agricultural production. This transformation will lead to agricultural

growth and spillover effects on the non-agricultural sectors of rural households. The Plantation Project will encourage households to adopt modern agroforestry technologies for improve livelihood conditions. Environmental resources in the area would be properly managed through the projects.

## 5.2 RECOMMENDATIONS

The following recommendations are made based on the findings of the study.

1. Since agriculture is the main source of income and other livelihood needs of the rural residents, an agroforestry technology like the plantation project in the area must be expanded to help bring about agricultural growth in the area. By expanding the project many households in the area would have their members employed for sustainable livelihood achievement.

2. It is recommendable that financial institutions should come to the aid of rural households in the area so that they can at least acquire basic farm tools and inputs for their agricultural activities through credit.If this is done significant improvement in agricultural production will be achieved for sustainable livelihood conditions of the people in the area.

3. The Forestry Commission can make it possible for rural households in the area to have easy access to land for their agricultural activities through taungya and modified taungya systems. The National Forest Plantationshould be motivational in terms of its monthly remuneration to encourage female-headed households to join for the purpose of improvingtheir livelihood.

4. It is recommended that further investigations into the effect of the National Forest Plantation projects on the income and food status of rural households' livelihoods be carried out. Impact assessment of rural livelihoods could also be carried out thoroughly to ascertain the real contributions of the forest plantation projects on rural peoples' household income, food and formal education in the area.

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## APPENDIX ONE

**THE EFFECT OF FOREST PLANTATIONS ON THE LIVELIHOOD OF FOREST-FRINGE COMMUNITIES IN NORTHERN REGION (A CASE STUDY IN KENIKENI AND YIRADA FOREST).**

RURAL LIVELIHOOD HOUSEHOLD QUESTIONNAIRE

Questionnaire Nº:_____

Name of interviewer:_____ Date of the interview:_____

Community:_____ District_____

Name of Household head _____ Sex_____

**A. Members of Household**

Gender, household size, age, level of education, origin, and sources of income ofthe household.

1 Gender: Male ☐ Female ☐

2 Age in years: Under 30 years ☐ 30- 45 years ☐ 46- 60 years ☐ 61 and above ☐

3 Level of education: Basic ☐ Secondary ☐ Tertiary ☐ None ☐

4 Origin: Native ☐ (If native go to 7) Migrant ☐

5 If migrant, is home town outside the District?: Yes ☐ No ☐

6 What was the reason for migration? To work with plantation ☐ rming ☐ )th ☐ her ☐

7 Household size: Total Number ……

**B. Household's Assets (Livelihood Capitals)**

8 Which of the following is/aresources of income of yourHousehold?

| Sources of Income | Check all that applies |
|---|---|
| Farming<br>Plantation project<br>Petty trading<br>Formal employment<br>Other…… | |

9. Rank your three most important sources of income.

| Sources of Income | Rank (1,2,3) |
|---|---|
| Farming<br>Plantation project<br>Petty trading<br>Formal employment<br>Other…… | |

10. List and rank the three most important areas where income is spent

| Income options | Yes =1, No =2 | Rank (1,2,3) |
|---|---|---|
| Pay existing debt<br>Put it in savings<br>Purchase food<br>Purchase agricultural supplies<br>Health<br>Education<br>Other (specify)_____ | | |

11. Do you have a farm? Yes ☐ No ☐ no go to 13

12. Indicate number of farms you have and their locations, sizes, purpose and distance from home.

| Farm land | Location (on-reserve or off-reserve) | Size (Hectares) | Use (Consumption, sale or both) | Distance from home(miles) |
|---|---|---|---|---|
| Farm 1 | | | | |
| Farm 2 | | | | |
| Farm 3 | | | | |
| Farm 4 | | | | |



13. What is the home made up of?

| Categories | House Features | Check one that most applies |
|---|---|---|
| Main material | Made with mud<br>Made with brick<br>Made with block<br>Made with straw | |

14. What is the major source of fuel energy for your household?

| Fuel energy source | Check one that most applies |
|---|---|
| Firewood<br>Charcoal<br>Gas (if gas go to 17)<br>Other…… | |

15. How does household acquire fire wood/ charcoal?

| Fire wood/charcoal Acquisition | Check one that most applies |
|---|---|
| Household collect all firewood/burn charcoal<br>Household buys some and collect/burn the rest<br>Household buys all firewood/charcoal (go to 17) | |

16. Where do household collect fire wood or burn charcoal?

| Fire wood Acquisition | Check one that most applies |
|---|---|
| On-reserve plantation farm<br>On-reserve outside plantation farm<br>Off-reserve<br>Both off and on-reserves farms | |

17. Rank your three most important land classes for your household.

| Land classes | Rank (1,2,3) |
|---|---|
| Government (on-reserve) land<br>Community land<br>Family land<br>Individual land<br>Other (specify)_____ | |

18. Has the household received any assistance from any organization or government? Yes/No

…… If no, go to 18 but if yes what? Check all that applies.

| | |
|---|---|
| Did not receive assistance<br>Wellington boots<br>Farm training<br>Seeds<br>Tools<br>Money<br>Other (specify)_____ | |

**C. Shocks**

19. Which of the following problems did your household experience during the last year?

| Shock | Yes =1, No=2 |
|---|---|
| Hunger | |
| Crop loss | |
| Illness | |
| Death | |
| Loss of job | |
| Shortage of labour/income | |
| Theft | |
| Bush fires | |
| Pests | |
| Damage to or loss of dwellings or other structures | |
| Did not experience shock (skip 20) | |



20. For each household problem you experienced, choose one coping strategy that you adopted.

| Shock | Coping strategy (choose one) | | | | | |
|---|---|---|---|---|---|---|
| | Sold physical asset | Sold labour | Sold animals | Sold crops | Migration | Other |
| Hunger | | | | | | |
| Crop loss | | | | | | |
| Illness | | | | | | |
| Death | | | | | | |
| Loss of job | | | | | | |
| Shortage of labour/income | | | | | | |
| Theft | | | | | | |
| Bush fires | | | | | | |
| Pests | | | | | | |
| Damage to or loss of dwellings or other structures | | | | | | |

**D. Forest Plantation Project**

21. Are you involved in the plantation project? Yes ☐ No ☐ If no go to 23

22. If yes which year did you get involved in the plantation exercise?

2004 ☐ 2005 ☐06 20☐ 2008☐ 2009☐ 2010 ☐ 2011 ☐ ☐

23. What was the reason for involvement in the plantation? Land for farming ☐ Livelihood ☐

to help in preserving the environment ☐ other ☐……



24. Which food crops are integrated in the plantation farm?

| Crop | Tick all that applies |
|---|---|
| Cereals | |
| Roots and tubers | |
| Legumes | |
| Vegetables | |

25. If you have a family member employed in the plantation job, how do you think the household would benefit? Choose one that most applies to your household.

| Benefit options | Rank (1,2,3) |
|---|---|
| Income<br>Education for children<br>Food security<br>Would not benefit our household<br>Other _____ | |

26. Do you consider Forest Plantation as a Livelihood/occupation? Yes ☐ No ☐

Why? .....

27. Do you consider Forest Plantation as a reliable source of income? Yes ☐ ☐

28. What was your main livelihood before Forest Plantation? Farming ☐ trading ☐ other ☐

29. Since the introduction of Forest Plantation what changes have you seen in your standard of living (livelihoods)? Increase income ☐ Increase food production ☐ Increase in fuel wood ☐ other ☐

30. How would you describe the ease of achieving the following, before and after the introduction of the project?

| | Before Plantation (easy/difficult) | After Plantation (easy/difficult) |
|---|---|---|
| I. Getting farm produce<br>II. Childrens' education<br>III. Putting up a building<br>IV. Household daily care<br>V. Access to land for farming | | |

31. What do you think can be a threat to the success of the Plantation Programme in the area? Annual bushfires ☐ Illegal farming ☐ irregular remuneration of plantation workers ☐ other ☐

32. What innovations do you think when put in place can encourage farmers in the area to join the programme? Paying workers regularly ☐ giving them incentives ☐ other ☐

33. What benefits or advantages have you derived from the plantation? Employment ☐ Land for farming ☐ Food ☐ Fuel wood ☐ come ☐ ther .. ☐ .....

34. Which of the following do you think as a problem of the programme? Lack of proper remuneration ☐ lack of working logistics ☐ walking a longer distance ☐ none ☐ other ☐ .....