Dissertation By

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POTENTIAL OF WOODLOT ESTABLISHMENT IN MEETING THE PRACTICAL AND STRATEGIC GENDER NEEDS OF WOMEN IN UPPER WEST REGION, GHANA

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by

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THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF PHILOSOPHY IN AGRICULTURAL ADMINISTRATION

DEPARTMENT OF AGRICULTURAL ECONOMICS AND AGRIBUSINESS
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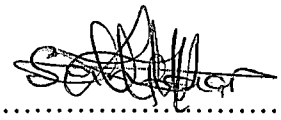
DECLARATION

I, **EMELIA GUO**, the author of this thesis titled "**POTENTIAL OF WOODLOT ESTABLISHMENT IN MEETING THE PRACTICAL AND STRATEGIC GENDER NEEDS OF WOMEN IN UPPER WEST REGION, GHANA**" do hereby declare that the research was done entirely by me in the Department of Agricultural Economics and Agribusiness, University of Ghana, Legon from August 2006 to June 2007 and that I have acknowledged other works that I have consulted.

This work has not been presented in whole or in part for any degree anywhere.



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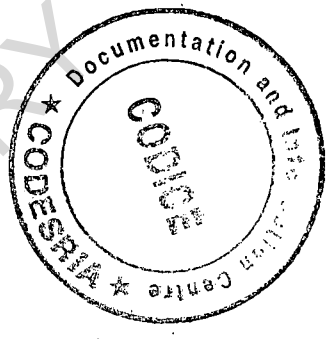

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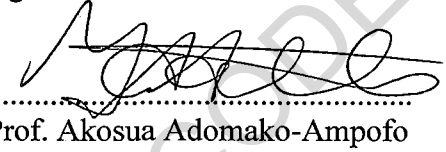

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I dedicate this work to my late Mum, Mrs. Mary Guo

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I thank the good Lord for His mercies and blessings that have brought me this far in my academic career.

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Abstract

Women have been traditionally associated with roles as wives and mothers. Their productive roles especially in agriculture are usually relegated to the background. There is a perceived low relative economic contribution of women mainly because of the exclusion of most of women's activities from the market-place. There is, thus, a need for interventions that will make women's activities more visible and mainstreamed into the market economy.

One area of technological improvement that the talent and ingenuity of women can be of great value is natural resource conservation and utilization. This study, thus, focused on using woodlot establishments as a means of achieving women's practical needs and the possible ways through which they could be used to address women's strategic needs in the Upper West Region of Ghana.

Primary data was collected from 60 women involved in woodlot activities and 29 women who are not involved in woodlot activities using a semi-structured interview instrument. Various participatory rural appraisal (PRA) tools, including use of key informants, focus group discussions, and participant observations, were also used to obtain qualitative information. Discounted cash flow analysis was used to estimate profitability of investment in woodlots and logistic regression analysis was used to identify factors that significantly influence participation in woodlot activities.

The study revealed that even though land is relatively scarce in parts of the Upper West Region, it is not a very limiting factor and women can access it for woodlots. A major factor which negatively influences women's participation in the establishment and maintenance of woodlots was farm activities. The women are required to provide labour on family farms at the time attention is required for young seedlings in the woodlots.

The discounted benefit-cost ratio at 25% discount rate is 2.7 while the financial internal rate of return is as high as 48.2%. The initial capital requirement is, however quite high for the women. As such credit for the establishment and maintenance of woodlot is very necessary and even critical. Indeed the most important factor influencing the women's decisions to participate in woodlots is access to credit.

Women's woodlots have to some extent met some of their practical needs by providing fuel for domestic use. There is, however, a need to make the enterprise more profitable. Group woodlots have also given the women the opportunity to acquire knowledge and skills through training in woodlot management skills and technology and in group dynamics. Awareness of women's potential to create wealth and sense of belonging has been created through the group activities and that is helping to sensitize them on their strategic needs as women. Improvement in the dynamics of the women's group can assist them to move towards satisfying their strategic gender needs.

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CHAPTER ONE

INTRODUCTION

1.1 Background

Women have been traditionally associated with their reproductive roles as wives and mothers. Their productive roles especially in agriculture have been overlooked for a very long time. Women's roles as farmers, processors, produce marketers, among others, have been relegated to the background and so has been their status in society. The situation is gradually changing through advocacy and research. There is now some recognition of the critical roles women play in the development process in all economies.

Boserup (1970) criticized colonial and post-colonial agricultural policies of African countries which associated men with the "modern" cash crop sub-sector and women with the "traditional" subsistence sub-sector. She also showed that there is positive correlation between the role of women in agricultural production and their status vis-à-vis men. Women, who for example, are able to produce cash crops and obtain income, have enhanced status. Other researchers have indicated that failure to acknowledge and utilize women's productive roles within and beyond the household have resulted in inefficient use of resources (see for example, Tinker, 1990). The argument is that there will be overall increase in efficiency of production if women's access to appropriate technology, credit and other productive resources are improved.

The subordination of women to men in Africa has also been linked to the perceived low relative economic contribution of women. That perception, it is argued, has been because of the exclusion of most of women's activities from the market-place. Women's unpaid labour,

for example, is quite substantial (Young, 1993). There is, thus, a need for interventions that will make women's activities more visible and mainstreamed into the market economy. That will improve both the economic and social status of women vis-à-vis men.

The literature on gender in development makes a distinction between practical gender needs and strategic gender needs of women. Strategic gender needs are "the needs women identify because of their subordinate position to men in their society. Meeting strategic gender needs helps women to achieve greater equality" (Molyneux, 1985 p.233). Practical gender needs, on the other hand, refers to "the needs women identify in their socially accepted roles in society. These are immediate perceived necessities, identified within a specified context. They do not generally entail a strategic goal such as women's emancipation or gender equality; neither do they challenge the prevailing forms of subordination even though they arise directly out of them" (Ibid p.233). Interventions are usually aimed at meeting the practical gender needs but the real goal of development is or should be to support women to achieve the strategic gender needs. It is, however, possible that, with adequate planning and effort, interventions meant to meet practical gender needs can be used, as a stepping-stone to achieve strategic gender needs.

Women as homemakers and care givers in most parts of the developing world and particularly in Africa, are major users of fuelwood as energy. According to Nishimizu (2001), women spend between two to nine hours each day in fuel and fodder collection and cooking chores in developing countries; thus, women are at the centre of rural life (and also urban life) in the provision and use of household energy even though they have little voice in how things might change.

Fuelwood continues to be the main source of energy for almost all rural households and many urban households in northern Ghana as well as in Burkina Faso, Niger, Mali and other parts of the West African sub-region (Noppen et. al. 2004). As home managers, women tend to be the main users of fuelwood. According to Ankrah (1996), firewood and charcoal are the most important domestic sources of heat energy in the savanna regions of Ghana and account for more than 80% of the total fuel energy used in both the urban and rural areas in this zone. Awumbila (1997) has also pointed out that in the Zorse area of the Upper East Region of Ghana, fuelwood gathering can become so critical in the rainy season that "women usually organize trips in groups about once a week and return carrying bundles of wood weighing up to 30kg" (Awumbila, 1997, p.40). Norton (1988) also reports that in some areas of the Northern Region of Ghana, women are forced to walk up to 12 kilometers a day to get a head load of fuelwood. That means if nothing is done to stop the increasing demand for fuelwood, the situation of workload for women will continue to increase in addition to deterioration in the environment.

Fuelwood is also a significant source of income to many rural women especially during the lean season in Northern Ghana. Fuelwood is particularly important in "pito" brewing which is a common local economic activity for women in the Upper West Region. In many communities in the region "pito" is brewed in almost every other household. Charcoal production is another source of energy for both rural and urban dwellers and again women are the main users of charcoal. Charcoal production has also become a major income earning activity in the Upper West and Northern Regions and several other parts of the country. Both fuelwood and charcoal are produced from trees and shrubs and their production is a major

source of natural resource exploitation and destruction. Trees and shrubs are simply cut and none replaced in many situations.

From the foregoing it can be deduced that one area of technological improvement that can be of great value to women as a practical need is the conservation and utilization of natural resources, particularly, fuelwood. In most parts of Africa, women are important users of all types of natural resources and partly because of their intimacy with the environment they tend to have great knowledge of resource conservation. Appropriate interventions in the area of natural resource use and conservation can thus provide a means for women to improve upon their natural talents and empower them economically and socially. An interesting example from the Gambia is found in the "Mariama and her Woodlot" success story (http://gambiatouristsupport.com/ConcernUMariama.htm). Mariama's woodlot in the Chogen Fulla village in the Gambia provides wood for "cooking, building and fencing" and the women are "empowered … to increase their choices through their increased income" (ibid p.5).

The present research focuses on the savannah woodlands of northern Ghana and the role of women in the sustainable production and use of fuel wood to meet their varying needs. There is generally heavy dependence on forests and woodlands for fuelwood in Ghana, particularly northern Ghana, and this is made worse by increasing population. It is estimated that the area of closed forest in Ghana is declining by an estimated 0.4 percent per year and the savanna woodland is shrinking by 0.5 percent per year. Also, approximately 280,000 acres (i.e. about 113,330 hectares) of tree cover are lost every year through improper farming practices (Forestry Department of Ghana, 1998).

Savanna woodlands cover about half the landmass of Ghana and forest areas are gradually turning into savanna. The savanna woodlands are being depleted rapidly through constant exploitation of their resources (mainly wood, fruits, leaves, fishes and wildlife) for both economic and domestic purposes. According to Mensah-Bonsu (2003), declining soil fertility (in northern Ghana) due to a combination of factors including reduction in fallow periods, erosion, improper cultivation, and population increases have led to farming on marginal lands. That clearly implies reduction in availability of fuel wood.

Woodlot establishment was introduced in the Upper West Region by several non-governmental organizations in the 1980s to ensure fast production of wood for fuelwood and charcoal production as well as for the protection of the environment. The Adventist Development Relief Agency (ADRA) is one of the major NGOs promoting woodlot establishment in the northern parts of the country because it believes that the gathering of fuelwood is a contributing factor to land degradation in savanna zones of the country. (Djarbeng and Ameyaw, 2006).

It is mainly women's groups that have been involved in the establishment and management of woodlots. The nature and extent to which planting and management of woodlots affect both strategic and practical gender needs are important goals of development. The established woodlots can satisfy the fuel wood requirements of women, a practical gender need. If the women's woodlot groups function well and have access to good gender training, a strategic gender need of enhanced women's role in the communities can be achieved, especially if the woodlots are able to generate considerable income for the women.

1.2 Problem Statement

The establishment of woodlots seems to be a solution to the unsustainable methods commonly used to obtain fuelwood and charcoal and aims to meet the practical needs of women. There is, however, little empirical evidence on the factors influencing the participation or otherwise of women in establishing woodlots in the savanna areas of Northern Ghana. The idea of establishing woodlots, especially by women's groups, for the purpose of providing fuelwood and charcoal is an introduced woodland management practice that has the potential to meet the practical and strategic gender needs of women and is therefore likely to be widely adopted. However, it appears from the current trend of expansion of woodlots, that the expected widespread adoption may not easily take place until factors and constraints that militate against woodlot establishment and management are examined and appropriate decisions taken. Furthermore, the planting of woodlots and their management may not necessarily empower women in the context where there is limited land available to women. Therefore the extent to which participation in woodlot establishment enhances access to and control over resources such as land is critical to understanding its impact on empowerment of women and therefore addressing women's strategic needs.

This research seeks to assess the extent to which women's participation in woodlot establishment meets the practical and strategic gender needs by providing them with the necessary production resource and by empowering them economically and/or socially.

The research questions that are addressed are:

1. What is the nature of the contribution of woodlots to the livelihoods of households in the Upper West Region and how far does the contribution satisfy the practical gender needs of women in the region?

2. What are the financial and economic profitability of woodlot establishment in the area? Reasonably high financial and economic profitability will address both the practical and strategic gender needs.
3. What social, economic and cultural factors influence the establishment of woodlots by women's groups in the area?
4. How does establishment of woodlots by women's groups help them to address their strategic needs such as social and economic empowerment?
5. What interventions are required to promote woodlot establishment amongst women in the Upper West Region to address not only their practical needs but also their strategic needs?

1.3 Objectives of the Study

This study aims at examining the practical needs of women that woodlots are meeting and how that can be made to move towards attaining strategic gender needs of women. The general objective of the study, therefore, is to determine the potential of woodlot establishment and management in meeting the practical and strategic needs of women in the Upper West Region of Ghana.

The specific objectives are:

1. To undertake a census of woodlots established in the Upper West Region by women's groups in the past 20 years and the rationale for their establishment.
2. To identify and describe the nature of the contribution of woodlots to the livelihoods of households in the region.

3. To determine the profitability of selected woodlot investments by women's groups in the region.
4. To identify and examine the effects of social, economic and cultural factors on women's decisions to partake in woodlot establishment and management in the region.
5. To identify the role woodlots play, within general interventions, to address practical and strategic gender needs.
6. To identify aspects of women's group woodlot establishment that can be used as springboards for social empowerment to achieve strategic needs.

1.4 Relevance of the Study

Energy is vital for the very existence of society and the most common and most important energy source in most parts of the rural areas of the world is wood. Increasing population and increasing need for fuelwood has led to unsustainable use of wood resources especially in densely populated rural areas such as many parts of the Upper West Region. There is need to find sustainable ways to produce and use fuelwood in such areas. The establishment of woodlots has the potential to be the main source of fuelwood in many communities in the region but it must be done scientifically and in a business-like manner.

Most of the woodlots in the Upper West Region are presently established by women's groups. Indeed women are the main users of fuelwood. Availability of fuelwood in the neighborhood prevents women from traveling long distances in search of it. Women are also typically sellers of fuel wood in local markets to meet basic cash needs. The production of fuelwood thus meets a number of the practical needs of women. If ways are found to establish woodlots with profitability in mind, it could lead to the alleviation of poverty in the area especially as

women in the area are generally among the very poor. It could even lead to women exerting themselves to ensure that not only their practical needs are met but also their strategic needs.

The results of the study should inform district assemblies and NGOs in the choice of projects that will benefit rural women, especially in the Upper West Region. It will also provide information for women to take informed decisions with regards participation or otherwise in woodlot establishment. Such decisions will have livelihood enhancement, environmental sustainability and women empowerment implications.

The research will also contribute significantly to current scientific knowledge with regards to practical and strategic gender needs as well as the natural resources management in Ghana. The outcome of the study will also serve as a basis for further research in woodlot establishment and savanna forest conservation.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review is divided into nine main sections. The first section discusses gender issues in the overall development process while the second is a general review of poverty and natural resource degradation in Ghana. The third section focuses on the fuelwood energy situation in Ghana, household energy use and the role of women, especially with regards to meeting practical and strategic gender needs. The fourth section is a review of the importance of fuelwood as a source of livelihood while the fifth dwells on fuelwood and the environment and the importance of woodlots and community forestry in that regard. The sixth section looks at socio-economic factors influencing household demand for fuelwood. The seventh and eighth sections concentrate on the determinants of woodlot establishment while the last section of the chapter reviews pertinent literature with regards to data collection and analytical methods.

2.2 Gender Issues in the Development Process

Inequalities that exist between females and males and the subordination of women by men have been areas of critical research and debate for several decades and there is now considerable social awareness or consciousness of the realities and the implications for national development. It is argued that women's disadvantages stem from stereotyped customary expectations held by society and internalized by women, and promoted through various agencies of socialization (Connell, 1987).

In most developing countries, for example, there is a clear gender division between paid men's work and unpaid women's work at the community level and this division has been reinforced by the actions of governments, NGOs and international organizations. A way of eliminating or reducing the subordination, therefore, is by breaking down as many of the stereotypes as possible. According to Awumbilla (2004), gender disparities are prevalent in Ghana and continue to limit women's capabilities and constrain their ability to participate fully in, and contribute to the economy.

Women's subordination may be looked at from two levels, the practical and the strategic and they result in what are termed the practical and strategic gender needs of women. The strategic gender needs are meant to overcome women's subordination and could vary depending on the particular cultural and socio-political context within which they are formulated. According to Molyneux (1985), strategic needs of women may include some or all of the following:

- the abolition of the sexual division of labour;
- the alleviation of the burden of domestic labour and childcare;
- the removal of institutionalized forms of discrimination such as rights to own land or property or access to credit;
- the establishment of political equality;
- freedom of choice over childbearing; and
- the adoption of adequate measures against male violence and control over women.

Many interventions for women by governments and development agencies have usually aimed at meeting the practical needs, that is, "the needs women identify in their socially

accepted roles in society" (Molyneux, 1985 p.233). The real goal of women is or should, however, be for their strategic needs to be met. It will be more useful if interventions can be transformed to meet the strategic gender needs of women.

In Ghana, as in other countries, governmental and other agencies provide women with skills to enhance their productive and reproductive roles. Many women acquire employable skills and are assisted to get employment or be self-employed. The basic goal is to provide livelihood avenues in the areas that are regarded as traditional to women such as dressmaking, shea butter processing, and gari processing. These meet practical gender needs but they hardly address the strategic gender needs. It is, however, possible for on-the-job skills training to be an entry point for meeting the strategic gender needs of women.

The important role played by women in agricultural production, processing and marketing is well known. In all parts of Ghana, women are virtually the agricultural labour force. Andah (1978 p.35) indicated that "female family members are merely units of unpaid labour"; and Elson (1991) has argued that the omission of women's unpaid labour from national accounts is based on very wrong assumptions about important determinants of the level of activity in an economy. According to Elson (1991), the foundation of economic activity is the reproduction and daily maintenance of human resources which is done almost wholly by unpaid women labour but this is hardly recognized by prevailing economic theory.

Apusigah (2004) has also pointed out that though women's empowerment initiatives in Ghana have resulted in marked improvement in the conditions of women in line with practical needs programmes, they have failed to change the status of women in Ghanaian society in any

significant way. Apusigah (2004) maintains that, "Ghanaian women remain subjugated in the socio-economic system and still occupy the lower echelons in social relations and interactions". Thus change in the practical needs of women only results in improving the conditions of women and not necessarily their status. Awumbilla (2004) also stated that closing the gender gap and enhancing women's participation in development is essential in order to build a just society and to achieve political, social, economic, cultural and environmental security among people on a sustainable basis. That means interventions should not aim only at meeting the practical needs of women but they should also pursue the strategic needs of women to ensure that all the types of security needed in society are available.

There are strong links between fuelwood production and use and women's roles in communities. In northern Ghanaian communities, women are literally "home owners" even though they traditionally do not "own" the natural resources. That is why there is a need to study the dynamics of women's empowerment through interventions very closely especially with regards to the practical and strategic gender needs of women.

Income generating activities by women in Ghana are usually undertaken with the basic aim of reducing poverty and empowering them economically. It seems, however, that the strategic needs cannot be addressed especially with regards to investments in land related enterprises if certain basic socio-cultural factors are not critically examined. For example, Amanor (1993) found that there is little enthusiasm among farmers for planting trees for fuelwood purposes in the Wenchi District of the Brong-Ahafo Region of Ghana. Norton (1988) also points out that, women in the Northern Region of Ghana are simply not used to the idea of planting trees. When that is combined with the land tenure constraints with regards to women as stated in

Dittoh (2000), the situation becomes very complex and seemingly intractable. It however needs well-informed research to address this. Also, as stated by Apusigah (2004), fulfillment of the strategic needs of women will bring benefit not only to women but also to their families and communities.

There are a number of examples of interventions that can address practical and strategic gender needs in the area of agriculture. As mentioned earlier, women form a substantial part of the agricultural labour force in Ghana and elsewhere and their roles in agricultural production, processing and marketing are well known. Despite that, most improved agricultural technologies do not consider the special requirements of women. The bullock plough is a very good case in point. The adoption of the bullock plough as the main technology for land preparation in the very thin soils of northern Ghana has not been that massive mainly because of its inappropriateness for women. It has been found that donkeys are more acceptable to women (Apiiga, 2004) yet the Ministry of Food and Agriculture is not giving the deserved attention to the donkey plough technology. The donkey plough technology can easily become a good strategy for meeting practical gender needs of women in rural northern Ghana by reducing the drudgery of labour and allowing better use of women's time. It could also be a good entry point to achieving the strategic gender needs of division of labour.

Another example that addresses practical and strategic gender needs of women is the provision of market stalls. Addison (1980) showed that "women of the Kaneshie market (in Accra) apart from their traditional roles as wives, housekeepers and bearers of children play remarkable roles as traders, farmers and entrepreneurs. They give loans and credit to farmers

in the villages to increase production". The activities of the women are fully market oriented and the women have shown high entrepreneurial ability and that surely improves their status as women vis-à-vis men.

2.3 Poverty and Natural Resources Degradation in Ghana

According to several studies, including Ewusi (1978), Songsore and Denkabe (1991), Norton and Bortei-Doku (1993), the Ghana Statistical Service (GSS, 1995), WFP (2003, 2004) and various Demographic and Health Surveys (GSS,1994, 1999, 2004), the three northern regions of Ghana are by far the poorest and the most vulnerable in the country. Some of these studies and several others have also identified food crop farmers and rural women as the poorest of the poor (ISSER, 2004 and Whitehead, 1999).

It is also generally held that there has been significant degradation of natural resources in West Africa due to poverty, population pressure and other factors (Ramaswamy and Sanders, 1992; Bationo et al. 1998; Tufuor, 1994). An association has been shown between these factors and how crop yields are affected by degradation. Ouedraogo (2002 p.10) has also stated that, "as well as causing poor yields, the decline in soil fertility (due to natural resource degradation) results in land tenure conflicts". FAO (2000) reports that the annual rate of deforestation in Africa in the period 1990-1995, was 0.7% and that it is very high. It has also been stated that early attempts in the 1950s and 1960s to establish fuelwood plantations in the woodland reserves did not succeed mainly because of bushfires (Tufuor, 1994). Thus, there are several constraints to environmental conservation but Tufuor (1994) has also stated that "women's participation and building on indigenous knowledge will make a crucial difference for ecological regeneration".

In 2000, the annual production or yield of wood in Ghana was about 30 million tons, of which about 18 million tons was available and accessible for wood fuels (ibid). Since majority (about 80%) of households in Ghana depend on wood fuels for cooking and water heating, in addition to commercial, industrial and institutional use (ibid), the demand for wood fuel has for the past years been on the increase. Population increase coupled with increasing cost of petroleum gas and the recent electricity supply problems can only result in increasing demand for wood fuels. If this trend of consumption continues, Ghana is likely to use more than 25 million tons of fuel wood by the year 2020 (ibid).

2.5 Fuelwood and Livelihoods

Fuelwood is very important in both rural and urban areas of developing countries as a source of livelihood. Energy for cooking food and undertaking food processing activities is basically obtained from wood and crop stalks in most parts of Africa (Duhamel, 1987).

Fuelwood is also a major income source for the poor, particularly rural women, in Africa. Ardayfio-Schandorf (1993) has pointed out that fuelwood is extremely important to those women involved in income-generating activities such as the brewing of "pito" and the processing of sheanut, both of which are highly energy intensive. Duhamel (1987) also points out that fuelwood production has become a source of income for most farmers in the Sahel and that is partly responsible for green trees being cut down in wooded areas and aggravating Africa's deforestation and the scarcity of fuelwood. He, (Duhamel, 1987 p.50), however, believes "wood could remain a resource for solving the energy crisis in Africa if its exploitation is modernized in conjunction with the economic and industrial development of the continent". Killman and Walter (2001) have also noted that fuelwood shortages affect

food security very negatively in many ways including reducing the amount of food cooked, number of meals eaten per day, quality of cooking, food processing possibilities and time available for processing.

Time spent on fuelwood collection affects livelihoods negatively. If less time is spent in fuelwood collection, care of children and households in general can be done much better (improving nutrition security) and girl children will spend more time in school (Nishimizu, 2001). Other negative impacts of fuelwood collection from the bush by women and girl children include long-term physical damage from strenuous work without sufficient recuperation time, threats of assault, snake bites, among other hazards (Karlsson and McDade, 2001). This is clearly an important argument for the establishment of woodlots by women. Woodlots, apart from providing income, will reduce the time spent on fuelwood collection.

It has been pointed out that energy projects designed to address environmental protection and natural resource conservation goals must provide expanded economic opportunities and improved health and social conditions (Misana, 2001). It is, however, necessary to know that while there is a need to seek livelihoods from investments, it is equally important to remember that "poverty and resource abuse are caused by politics and actions that seek rapid returns from investments" (Goldsmith,1985 p.3). That is, interventions such as woodlots should aim at balancing income and environmental concerns as well as short-term and long-term benefits.

2.6 Fuelwood, the Environment and the Role of Woodlots and Community Forestry

There are growing concerns about fuelwood energy crisis and the effect of increasing demand for fuelwood on the environment. The importance of fuelwood and the likelihood of a fuelwood energy crisis led to the organization of a UN Conference on New and Renewable Sources of Energy in 1981. That conference endorsed a recommendation for a five-fold increase above existing levels of tree planting for fuelwood (Arnold et. al. 2003). Anderson and Fishwick (1984) also suggested that "the rate of tree planting in Africa would need to increase fifteen-fold to meet demands for fuelwood by the year 2000 and avoid the destruction of existing tree stocks". That increase has not taken place and that means the crisis is increasing.

Increasing fuelwood use by community members generally has negative impacts on the environment, more so because of what is commonly referred to as the tragedy of the commons. The tragedy of the commons refers to "a collective trap that occurs because the costs and benefits apparent to the individual are inconsistent with the costs and benefits of the collective society" (Arnold, 1998 p.6). Any additional individual that cuts one more tree for firewood sees himself not destroying the microclimate but making additional income for his livelihood. This situation led in part to the emphasis put on capacity building of community members in the management of common natural resources such as forests and the promotion of the establishment of woodlots.

Ghana is currently implementing a Community Based Natural Resource Management (CBNRM) programme. One can learn from countries such as Zimbabwe, Namibia and other countries that started CBNRM programmes much earlier. Jones (1999), for example, states

that in implementing CBNRM programmes, communities should be encouraged to be open and transparent about the distribution and use of income derived from the common resources. This indeed is very important in relation to community woodlots.

Interventions such as community forestry and woodlots recognize the importance of local populations in the effective management and sustainable use of their common resources. According to Horowitz (1990), there can be no solution to the environmental crises of the Third World if projects exclude local populations in their identification, design, implementation and evaluation. Thus an area worth examining in this study is how various women's woodlot projects were designed and implemented and the extent of participation of beneficiaries in the design stage.

Indeed, research has shown that there are traditional practices and customary rules which were used as instruments in conserving natural resources and it is possible to incorporate those in the new intervention initiatives if adequate detailed information is available on factors that influence the adoption behaviour of farmers regarding appropriate technologies for resource conservation (see for example Deme, 1998; Bonnet, 2000; Dittoh et. al., 2001; Quisumbing et. al. 2001; Hamilton and Dama, 2003; Bocoum et. al. 2003; Konate, 2003).

In her study of the perceptions of environmental degradation, access to fuelwood and other trees, and countermeasures for environmental degradation among 30 women in southern Ghana, Ardayfio-Schandorf (1997) reported that the women lamented the increasing fuelwood scarcity and the long distances they had to walk to obtain fuelwood. One of the recommendations by the women was the need for afforestation and reforestation. Among

other recommendations, Ardayfio-Schandorf (1997) believes more research into strategies for wood-fuel management to stem environmental degradation is needed. Woodlots and forest plantations are important, but as pointed out by Dewees (1989), the growing of trees involves costs in terms of land, labour and capital and only makes sense if outputs produced are of corresponding value to farm households especially as fuel wood is generally regarded as a low value commodity.

In relation to community forestry in the Kassena-Nankani District of the Upper East Region, Makain (2005) has observed that though the community forestry approach is being recognized, there is low collaboration and coordination in activities among institutions and organizations involved. Makain (2005) contends that this is mainly due to the ineffective application of the participatory approaches adopted at the planning and implementation stages. Duhamel (1987) also maintains that "the planting of trees serves the purpose of environmental recovery and energy replenishment, but if the planting and maintenance of trees are not socially supported any project will surely fail".

2.7 Socio-Economic Factors Influencing Household Demand for Fuelwood

There are several socio-economic factors that influence the demand for fuelwood by households. The most basic ones are income, price, distance from the forests, and access to other fuels. It has been hypothesized that fuelwood is an inferior good because as incomes increase, there is a progression to the use of modern fuels (Arnold et. al., 2003). According to Arnold et. al. (2003), there are a number of multivariate econometric analyses of household wood fuel demand that include income as an explanatory variable. Those analyses indicated that most of income elasticities are negative, confirming the "fuelwood is an inferior good"

hypothesis. However, relatively few of the observed income elasticities were significantly different from zero and those that were, ranged from -0.31 to 0.06. That is indication that the "fuelwood is an inferior good" hypothesis is quite shaky. Indeed other analyses have observed that fuelwood is a normal good for lower income households, and for charcoal the shift from normal to inferior good comes at a higher income level than for fuel wood (Arnold et. al. 2003). That means that, in this study, fuelwood may not exhibit the inferior good characteristics since the target group is low income earners in rural areas.

The other major factor influencing fuel wood demand is the price. Arnold et. al. (2003) have noted that in rural areas, the range of own price elasticity of demand is between -0.21 and -1.47 with only 2 out of 17 estimates being greater than 1 in absolute value. That indicates that fuelwood has few substitutes in most rural areas. According to them, results from Asian countries indicate that rural fuelwood demand is not very responsive to increased scarcity.

2.8 Factors Influencing Ability to Establish Woodlots

An important factor that has a bearing on the production of fuelwood through woodlots (that is the establishment of woodlots) is available land. According to several writers and researchers, families, clans, sub-ethnic groups and chiefs own the lands of northern Ghana. Family heads, clan heads, *tindanama* (first settlers) and chiefs hold the land in trust for the people (Benneh, 1975; Kasanga and Kotey, 2001; Dittoh, 2004a). The different custodians of the lands play different roles in the allocation of land for use and their roles differ depending on the locality.

Different localities have devised different rules in accordance with prevailing conditions. In densely populated areas such as the Upper East and parts of the Upper West Regions, the scarcity of land dictates to a large degree the extent to which land can be given out for use by non-members of the family or clan. In areas where land is more abundant, the rules are more liberal. Generally, however, if a tenant is requesting for a relatively small piece of land, family and clan heads could afford to give out some of their land. If, however, large tracts of land are required, the chief or *tindaana* with jurisdiction over that entire land area will give the right of use. Customarily, land for farming purposes, is not to be sold out for any form of payment. However gifts in any form are acceptable from tenants to land owners.

The customary laws, rules and practices regulating access to, use of, and rights in land are considerably different for women and men in all parts of Ghana. According to Kotey and Tsikata (1998), law, practices and attitudes tend to discriminate against women. In northern Ghana, it is generally accepted that women should receive land for farming from their husbands. Unmarried women, however, receive land from their fathers or families. Many writers on land in Ghana claim married women belong to their husband's family rather than their fathers' families for the purposes of access to and use of land. The position of women in respect of inheritance is also different. The customary laws of succession in the various societies in northern Ghana tend to discriminate against women. Almost everywhere, landed property is inherited by men, either the patrileneal junior brother or children. Generally, women inherit when a woman dies but the rules and practices relating to access to and use of land and other social and economic factors ensure that men have more property than women (Kotey and Tsikata, 1998).

The above customary practices in relation to access and use of land as well as inheritance have had very adverse effects on many women especially widows. That is why the Ghana government, in 1985, passed PNDC Law 111, the interstate succession law. The law aims at treating men and women equally with respect to inheritance. According to Kotey (ibid) the law has, however, not had much of an impact in the rural areas and inheritance to property has largely continued to be regulated by custom. Even where women gain access to land in their own families and clans, their rights tend to lapse once they marry and move away to join their husbands. Women only have use rights to land as wives. They do not have rights to permanently appropriate the land in spite of the law.

For the purposes of this study, the concept of tree tenure is also of some importance. However, tree tenure as distinct from land tenure, is fairly new in the literature. It is, however, important to recognize that, in many areas in northern Ghana, trees are not necessarily part and parcel of the land on which they grow. The land on which trees grow and the trees could belong to two different people in some societies.

Tree tenure primarily refers to the relationship between people and trees and tree products and the rights and incidents which they generate and determine in given socio-economic and political contexts (Kotey, 1995). These rights may be seen as a bundle that can be broken up, re-divided, transferred and transmitted. They include the right to use, inherit, plant, dispose of and exclude trees. Some of these rights may be held by individuals, some by groups, and others by political authorities. As stated by Kotey (1995), the tree tenure regime can be very complicated drawing important distinctions on several bases. It may, for instance, distinguish between planted and wild trees, between various species of trees and between trees near to

human settlements and those further a field. Rights to use trees' products may also depend on the nature of the use, for instance, whether the produce is taken for commercial or personal use.

Kotey (Ibid) has also noted that, planted trees are owned by the planter. Such a person can sell, give away and use such trees. Such trees are inherited in the same way as land. Naturally growing trees in the bush are owned by chiefs, landowners, *tindanama* or families. Apart from dawadawa, which may be governed by different rules, trees are used and enjoyed by the land owning group. The Dawadawa tree (*Parkia biglobosa*) usually belongs to the chief or the *tindana*. Fruits from it are picked for the chief or *tindana*. Two-thirds of the fruits usually go to the *tindana* and a third goes to the owner of the land where the tree grows. Trees growing naturally on farms with the exception of dawadawa are in most instances owned by the farmer and he can use such trees as he wishes. It can be observed that in all this, women do not play any significant role except to benefit in the products of the trees that belong to their husbands.

Land and tree tenure with regards woodlots is yet to receive any attention in research probably because woodlot establishment technology is relatively new in Ghana, particularly northern Ghana. There is, however, no doubt that the establishment of woodlots by women will generally face problems given the above described land and tree tenure regimes.

2.9 Interventions to Promote the Establishment of Woodlots

Community forestry arises from the need for development workers in forestry to establish partnerships with local people and to respond to the subsistence needs of rural populations,

which are increasing at fast rates. New perspectives in community forestry have been largely influenced by the rural development strategy advocated by the 1979 Programme of Action of the World Conference on Agrarian Reform and Rural Development (FAO, 1979). It was realized through this initiative that the involvement of rural communities in forestry required a new understanding of the many important links between trees and people. There are, for example, important links between forestry and basic needs such as nutrition, food security, off-farm employment and energy. That means livelihood considerations are very crucial in community forestry development. Forestry must contribute to solving the problems of environmental degradation and rural poverty. Thus people must be full agents and beneficiaries of forestry activities.

Community forestry is any situation which intimately involves local people in a forestry activity. It embraces a spectrum of situations ranging from woodlots in areas which are short of wood and other forest products for local needs, through the growing of trees at the farm level to provide cash crops and the processing of forest products at the household, artisan or small industry level to generate income, to the activities of forest dwelling communities (FAO, 1979). Indeed community forestry began to also emphasize the complementary role of agriculture in the early 1990s. It was quite evident that rural people depended on forests and trees as sources of livelihood.

The 1973 jump in fossil energy prices, drew attention to the extent to which people in the developing world depend on wood as their main fuel for cooking and other household needs. Eckholm (1975) pointed out that "for more than a third of the world's people, the real energy crisis is a daily scramble to cook dinner".

Over time, there has been a shift of emphasis from forestry to agroforestry mainly because of the need to simultaneously satisfy environmental protection and meet the local needs of the people. This shift was to reflect the reality that the major contribution of forestry to development will come from its impact on indigenous people in developing countries.

FAO (1979) reports that community forestry was seen to comprise of three main elements:

- the provision of fuel and other goods essential to meet basic needs at the rural household and community level;
- the provision of food and the environmental stability necessary for continued food production, and
- the generation of income and employment in the rural community.

This definition clearly indicates the links between people and trees and the outputs of trees. The FAO document stressed the importance of regarding community forestry as an integral part of rural development and the basic precept that the central purpose of rural development is to help the poor, both men and women, become self-reliant. Thus forestry for community development must be forestry for the people and involving the people. It must be forestry which starts at the 'grass roots' and is therefore necessarily participatory (FAO, 1979).

From the above discussion, it is clear that there is need for tree planting to meet the increasing fuel wood demand. A major World Bank study for sub-Saharan Africa estimated that tree planting would have to increase fifteen-fold in order to close the projected fuel wood gap in the year 2000 (Anderson and Fishwick, 1984). That is why a very large part of the initial investment in community forestry was in the form of afforestation projects to increase fuel wood supplies. Many early community forestry projects therefore took shape more as a

response to an energy supply/demand problem, rather than to the problem of meeting local needs for trees and tree products (Leach and Mearns, 1988).

There are several successful interventions with regards community forestry in several countries in and outside Africa.

2.10 Review of Analytical Methods

Several analytical methods could be combined to investigate the issues at stake in this study but the main ones are the discounted cash flow analysis and logit analysis. Thus this review will concentrate on these two analytical methods.

2.10.1 Discounted cash flow methods

Several researchers have used discounted cash flow analysis to analyze various economic problems. Mahama (1999) and Osei (2004) used the method to work on short run production regimes, involving broilers, and grasscutters respectively. Our interest here is, however, in perennial crops. D'Haese et. al. (1999) did a financial analysis of mango production in the Venda Region of South Africa while Mensah (2001) worked on cocoa-agroforestry in Ghana. Dittoh and Adegeye (1987) have also used the method to estimate the profitability of coffee production in Nigeria.

In another study on cocoa, Dittoh and Adegeye, (1994) argued that for perennial crops, it is the expected costs and returns (over the life time of the crop) that must be used to determine profitability. This is because "a farmer's decision to establish a new cocoa farm or replant an old one or to do neither will depend on the expected net present value of the farm to be

established" (Dittoh and Adegeye, 1994 p.372). The formula for such a net present value was given by the following;

$$ENPV = \sum P_t Q_t/(1+i)^t - \sum \sum R_{tj} X_{tj}/(1+i)^t$$

where,

ENPV = Expected net present value

P_t = Expected output price in year t

Q_t = Expected output in year t

R_{tj} = Expected price of the jth input in year t

X_{tj} = Expected quantity of the jth input in year t

i = the discount rate

The equation implies that the expected net present value (ENPV) is the discounted expected benefits over the life of cocoa trees less the discounted expected costs of establishment and maintenance over the same period.

In their earlier work on coffee (Dittoh and Adegeye, 1987), they argued that the best way to estimate the expectations is to divide the life of the coffee crop into four phases and collect cross sectional data for the four phases. They did that and estimated the expected costs and returns for the whole life span of a hectare of coffee in Kwara State of Nigeria. This method of collecting cross sectional data for analysis is applicable to any perennial crop including woodlots.

2.10.2 Logit analysis of factors of adoption

There have been extensive studies on adoption of innovations, especially in agriculture in many parts of the world. In most of the studies it has been shown that adoption follows a logistic curve and that a logit model can be used to estimate factors that influence the adoption process. The use of a logit model is appropriate because of binary choice in relation to the dependent variable.

Adesina and Zinnah (1993) and Adesina and Baidu-Forson (1995) used variations of the logit model to study farmers' perceptions and adoption decisions in Burkina Faso, Guinea and Sierra Leone. There have been similar studies in other West African countries.

According to many of the studies, most technologies, especially agricultural and rural technologies, tend to be gender inconsiderate and thus their adoption by women can be problematic. In a study of ways of improving agricultural extension services in Zambia, a number of logit models were specified and one of them indicated that females tended to have a lower probability of receiving extension services than males and also more educated farmers tended to have a higher probability of receiving extension information than their less educated colleagues (Bliven, 1991). Mensah-Bonsu (2003) also used a nested logit model to estimate migration decisions in northeastern Ghana. Of importance to this study is the finding that improvement in the soil fertility index significantly reduces the probability of a person migrating from the Bawku-Garu area of the northeastern Ghana. Reducing the tendency of women to migrate from the Upper West Region is important since the women may soon imitate their male counterparts by migrating to the south of the country in the face of limited

economic opportunities. If their practical gender needs are met there will be less eagerness to migrate out of the region.

2.11 Conclusions and Implications of Literature for the Present Study

The literature review clearly indicates that sustainable development has to be looked at holistically especially with regards to linkages that exist between gender, livelihoods, poverty, natural resource use and conservation, and community or group actions. The incorporation of gender analyses in research makes it possible to highlight the main differences in the roles of women and men in production and reproduction and helps in the design of appropriate interventions to improve productivity.

The implication is that gender analyses in woodlot establishment and maintenance is relevant and will produce information which will be useful in designing interventions to ensure sustainable production and use of fuelwood and improve natural resource conservation generally. The analyses can also help to determine how to make interventions that concentrate on practical needs of women also address strategic needs of women.

The literature clearly indicates the importance of woodlots in the livelihood strategies of women, and the need to analyse woodlot interventions more closely to identify ways of improving their impact on the livelihoods of rural women in the study area. Also several socio-economic factors affect livelihood sources positively and negatively and many of these have been identified through the literature review and their relevance in the study area will be tested statistically.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter begins with a brief discussion of the conceptual framework, followed by the research hypotheses, the methods of data analysis and the methods of data collection. The data analysis section is divided into two: cash flow and econometric (logit) analyses.

3.2 Conceptual Framework

Women and men play different roles in society, with distinct levels of control over resources but they often have different needs. A prioritized concern of an individual is translated into a need (Molyneux, 1985). Development interventions help to meet various needs of both men and women but depending on how the interventions are designed, men and women may not benefit equally or proportionally.

The establishment of woodlots is a development intervention that can lessen the burdens on rural women as they carry out their reproductive roles because the woodlots reduce the time spent in search of fuelwood and also ensures the availability of it for domestic use. Woodlots also are sources of income to the women, and that meets both practical and strategic needs. In addition, the long term occupation of land by trees results in women having control and access over the land which solves a strategic need.

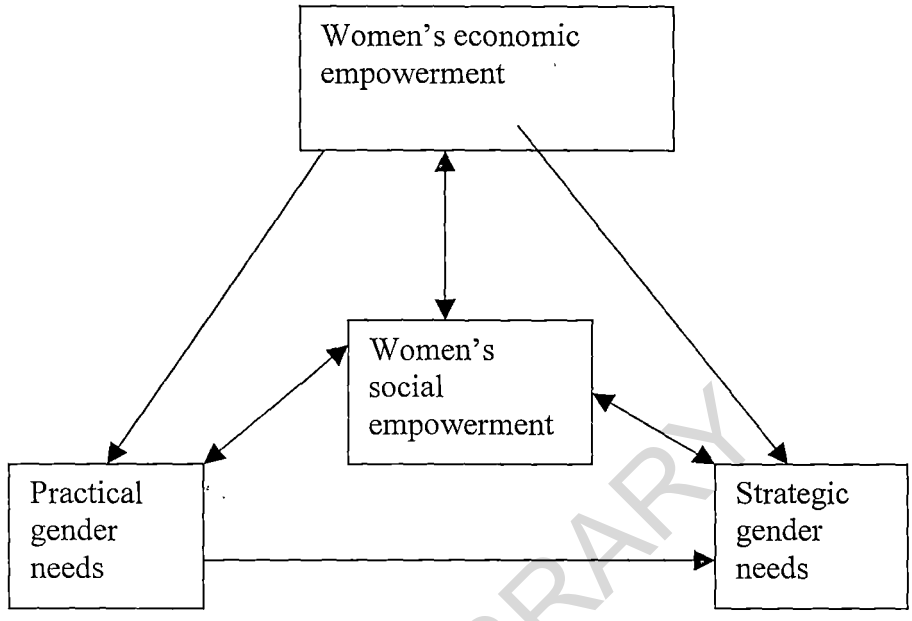
Both the practical and strategic needs are critically linked to the economic and social empowerment of women (see Figure 1). Women's levels of economic empowerment are best captured in quantitative profitability of investment terms while their social empowerment can

be captured in terms of the degree to which household decision processes have become more or less participatory or "democratic". Thus the analyses concentrate on trying to capture both of these. Practical gender needs are met if economic and social interventions or changes enable women to 'cope' with their socially accepted roles in the society. If they go further to ensure some economic and social equality with men then it means the strategic gender needs are being addressed.

When women are economically empowered they can fulfill their practical needs but the fulfillment of strategic needs depends on both economic and social empowerment. These concepts are illustrated in Figure 1, where the double arrows indicate the interdependence of processes. The diagram indicates that women's practical and strategic gender needs are critically dependent on interventions that ensure their economic empowerment. There are, however, interdependences between social empowerment and the practical and strategic needs. Also social empowerment which is usually initiated by economic empowerment can in turn enhance economic empowerment.

Most of the variables used in this study, to assess economic empowerment were quantitative in nature and were, thus, obtained through a semi-structured interview tool. Most of the social issues were, however, qualitative in nature and were, thus, obtained through the use of participatory rural appraisal (PRA) tools.

Figure 1: Conceptualization of Empowerments and Gender Needs



3.3 The Research Hypotheses

The following hypotheses were tested

1. Woodlot establishment and management enable adequate wood to be provided in a sustainable manner for household and commercial use thereby addressing the practical gender needs of women.

2. The establishment of woodlots empowers women economically and socially by giving them increased incomes and increased sense of belongingness and democratic governance.

3. Woodlots are perceived to be major contributors in measures to address sustainable environmental conservation[1].

3.4 Methods of Data Analysis

3.4.1 Identification of the contribution of woodlots to women's livelihoods

Contributions of woodlots to women's livelihoods were obtained by analysing social, financial, human, natural and human capital indicators of livelihood. The various indicators were obtained from the respondents using both quantitative and qualitative tools.

The various capital indicators may be grouped into the following categories:

1. Social capital indicators:

Social capital refers to the networks that develop among various persons and the degree to which bonds are established and the trustworthiness and reciprocity that arise from them. It is the stock of active connections among people: the trust, mutual understanding, and shared values and behaviors that bind the members of human networks and communities and make cooperative action possible.

[1]Environmental degradation/instability is a potential threat to the achievement of both the strategic or practical gender needs of women

2. Financial capital indicators:

Financial capital refers to the value of the woodlots, the savings made due to the woodlots and access to credit by members of the woodlot groups as a result of woodlot activities. These

financial capital indicators determine to a large degree the level of empowerment achieved as a result of the woodlots.

3. Natural capital indicators:

Natural capital refers to access to, and ownership of, land, trees and other natural resources. Women's access to, and ownership of land and natural resources are major problems in northern Ghana in particular as discussed in Chapter 2. How the women's groups acquired the land and the extent to which they can keep and use the land are the natural capital indicators.

4. Human capital indicators:

Human capital refers to the number and quality of the persons in the group. The quality is measured partly with respect to level of education. Human capital is a way of defining and categorizing peoples' skills and abilities. In this study, the human capital indicators are the number of women in the groups, their educational levels, their ages as well as skills acquired from their participation in woodlot establishment and management.

5. Physical capital indicators:

Physical capital refers to the value of the capital equipment and tools that are owned by the groups. Thus the equipment and tools owned and/or used in the woodlots are valued to give the physical capital.

Descriptive analyses such as percentages, charts and graphs are use to describe the distribution of the above indicators.

3.4.2 Determination of Financial and Economic Profitability of Selected Woodlot Investments by the Women's groups

To address specific objective 3, the management systems of each of the sampled woodlots was studied in detail. This involved study of the management structures, decision-making processes, management changes over the years, and opinions of the various groups as to best practices in woodlot establishment and management. The cost of establishing and maintaining the woodlots and the benefits accruing over time were also assessed.

Economic gains over time from investments that take time to mature are often captured using the method of discounted cash flow analysis. Quantitative information on the investments in woodlots and the benefits obtained and expected were used to determine profitability of the woodlot enterprises over time. The specific indicators estimated were the net present value (NPV), the benefit-cost ratio (BCR) and the internal rate of return (IRR).

Because the trees planted in the woodlots are perennial in nature, the collection of information to compute the various indices of profitability is quite complicated. Following Dittoh and Adegeye, (1994) the life span of the woodlot was divided into the following phases depending on the tree species.

Phase 1: The establishment of the woodlot in the first year.

Phase 2: The maintenance of the woodlot from year 2 until no weeding is necessary (approximately year 4 for many wood species). It is at the end of this phase that some "thinning out" and "pruning" begin.

Phase 3: The year of "thinning out" and "pruning" (usually year 5). It should be noted that the wood "thinned out" and "pruned" has value so it means some "harvesting" starts at this stage.

Phase 4: From end of phase 3 (usually year 5) till the major harvest of the trees (which normally occurs at the most economical age, usually about 8 years for most tree species).

For this study, detailed information was obtained from at least five woodlots per each of the four phases. When the costs and benefits are obtained by this method, enough information exists to undertake discounted cost benefit analysis over the entire life of the woodlots.

The NPV is computed by finding the differences between the present worth of the benefit streams and the present worth of the cost streams. This is usually interpreted as the present worth of the income stream generated by an investor.

$$NPV = \sum_{t=0}^{n} \frac{(B_t - C_t)}{(1+r)^t}$$

C_t = Cost at time *t*

B_t = Benefit (value of output) at time *t*

$(1+r)^t$ = Discount factor, where r is the discount rate

n = useful life of investment

Decision rule is that NPV > 0

Thus if the NPV of a "typical" woodlot is obtained to be positive, it means it is worth investing in it. Indeed the larger the value the better.

The BCR measures the worth of a project by discounting cost and benefit streams separately. The present worth of benefit stream divided by the present worth of cost stream gives the benefit/cost ratio.

$$BCR = \frac{\sum_{t=0}^{n} \frac{B_t}{(1+r)^t}}{\sum_{t=0}^{n} \frac{C_t}{(1+r)^t}}$$

B_t= Benefit at time *t*

C_t = Cost at time *t*

$(1+r)^t$ = Discount factor, where r is the discount rate

If investment in a woodlot results in a BCR greater than 1, we conclude that the investment is worthwhile. Again the greater it is the better the investment.

The financial internal rate of return (FIRR) is based on the incremental net cash flow. It takes into account the life span of the project or an investment and the rate of flow of cash to determine how quick it can recover the cost of an investment.

FIRR = L + (H-L) $NPV^+ / \sum|NPV^-|$

H = Higher discount rate

L = Lower discount rate

NPV^+ = Positive Net Present Value

/NPV^-/ = Absolute Value of the Negative Net Present Value

FIRR ≥ the prevailing market interest rate

Thus if the financial internal rate of return of a "typical" woodlot is far above the prevailing interest rate it means it is a very profitable enterprise.

3.4.3 Determination of social and economic factors that influence the participation of women in woodlot establishment and management

Objective 4 of the study is to examine the effects of socio-economic factors on the decisions of women to participate in woodlots. It is postulated that a number of socio-economic variables influence the decision of individual women to be part of a woodlot group or not. The variables include age, educational level, access to credit and distance of forest from the community.

Experience is a very important determinant in decision making and "age squared" is a reasonably good proxy for experience especially in the rural areas. It should have some effect on the decision to participate in woodlot establishment and maintenance. The educational level of the women is also postulated to be a determinant because more educated people tend to have greater access to information and thus will take decisions quite differently from people with less information concerning a particular issue. Woodlot establishment by NGOs started with the delivery of credit as a way of enticing women to form groups and to adopt the new technology. It should, therefore, have some influence on decision making by the women. It is also obvious that distance from the natural forest will influence the decision by women to participate in the establishment of woodlots.

The factors described above were examined using econometric methods. The dependent variable, that is, participant or non-participant, is binary. For that reason, the logit model of analyses was used. The general form of the model is given as:

$$\log\left[\frac{P_i}{1-P_i}\right] = \beta_0 + \beta_1 X + \mu$$

P_i is the probability that a woman will participate in woodlot establishment

β_0 is the constant term

β_1 is the vector of the unknown coefficients of the factors that influence participation in woodlot establishment

X is a vector of independent variables of the set of factors that influence participation in woodlot establishment.

μ is the error term.

The specific model for the study is as follows:

$$\log\left[\frac{P_i}{1-P_i}\right] = \beta_0 + \beta_1 AGE + \beta_2 AGE*AGE + \beta_3 CREDIT + \beta_4 DWA + \beta_5 NAN + \beta_6 PRIM\ \beta_7 SEC + \beta_8 NONE + \beta_9 DISTANC + e$$

Where;

P_i = 1 if a woman has been in a woodlot group in the past four years, 0 otherwise.

AGE = age of woman (in years)

AGE*AGE = measure of the experience of the woman

CREDIT = number of times woman obtained credit for woodlot establishment

DWA = Wa district dummy (1= Wa West District and 0 otherwise)

DNAN = Nadowli district dummy (1= Nadowli District and 0 otherwise)

DPRIM = Primary education dummy (1= Education up to primary level and 0 otherwise)

DSEC = Secondary education dummy (1= Education up to primary level and 0 otherwise)

DNONE = No formal education dummy (1= No formal education and 0 otherwise)

DISTANC = distance from forest where fuelwood is normally obtained (in kilometers)

$\beta_1, \ldots \beta_9$, are parameters to be estimated

$\beta_1>0, \beta_2<0, \beta_3>0, \beta_4<0, \beta_5>0, \beta_6>0, \beta_7>0, \beta_8<0, \beta_9>0$

It is expected that younger women will be more eager to participate in woodlots since the search for fuelwood is more of their responsibility than older women. It would, however, not be surprising if older women are eager to participate because they have experience of the difficulties of fuelwood and probably have more information with regards woodlots. Also those women who have benefited from loans for woodlots are likely to participate in the establishment and management of woodlots. It is reasonable to expect that educated people will be more inclined to participate in woodlots. It is also expected that the farther a woman lives from a forest, the more likely it is that she will be eager to participate in woodlots establishment. The district dummies have been added to distinguish between the districts and note how similar or different they are. The districts differ in population densities and thus the availability of fuel wood and that can have effect on the desire to establish woodlots.

The last two specific objectives, namely, aspects of woodlot establishment and management that can be used to pursue strategic gender needs and the roles woodlots play in addressing practical and strategic gender needs were addressed from the overall information of the study as well as experiences elsewhere which have been obtained through literature.

3.5 Sample Selection and Methods of Data Collection

There are a number of organizations (governmental and non-governmental) involved in the promotion of woodlots in the Upper West Region and they had good records of woodlots established in the region. A census of woodlots by women's groups in all the eight districts of

the Upper West Region was taken and a combination of purposive (snowball) and stratified random sampling techniques was used to select districts, communities and the individual women for interview. The districts were selected purposively. They are districts with concentration of woodlots. Agricultural zones within the selected districts formed the strata and the women groups within the strata were randomly selected. Some agriculture-related women's groups which do not have woodlots were also sampled from the chosen districts for comparison. Data were collected from 60 women involved in woodlot activities and from 29 women who are not involved in woodlot activities. These were also sampled randomly from within the groups.

Various participatory rural appraisal (PRA) tools, including use of key informants, focus group discussions, and participant observations, were used to obtain the required information. Focus group discussions were held with adults and youth separately. Semi-structured interviews were also used to collect necessary information from the sampled units. PRA methods are appropriate in capturing qualitative information. It was necessary to probe into why some things are done the way they are done. Usually the use of quantitative information collection tools such as questionnaires alone do not allow for appropriate probing to establish why particular actions and/or decisions are taken. Table 3.1 shows the data collection methods used and the types of data collected.

Table 3.1: Data Collection Methods and Types of Data Collected

Data collection method	Type of Data Collected
Secondary data from files of governmental and non-governmental organizations	Census of woodlots established in the past 10 years
Focus group discussions with adult women and girls (youth)	The history of woodlots in the Upper West Region, the importance and practices of women's groups, varied perceptions of the role of woodlots in addressing the needs of women and general information on successes and failures of woodlots.
Semi-structured questionnaire survey	Cost items and values in woodlot establishment and maintenance, socio-economic information on respondents and their activities.
Key informant interviews (Key informants included EPA, Forestry Department and Suntaa-Nuntaa staff as well as chiefs and other community leaders)	Crosschecks on information obtained from survey. Information on constraints and challenges.
Field observations	Crosschecks on information obtained.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

The results and discussion chapter contains the main results obtained from analyses of both qualitative and quantitative information obtained from the field survey. It is divided into five main sections: the census information, the benefits women derive from woodlots, results from the cash flow analysis, results of the logistic regression analysis and lastly a discussion of group formation and group dynamics.

4.2 Census of Woodlots in the Upper West Region

A complete census of woodlots in the Upper West Region was conducted to assess the spread of the environmental technology in the region. Table 4.1 gives the numbers of woodlots in the various districts as obtained from the Forestry Department and environmental non-governmental organizations (NGOs) in the region, including Suntaa-Nuntaa, Adventist Development and Relief Agency (ADRA), and Plan Ghana. The population of woodlots is therefore restricted to those established with the assistance of the Forestry Department or NGOs since others would have been missed by their lists.

By this census, there were 252 woodlots in the region as at January 2007. The spatial distribution (Table 4.1) shows that woodlots are found mostly in Nadowli, (16.7%), Lawra (16.7%), Sissala West (15.1%) and Wa West (13.9%) Districts. The research concentrated in Nadowli, Lawra and Wa West Districts. These have dense populations and thus less natural forests. The eastern part of Nadowli District is however sparsely populated. Most of the

woodlots in the districts are established by women's groups. Table 4.1 also shows the average area per woodlot in the three chosen districts. The overall average is 1.8 hectares.

Table 4.1 Numbers of Woodlots by Districts in the Upper West Region as obtained from the Forestry Department and Environmental NGOs

District	Capital	Number of woodlots	% of Total woodlots in region	Average number of women per woodlot	Average hectares per woodlot (for the selected districts only)
Wa East	Funsi	27	10.7	12	-
Wa Central	Wa	15	6.0	8	-
Wa West	Wecheau	35	13.9	14	2.2
Nadowli	Nadowli	42	16.7	15	1.8
Jirapa-Lambussie	Jirapa	28	11.1	10	-
Lawra	Lawra	42	16.7	10	1.5
Sissala West	Gwollu	38	15.1	8	-
Sissala East	Tumu	25	9.9	6	-
Upper West Region	252		100.0	10.4	1.8

Source: Field Survey, December 2006/January 2007

4.3 Benefits of Woodlots and Inhibiting Factors in Woodlot Establishment

4.3.1. Benefits derived from woodlots

All the women interviewed gave a number of benefits they derive from the establishment of the woodlots as indicated in Table 4.2 and Figure 2 below. The most important benefit is the use as fuelwood, despite the fact that the wood is obtained only after many years. Another major benefit is the income derived either from sale of wood or charcoal produced from the wood. That is particularly important in Nadowli District as indicated in the table.

The use as fuelwood addresses a major practical need of women. Women in the Upper West Region, as in many other parts of Ghana, are major home makers and care givers and a major role with regards those functions is food preparation for family members. The income derived also addresses both the practical and strategic needs of women. As Figure 1 indicates, economic empowerment can lead to social empowerment. The following of the benefits listed may be regarded as the strategic needs; access to credit, production of rafters for roofing and incentives from NGOs. These are not the usual activities of women. Sale of wood and charcoal, the feeding of animals and gathering of fuel wood for home use are the practical needs.

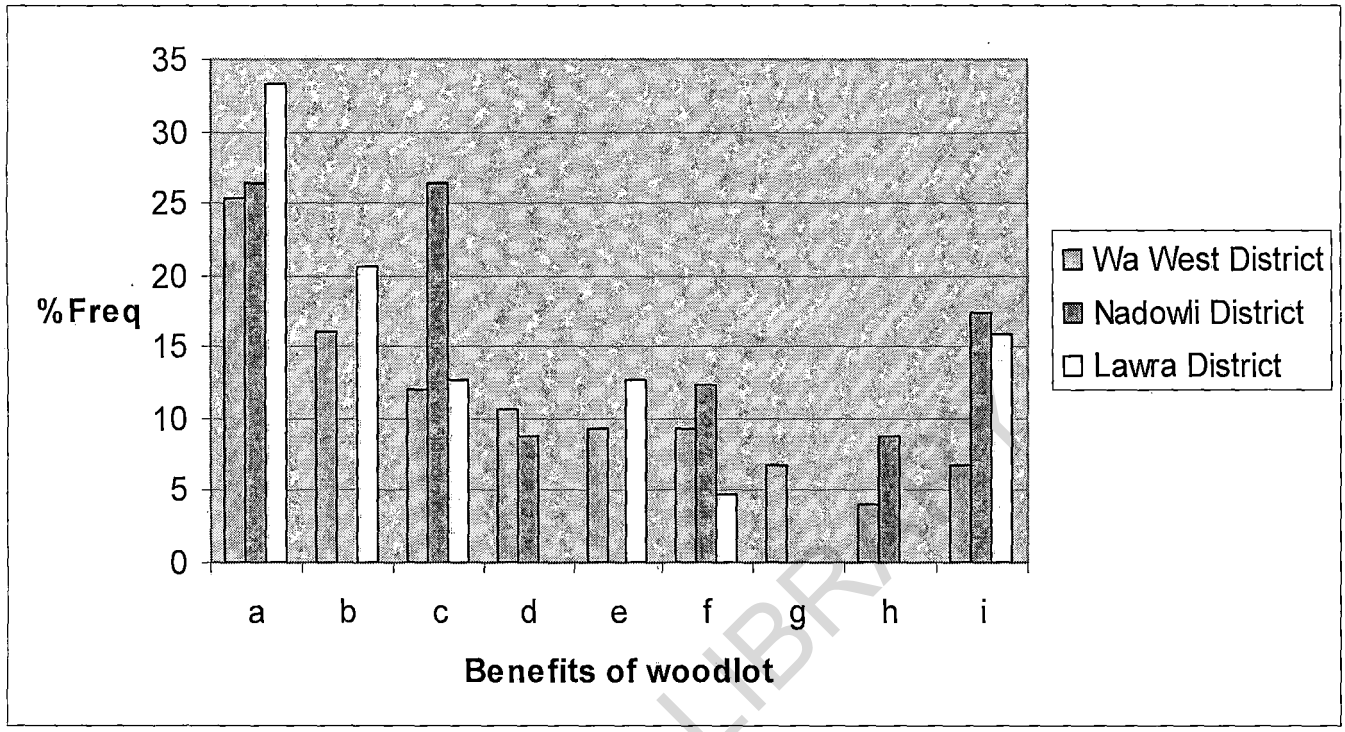
The use of woodlots as windbreaks was not mentioned in Nadowli District but it was considered important in the other two, particularly Lawra District, as shown in the table and figure. Upper West Region is generally prone to wind storms especially in the rainy season and Lawra District is the northernmost district and thus is probably the most affected by storms. Woodlots serve as protection against such hazards.

Table 4.2: Benefits Derived from Woodlots

Benefits derived	Wa West District		Nadowli District		Lawra District		Total	
	Freq.	% Freq.	Freq.	% Freq.	Freq.	% Freq.	Freq.	% Freq.
For fuelwood	19	25.3	15	26.3	21	33.3	55	26.1
Windbreaks/protection	12	16.0	-	-	13	20.6	41	19.4
Sale of wood/Charcoal	9	12.0	15	26.3	8	12.7	32	15.2
Feed for animals	7	9.3	7	12.3	3	4.8	17	8.1
Shade	7	9.3	-	-	8	12.7	15	7.1
Access to credit	8	10.7	5	8.8	-	-	13	6.2
Incentives from NGOs	3	4.0	5	8.8	-	-	8	3.8
Roofing (of houses)	5	6.7	-	-	-	-	5	2.4
Others	5	6.7	10	17.5	10	15.9	25	11.9
Total	75	100.0	57	100.0	63	100.0	211	100

Source: Field survey, December 2006/January 2007

Figure 2: Benefits derived from woodlots



Key
a) For fuel wood
b) Wind Breaks/Protection
c) Sale of wood/Charcoal
d) Access to credit
e) For Shade
f) Feed for animals
g) Used for roofing
h) Incentives from NGO
i) Others

4.3.2 Factors inhibiting woodlot establishment

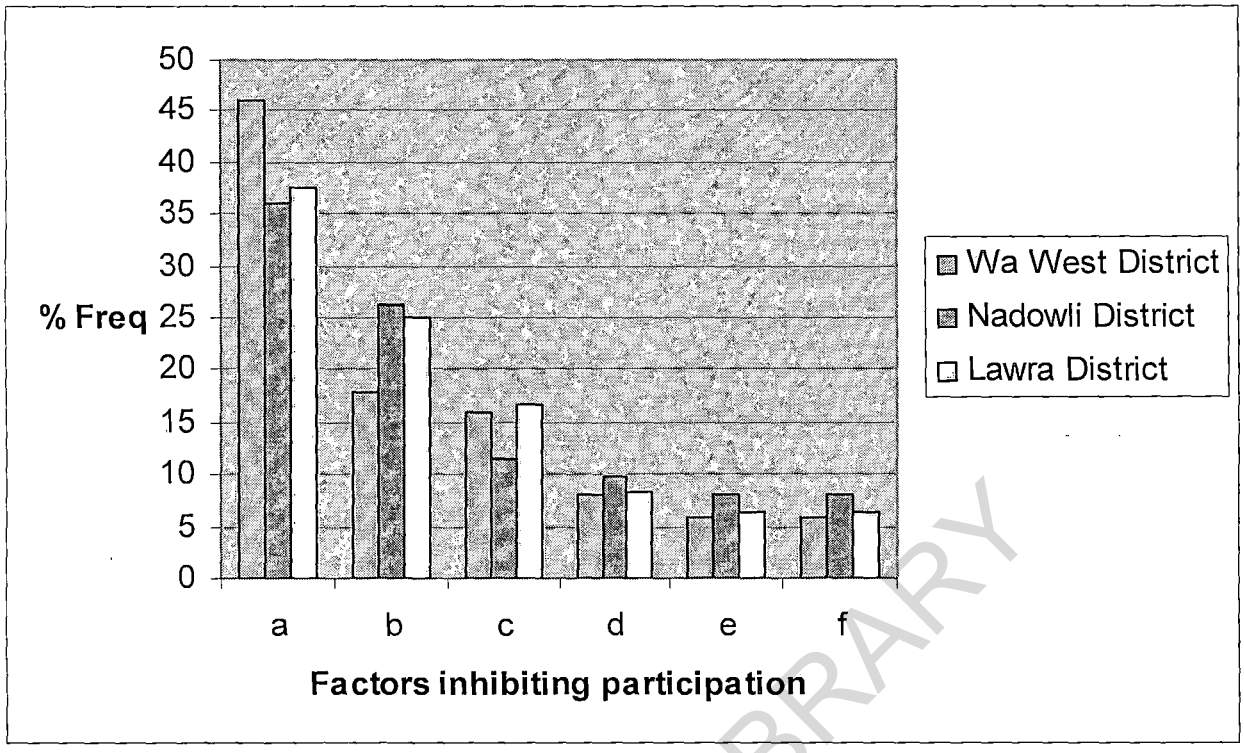
The women interviewed identified several factors inhibiting the establishment of woodlots (Table 4.3 and Figure 3). The most prominent inhibiting factor is competition from farm work in the rainy season. During times of high demand for labour on farms, the woodlots are often neglected. The second most important inhibiting factor in all the districts is the non-transparent way credit is given to the individual women. There seems to be a lack of trust among women, in the methods used by women leaders to allocate credit accessed from NGOs.

Table 4.3: Factors Inhibiting Participation in Woodlots

Inhibiting factors	Wa West District		Nadowli District		Lawra District		Total	
	Freq.	% Freq.	Freq.	% Freq.	Freq.	% Freq.	Freq.	% Freq.
Farm activities	23	46.0	22	36.1	18	37.5	63	39.6
Non-transparent credit disbursement	9	18.0	16	26.2	12	25.0	37	23.3
Water problem in dry season	8	16.0	7	11.4	8	16.6	23	14.5
Difficulties in making regular contributions	4	8.0	6	9.8	4	8.3	14	8.8
Poor communication	3	6.0	5	8.2	3	6.3	11	6.9
Others	3	6.0	5	8.2	3	6.3	11	6.9
Total	50	100.0	61	100.0	48	100.0	159	100

Source: Field survey, December 2006/January 2007

Figure 3: Factors inhibiting participation in the establishment of woodlot



Key
a) Farm Activities
b) The way credit is distributed
c) Water problems during the dry season
d) Difficulties in making regular contributions
e) Poor communication
f) Others

4.4 Cash Flow Analysis of Establishing Woodlots

4.4.1 Cost of establishing and maintaining a hectare of woodlot

Cash flows are presented according to the four phases of the life of woodlots as outlined in the methodology (subsection 3.4.2). Over the assumed eight-year life of woodlots, costs are incurred in all years but revenues are obtained mainly in years 7 and 8 when the wood is harvested. Values have been put on pruned leaves, since the leaves are fed to animals, but the amounts are relatively small as indicated in Table 4.6.

Cost items involved in the establishment of woodlots are as given in Table 4.4. Land is a very important factor in the establishment of woodlots. However, no where in the study was a charge for land encountered. The cost of seedlings constitutes over 80% of the total cost of establishing a hectare of woodlot in the first year. As a result, the women prefer to raise their own seedlings.

Table 4.4 : Cost of Establishing a hectare of woodlot

Cost Item	Quantity required per hectare	Cost per unit (in cedis)	Cost per hectare (in cedis)	Cost Share (%)
Land	-	-	-	-
Land clearing and stumping	4 labourdays	15,000	60,000	3.9
Seedlings (Cost of raising seedlings)	500	2,500	1,250,000	81.4
Transplanting	5 labourdays	15,000	75,000	4.9
Weeding (2X)	6 labourdays	15,000	90,000	5.9
Making of fire belt	2 labourdays	15,000	30,000	2.0
Watering (in dry season)	2 labourdays	15,000	30,000	2.0
Total			1,535,000	100.0

Source: Field survey, December 2006/January 2007.

Table 4.5 gives the components of costs incurred in the maintenance of woodlots from year 2 to year 8. As indicated the main cost items are weeding in years 2 and 3, maintenance of fire-belt, and pruning in all years. Harvesting of the wood takes place in years 7 and 8.

Table 4.5: Maintenance and Harvesting Costs (Cedis) (See Appendix 1 for information on cost items)

Cost Item	Cost of maintaining a hectare of woodlot (in cedis) – Years 2 to 8						
	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Weeding	102,000	57,000	-	-	50,000	54,000	-
Firebelt maintenance	34,000	38,000	42,000	46,000	50,000	54,000	58,000
Thinning	34,000	-	-	-	-	-	-
Pruning	34,000	38,000	42,000	69,000	75,000	81,000	87,000
Watering (dry season)	34,000	-	-	-	-	-	-
Harvesting (including transportation of wood)	-	-	-	-	-	135,000	290,000
Total	238,000	133,000	84,000	115,000	175,000	324,000	435,000

Source: Field survey, December 2006/January 2007.

As indicated earlier (Table 4.1), there are, on the average, about 10 women per woodlot and the average area per woodlot is about 2 hectares. That means on the average about 5 women share the costs and benefits of a hectare of woodlot. Contributions by women for the establishment and maintenance of woodlots are largely (about 70%) in kind. They however contribute cash to pay for weeding and fire belt maintenance which is usually carried out by

hired labour (men). The wage rate of 15,000 cedis includes food given to the workers. It is assumed, in the analysis that wage increases by 2,000 cedis every year.

4.4.2 Estimated revenue flows

Table 4.6 gives the estimated revenue from a hectare of woodlot over the eight year period. Leaves fed to animals from pruning have been valued. Pruning begins in year 2. Information as to what quantity of leaves was usually obtained and how much the quantity could be sold, at the time of the survey (January 2007), was collected from the women. It must be noted that the sale of pruned leaves from woodlots is not a common practice and pruned leaves is not a major source of feed for livestock. Thus the value is very low as indicated in the table.

A similar method was used to value the harvested wood. Most of the wood is used by the women but all the quantity that could be harvested was valued at the January 2007 market price. The price for a bundle of wood can vary widely since bargaining is permitted.

The total value of wood from a hectare in years 7 and 8 was estimated to be ¢24,000,000 (Table 4.6).

Table 4.6 : Estimated Revenue from a Hectare of Woodlot *(Leucenia)*

End of	Revenue items	Estimated income	Total yearly income
Year 1	-	-	-
Year 2	Animal feed	35,000	35,000
Year 3	Animal feed	70,000	70,000
Year 4	Animal feed	90,000	90,000
Year 5	Animal feed	120,000	120,000
Year 6	Animal feed	140,000	140,000
Year 7	Animal feed Fuelwood	160,000 6,000,000	6,160,000
Year 8	Animal feed Fuelwood	320,000 18,000,000	18,320,000

Source: Field survey, December 2006/January 2007.

4.4.3 Discounted cash flow analysis of a typical woodlot enterprise

Costs and revenues are spread over a number of years, thus there is need to determine the present cost and present revenue of the stream of costs and benefits in order to calculate the Net Present Value (NPV) and the Benefit-Cost Ratio (BCR). The discounted cash flow analysis is presented in Tables 4.7 and 4.8.

The NPV at 20% and 25% are ¢5,228,526 and ¢3,571,352 respectively. The discounted BCR at 20% and 25% are 3.4 and 2.7 respectively. The computed financial internal rate of return (FIRR) is 48.2%. All these values indicate that woodlot enterprises in the Upper West Region are profitable. The FIRR of 48.2% implies that even if bank interest rates are that high, a woodlot enterprise can break even.

The NPV of only about ¢5,228,526 and ¢3,571,352 at 20% and 25% discount rates are however very low. Since the average area of woodlots in the three districts is about 2 hectares and the average number of women per woodlot is about 10, it means about five women own a hectare of woodlot on the average. By this analysis each will be earning about ¢1,000,000 or less in eight years. This is definitely not a good economic incentive for the women to participate in woodlots. It does not also seem to be a good intervention source for meeting the practical and strategic needs of women. It must, however, be noted that in the absence of alternative sources of earning income, this may not be totally useless. The intervention can also be improved upon. The non monetary benefits must also not be underrated.

4.5 Logistic Regression Analysis of Determinants of Participation in Woodlots

Table 4.9 presents the logit regression result and Table 4.10 gives the marginal effects and elasticities of the independent variables. As indicated, the most important determinant of participation in woodlots, from establishment to harvesting, is access to credit. Credit has continued to feature in all the analyses indicating its strategic importance in determining women's participation in woodlots. The women use the credit mainly to purchase seedlings and for labour hire. It is also for consumption purposes especially in the lean season.

The age variable in the model was significant at 1% with a negative sign and, thus, not meeting the a priori expectation. Therefore all things being equal, if the age of the respondents increase by a unit, the log of the odds ratio in favour of participating fall by about 10% as indicated by the marginal effect. By this result it means that as women's age increases, they tend to have less probability of participating in the establishment and maintenance of woodlots. In other words, younger women are more likely to participate in woodlot projects than older women. This is probably the case because the younger women are those who do the household cooking and are those who go the long distances to get fuelwood.

Table 4.9: Logit Regression Results (probability that a woman in the Upper West Region will participate in woodlot establishment, i.e. from planting to harvesting)

Dependent Variable: Participation or non-participation

Method: ML - Binary Logit

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	**25.1758****	**9.572349**	**2.630051**	**0.0085**
AGE	**-1.157985****	**0.368011**	**-3.146604**	**0.0017**
AGE^2	**0.0098195****	**0.003664**	**2.680340**	**0.0074**
CREDIT	**3.773948*****	**0.792407**	**4.762638**	**0.0000**
DWA	-0.7719715	1.107112	-0.697284	0.4856
DNAN	2.167741	1.401326	1.546921	0.1219
DPRIM	-0.8045213	1.455925	-0.552584	0.5805
DSEC	**-3.18103***	**1.959884**	**-1.623071**	**0.1046**
DNONE	0.568994	1.457937	0.409414	0.6822
DISTANC	0.01553707	0.278480	0.557924	0.5769
LR statistic (9 df)		McFadden R-squared		0.718560
Probability(LR stat)				
		Total obs		89

*** Significant at 1 percent**significant at 5 percent * Significant at 10 percent

Table 4.10: Marginal effects and elasticities of independent variables of the logit equation (computed from Table 4.9)

Variable	Coefficients	Marginal Effects	Elasticities
AGE	**-1.1580***	**-0.1012**	**-4.5106**
AGE^2	**0.0098***	**0.0009**	**1.6288**
CREDIT	**3.7739****	**0.3297**	**0.6563**
DWA[a]	-0.7720	-0.0743	-0.0268
DNAN[a]	2.1677	0.1571	0.0707
DPRIM[a]	-0.8045	-0.0729	-0.0358
DSEC[a]	-3.1810	-0.5289	-0.0588
DNONE[a]	0.5968	0.0442	0.0084
DISTANC	0.1554	0.0136	0.0488
_CONS	25.1758	-	-
Predicted P(PART)	0.9032		
Log likelihood	-15.8102		
$\chi^2(10)$	80.7***		

(a) Marginal effects and Elasticities are for discrete change of dummy variable from 0 to 1.

*** Significant at 1 percent **significant at 5 percent * significant at 10 percent

Experience of women, as community members, as measured by age squared gave a positive sign and was significant at 1%. The implication is that as experience increases by a unit, the log odd of participation in woodlot establishment will increase by 0.09% as indicated by the marginal effect. Though the increase is very small it is statistically significant. That means that even though younger women are more likely to participate in woodlots, community

experience has a very positive influence on participation. The implication is that there is a specific age range within which the negative sign of the first variable, age, will be relevant.

The credit variable in the logit model was significant at the one percent level, with a positive sign. That meets the a priori expectation. It implies that, ceteris paribus, the log of the odds ratio in favour of participating in the woodlot establishment will increase by 32.77%. This means credit is a very significant determinant in women's participation in woodlot projects in the study area. It is important that credit is maintained as part of the package for participation. There is, however, need for a more democratic and transparent way of administering the credit. As indicated in sub-section 4.2.2, the non-transparent way credit is disbursed to the individual women cause a lot of dissatisfaction. That has the potential of not only stifling participation but it inhibits the drive towards achieving women's social empowerment and the strategic needs of women. Attainment of secondary education was found to be significant at the 10% level but is negative. That means that women who obtain secondary education tend not to participate in woodlot establishment. Indeed the log of the odds ratio will decrease by 52.89% with the attainment of secondary education.

All the other variables were not significant to any appreciable degree. The estimated equation, however, had an R^2 of 0.72 indicating that the independent variables explained the probability of participation in woodlots to a very large degree. The log odds is indicative of the probability of participation in woodlot establishment by the women. The marginal effects and the elasticity derived from the estimated equation rather describes by how much wood lot establishment responds to the women's socioeconomic and other variables. Table 4.10 summarizes the marginal and elasticity responses from the log odds coefficients.

4.6 Group Formation and Group Dynamics

4.6.1 Introduction

Social empowerment of women, which is critical to the achievement of their strategic needs, is obtained through formal and informal capacity building of the women. Women's groups offer good opportunities for building their capacities. They learn modern governance procedures through the way they organize their own groups. They also get training from various people from time to time and learn from one another.

4.6.2 Motivating factors for group formation

It has been established that there are benefits if people with the same interests and similar constraints work together in groups. However, it is important that groups operate under guidelines that ensure that goals are met and that actions lead to the development of the people and communities.

Table 4.11 and Figure 4 give the responses obtained from respondents as to the factors that motivate them to join groups. The responses of both woodlot and non-woodlot group members are presented. Most of the women identified the opportunity created to access credit as the most important motivating factor in joining a group. Credit to the women is very important for their ability to survive in the harsh environment they find themselves. Another major motivating factor is the creation of a sense of belonging. Most of them want to be seen to be part of the community and thus there is need to belong to a group where community issues can be discussed from time to time. The responses in all the districts are very similar. It is informative that in all the districts, the women put some premium on "belongingness". It

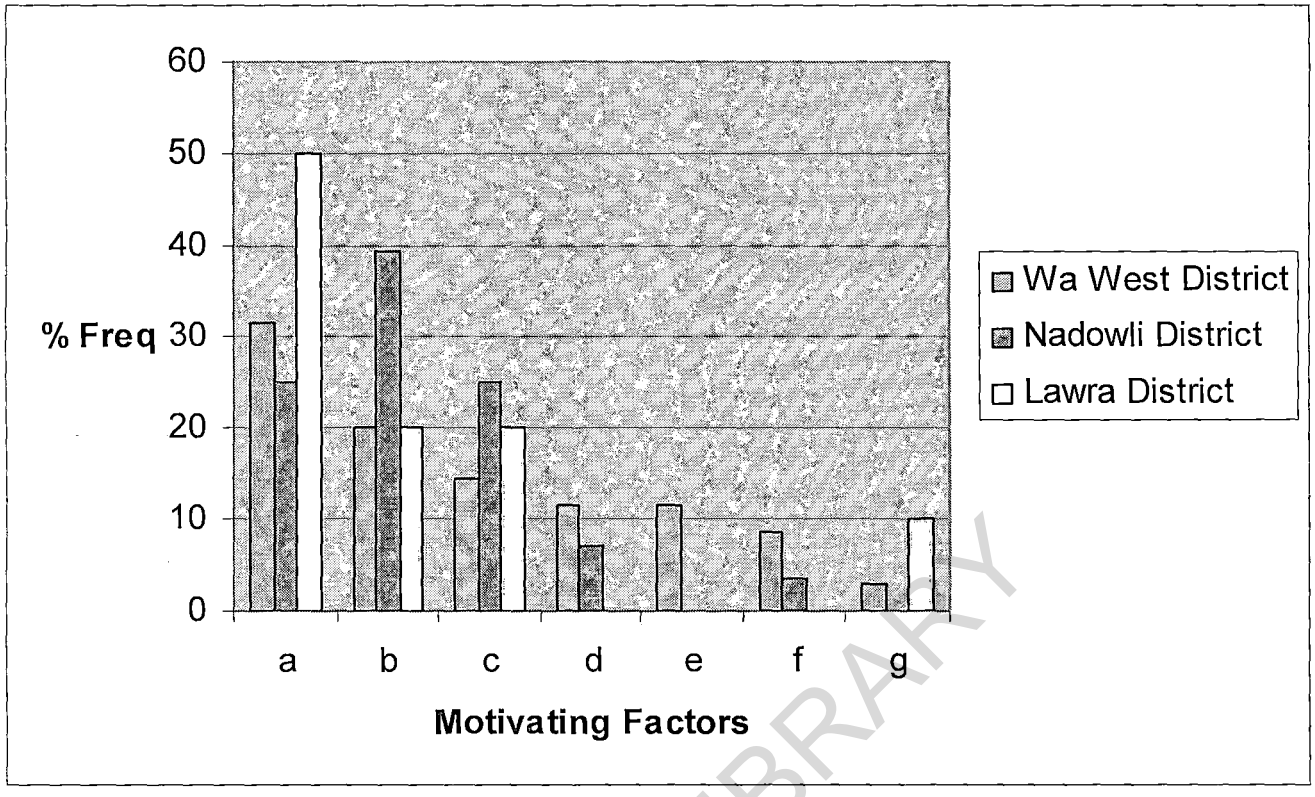
shows the degree to which the women, though mostly "illiterate" wish to address their strategic needs.

Table 4.11: Motivating Factors for Group Formation

Motivating Factors	Wa West District (n=35)	Nadowli District (n=28)	Lawra District (n=20)	Total (N=83)
	% of responses	% of responses	% of responses	% of responses
Access to credit	31.4	25.0	50.0	33.7
Belongingness	20.0	39.3	20.0	26.5
Success of other groups	14.3	25.0	20.0	19.3
Benefits from incentives	11.4	7.0	-	7.2
Income generation	11.4	-	-	4.8
Exposure (to outside world)	8.6	3.6	-	4.8
Poverty	2.9	-	10.0	3.6
Total	100.0	100.0	100.0	100

Source: Field survey, December 2006/January 2007

Figure 4: Factors that motivate women group formation



Key
a) Access to credit, b) Belongingness, c) Inspiration from the success of other groups
d) Income generation, e) Exposure, f) Poverty

4.6.3 Benefits Derived from Group membership

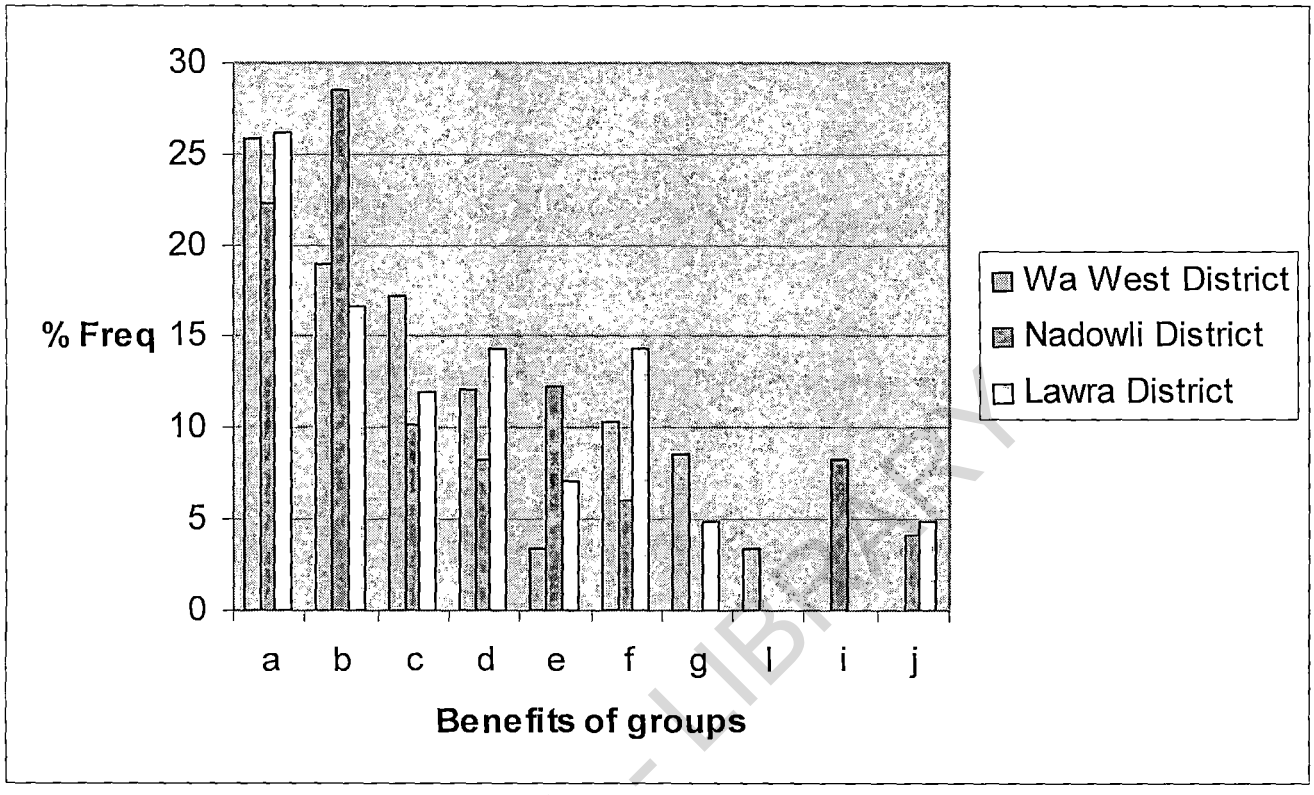
Table 4.12 and Figure 5 indicate responses with regards to the benefits women have derived from being in various women's groups in the communities. As indicated the overriding benefit mentioned in all the districts is their ability to access credit followed by the opportunity for self-help. It is quite clear from this result that most of the women in the Upper West Region value the social benefits very much and thus continue to be part of groups inspite of the relatively low returns indicated by the cash flow analysis. The woodlots give the women opportunity to achieve several non-cash benefits which are important for the achievement of strategic needs. The non-cash benefits build the human capacity of the women.

Table 4.12: Benefits Derived from being in Groups.

Benefits derived from being in groups	Wa West District (n=58)	Nadowli District (n=49)	Lawra District (n=42)	Total (n=145)
	% of responses	% of responses	% of responses.	% of responses
Access to credit	25.9	22.4	26.2	25.5
Contributions to help in times of need	18.9	28.5	16.6	21.4
Exchange labour	17.2	10.2	11.9	13.8
Assistance at funerals	12.1	8.2	14.3	11.2
Assistance in times of sickness	3.4	12.2	7.1	7.6
Training	10.3	6.1	14.3	8.3
Sharing of ideas at meetings	8.6	-	4.8	4.8
Embark on community projects	3.4	-	-	1.4
Getting incentives	-	8.2	-	2.8
Income generating activities (IGA)	-	4.1	4.8	2.8
Total	100.0	100.0	100.0	100

Source: Field survey, December 2006/January 2007

Figure 5: Benefits derived by being in a group



Key
a) Access to credit
b) Contributions to help in times of need
c) Exchange labour
d) Assistance during funerals
e) Assistance in times of sickness
f) Training
g) Sharing of ideas at meetings
h) Embark on community projects
i) Getting incentives
j) Generate I&A

4.6.4 Problems faced by Groups

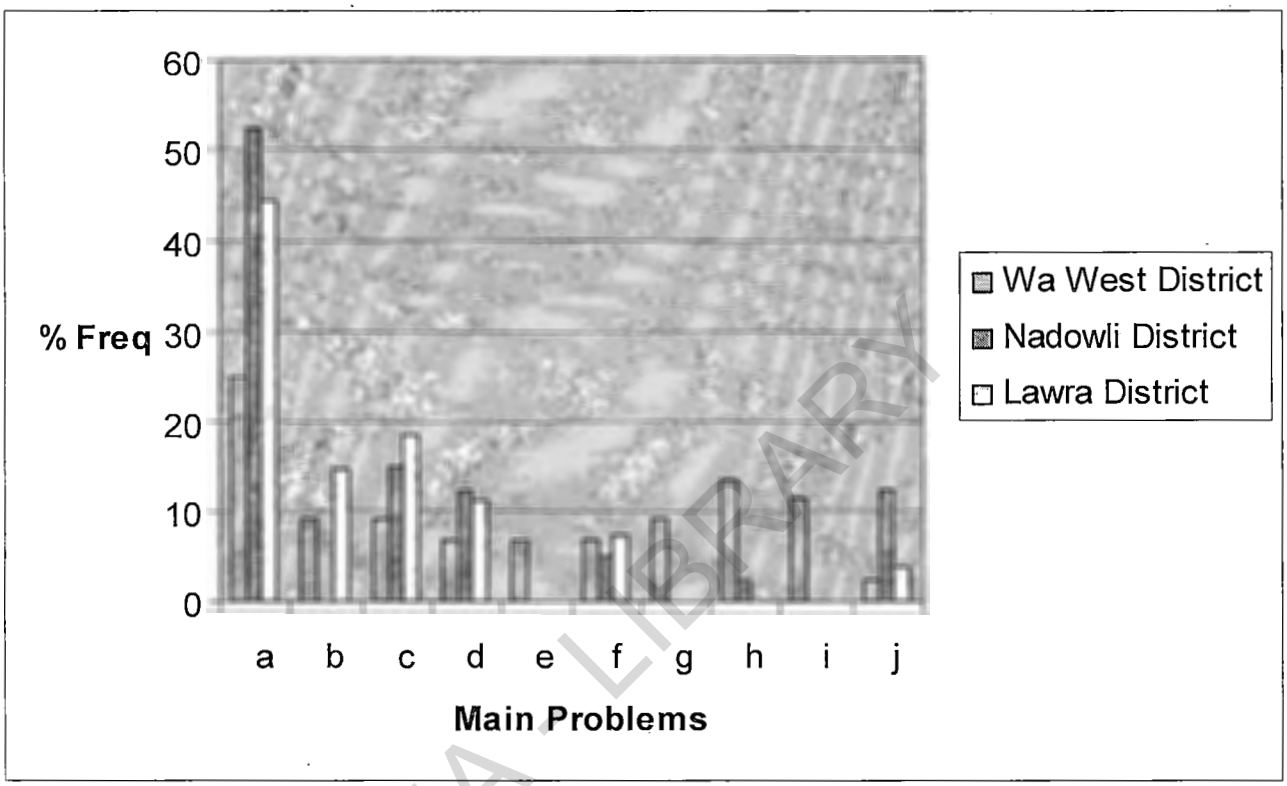
Table 4.13 and Figure 6 indicate responses with regards problems faced by the various groups. It is very instructive that the first three problems identified in all the districts relate to credit. It shows the very high role credit plays in the lives of women in the Upper West Region.

Table 4.13: Problems faced by Groups

Problems faced by groups	Wa West District(n=44)	Nadowli District(n=40)	Lawra District (n=27)	Total (N=111)
	% of responses	% of responses	% of responses	% of responses
Inadequate credit	25.0	52.5	44.4	38.4
Short repayment period	9.1	-	14.8	7.2
Mode of distributing loans	9.1	15.0	18.5	13.5
Lack of logistics (benches, meeting place etc.)	6.8	12.5	11.1	9.9
Inability to contribute regularly	6.8	-	-	2.7
Lack of water in dry season	6.8	5.0	7.4	6.3
Lack of feed for animals in dry season	9.1	-	-	3.6
Poor attendance at meetings	13.6	2.5	-	6.3
Theft of animals (due to poor housing)	11.4	-	-	4.5
Others	2.3	12.5	3.7	7.2
Total	100.0	100.0	100.0	100

Source: Field survey, December 2006/January 2007

Figure 6: Main problems faced by groups



Key

a) Inadequate credit
b) Time for repayment is short
c) Mode of distributing loan among others
d) Lack of logistics
e) Members' inability to contribute regularly
f) Lack of water in the dry season
g) Lack of feed fro animals in the dry season
h) Poor attendance to meetings, (i) theft of animals and (j) other

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

Fuelwood has been a major source of energy for domestic purposes in both developed and developing countries. However, wood fuel resources are depleting very fast as a result of unsustainable practices in the production, marketing and use of the products. The general objective of the study is to determine the potential of woodlot establishment and management in meeting the practical and strategic needs of women in the Upper West Region.

Analysis of information obtained showed that the initial capital requirement for woodlot establishment is quite high for the women. As such credit for woodlot establishment and maintenance is very necessary and critical. Indeed the most important factor influencing the women's decision to participate in woodlots is access to credit.

The analysis also indicates that the NPV at 20% and 25% are ¢5,228,526 and ¢3,571,352 respectively, the discounted BCR at 20% and 25% are 3.4 and 2.7 respectively and the computed financial internal rate of return (FIRR) is 48.2%. Though all these values indicate that woodlots are profitable ventures, the actual benefits in terms of value of produce that will go the individual women is too small and not encouraging enough. The woodlots cannot therefore adequately address the women's practical and strategic needs. They, however, do address the practical needs to some extent by providing fuel for domestic use and are, more importantly, good entry points for further interventions to address the practical and strategic needs of women.

5.3 Recommendations

1. Even though, the discounted cash flow analysis indicates that woodlots are profitable enterprises, it also indicates that the level of returns is low. There is, thus, need to make the enterprise more profitable. It is recommended that the inclusion of economic trees, such as teak, cashew and others, in the interventions should be intensified and areas under woodlots expanded to increase profitability.
2. Credit has been shown to be of very great importance in effecting change. It is recommended that District Assemblies, NGOs and micro-credit agencies should provide appropriate financial products, such as savings with credit, to assist women groups to expand and maintain their woodlots and other group productive activities.
3. Strategic gender needs of women can be met if women understand the importance of the roles they play in society and the need to improve their economic and social status. It is, therefore, recommended that intervention agents assist women groups to improve the dynamics of their group activities. The emphasis should be on both economic and social empowerment of the women.

5.4 Limitations and Suggestions for Future Research

1. This study was limited to only three out of the eight districts of the region due to several constraints. It was also very difficult to obtain from the women how much of their earnings from the sale of fuel wood and charcoal went into housekeeping and for other purposes. It is recommended that a more elaborate study should be carried out in the near future for a greater understanding of the issues tackled in this study.
2. More attention needs to be devoted to the production of fuel wood, since it will continue to be a major source of energy for domestic purposes especially in Africa.

3. Also, considering the rate at which the population is increasing and the dependency on natural resources, more studies needs to be done especially towards the development of alternative sources of energy for domestic purposes which are environmentally friendly and affordable.
4. Further studies should also be carried out on better ways through which women can play their traditional roles and yet help them achieve their strategic gender needs.

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APPENDIXES

Appendix 1

Cost of maintaining a hectare of woodlot and harvesting from year 2 to year 8*

Cost Item	Year 2		Year 3		Year 4		Year 5	
	Quantity required	Cost	Quantity required	Cost	Quantity required	Cost	Quantity required	Cost
Weeding	6	102,000	3	57,000	-	-	-	-
Firebelt maintenance	2	34,000	2	38,000	2	42,000	2	46,000
Thinning	2	34,000	-	-	-	-	-	-
Pruning**	2	34,000	2	38,000	2	42,000	3	69,000
Watering (dry season)	2	34,000	-	-	-	-	-	-
Harvesting (including transportation of wood)	-	-	-	-	-	-	-	-
Total		238,000		133,000		84,000		115,000

*Wage rate includes food given to labourers. It is assumed that wage increases by 2,000 cedis every year.

**Leaves on branches pruned are fed to animals so the quantity is estimated and valued (see next Table).

Appendix 1 (Continued): Cost of maintaining a hectare of woodlot and harvesting from year 2 to year 8*

Cost Item	Year 6		Year 7		Year 8	
	Quantity required	Cost	Quantity required	Cost	Quantity required	Cost
Weeding	2	50,000	2	54,000	-	-
Firebelt maintenance	2	50,000	2	54,000	2	58,000
Thinning	-	-	-	-	-	-
Pruning**	3	75,000	3	81,000	3	87,000
Watering (dry season)	-	-	-	-	-	-
Harvesting (including transportation of wood)	-	-	5	135,000	10	290,000
Total		175,000		324,000		435,000

Source of credit	Purpose of credit
(1) NGO (2) Credit Union (3)RuralBank (4) Commercial Banks (incl. ADB) (5) District Assemblies (6) Family member /friend (7) Money lender (8) Group saving and credit (susu) (9) Informal credit association (10) Other (Specify)	(1) Purchase of seedlings (2) Purchase of chemical inputs (3) Labour (4) Land (5) Others (Specify)

3.17 Have you ever received any formal training in woodlot establishment? Yes/No

3.18. If yes, from who? .....

3.19. Give 3 benefits of the training with respect to woodlot establishment?
1. .....
2. .....
3. .....

3.20. Give 3 major benefits you have derived from the woodlot:

1. .....
2. .....
3. .....

3.21 What is the distance of the woodlot to your home? .....

3.22. What is the distance of your home to the nearest natural forest or woodland where you can obtain fuelwood? .....

3.23 What three major factors affect your participation in the establishment of the woodlot?
1.....
2.....
3.....

4. Group Formation and Dynamics

4.1 What motivated you and the other women to form your group? .....
.....
.....
.....

4.2 Which organization(s) assisted you in the formation of the group? .....

.....
.....

4.3 Give 3 major benefits you have obtained by being in a group.

1. .....
2. .....
3. .....

4.4 List any three main problems faced by your group?

1. .....
2. .....
3. .....

4.5 How has your group been involved in the following?

Community activities	How involved
Decision making	
Initiation of community projects (Which projects?)	
Participation in community projects initiated by others (Which projects?)	
Awareness creation (what types?	
Other community activities	

5.0 Woodlots and Livelihood

Rank the following according to importance and give what proportions/percentages

5.1 Use of harvested wood from woodlot	5.2 Rank (1^{st}, 2^{nd} , 3^{rd} etc.)	5.3 Proportions of harvested wood used
1. Sale		
2. For pito brewing		
3. For shea butter processing		
4. For charcoal		
5. For domestic use (home cooking)		
6. Other uses (Specify)		

5.4 Give estimates in percentages of how much of your income generated from woodlot is spent on the following:

Item	Proportion/percentage
School fees	
Purchase of cloth	
Purchase of foodstuffs	
Health care	
Others (specify)	

5.5 In total or on the average what proportion do you think your woodlot contribute to the entire running of the household? .....

5.6 What is the distance of your woodlot from your home? .....

5.7 Before the establishment of the woodlot, what was your source of fuel wood?
(a) Market (b) bush (c) forest (c) others-specify.

5.8 What is the distance from this former source of fuelwood to your home? .....

5.9 Averagely before your woodlot was established how much time did you spend in fetching fuelwood? .....

5.10 How many times did you fetch fuelwood in a week then?
(a) Everyday (b) once a week (c) twice a week (d) other-specify.

5.11 What is your current other source of fuelwood (i.e. apart from the woodlot)?

5.12 What is the distance of that source to your home? .....

5.13 Averagely how much time do you spend in fetching fuelwood from this current source? .....

5.14 How many times do you fetch fuelwood in a week now (i.e. from current source)?
(a) Everyday (b) once a week (c) twice a week (d) other-specify.

5.15 What other activities do you carry out in a day? .....
.....

5.16 Please specify how much time is spent on each activity in a day?

Activity	Time spent
Fetching fuelwood	
Fetching water	
Going to the market	
Cooking	
Attending meetings/social activities	
Others-specify	

6.0 Cost incurred in woodlot establishment

6.1 What is the area of your woodlot? ..... (convert to hectares)

6.2 What species of trees are in your woodlot? .....
.....

6.3 What is/are your source(s) of seedlings? .....
.....

6.4 How much did you purchase the seedlings? .....

6.5 How many seedlings are required per hectare? .....

6.6 What was the market value of a seedling at the time of purchase? .....
.....

6.7 What is the market value now? .....

6.8 How much will you buy a seedling now from your source(s)? .....

6.9 Indicate the cost of the following in your first year of establishment and the equivalent now (please value own labor as well)

	Cost of land	Cost of Seedling	Land clearing and stumping		Transplanting		Fertilizer/cost application		Weeding (wet season)		Making of firebelt	
			Labor days	Cost	Labor days	Cost	Labor days	Cost	Labor days	Cost	Labor days	Cost
During yr est.												
Now												

6.10 What quantity of fertilizer was used in the woodlot in the first year?
.....

6.11 What was the cost of fertilizer used?.....

6.12 What was the following in the dry season of the first year?

	Weeding		Watering	
	Labor days	Labor days	Labor days	Cost
During yr established				
Now				

6.13 State any other costs not included in 6.9 and 6.12. .....
.....
.....

6.14 What was the labor wage rate at the time? .....

6.15 What is the current labor wage rate? .....

6.16 What are the yearly costs from year 2 to year 8? (Note: Activities in particular years may vary according to tree species)

	Weeding		Mulching		Watering		Making of firebelt		"Thinning" and "pruning"		
	Labor days	Cost	Labor days	Cost	Labor days	Cost	Labor days	Cost	Labor days	Cost	**Re-venue**
During yrs 2-4											
Cost now											
During year 5											
Cost now											
During yrs 6-8											
Cost now											

6.17 What was the following in the dry season of the year 2 to year 8?

	Weeding		Watering	
	Labor days	Labor days	Labor days	Cost
During yrs 2-4				
Cost now				
During year 5				
Cost now				
During yrs 6-8				
Cost now				

6.18 State any other costs not included in 6.16 and 6.17. .....
.....
.....

6.19 Costs and revenue at harvest (usually year 8)

	Cost of harvesting (including transportation)		Harvest	
	Labor days	cost	Quantity	Revenue
Year 8 (harvest year)				
Equivalent now				

6.20 State any other cost and revenue not included in 6.19?.....
.....