

**THE CONTRIBUTION OF FARMERS' KNOWLEDGE, ATTITUDES
AND INSTITUTIONAL SUPPORT TOWARDS SHEA
CONSERVATION MANAGEMENT IN THE UPPER EAST REGION**

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INTEGRI PROCEDAMUS

Declaration

I hereby declare that with the exception of identified quotations, this thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

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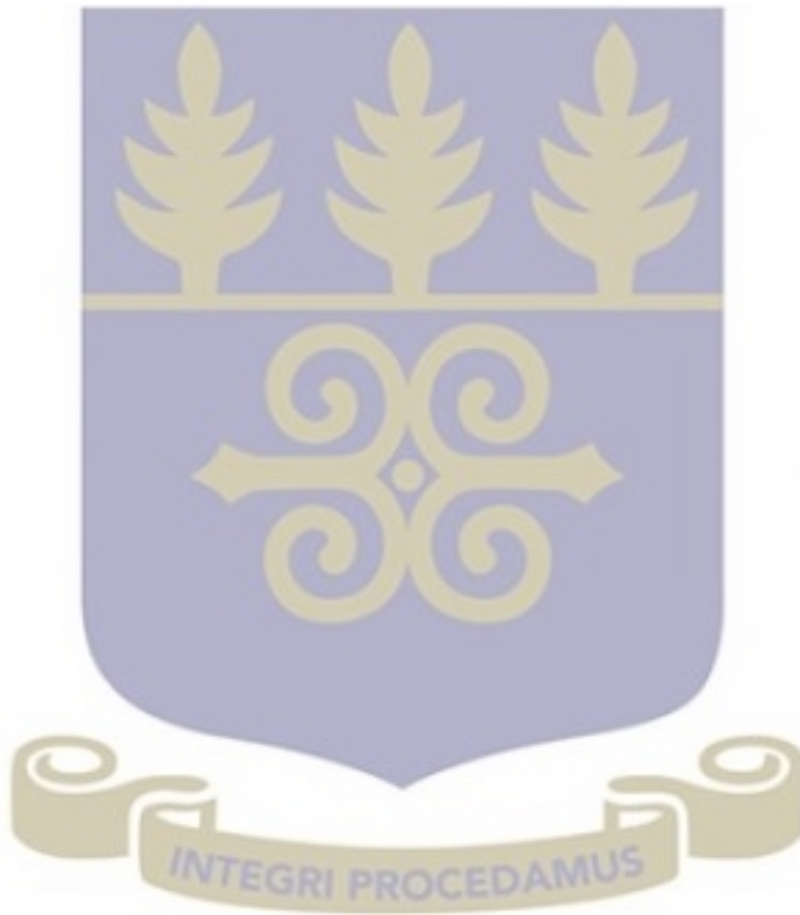
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DR. S.D. BOATENG



Dedication

Dedicated to my beloved mother Akudugu, my dear wife Janet, my children and the entire Aboyella's family.

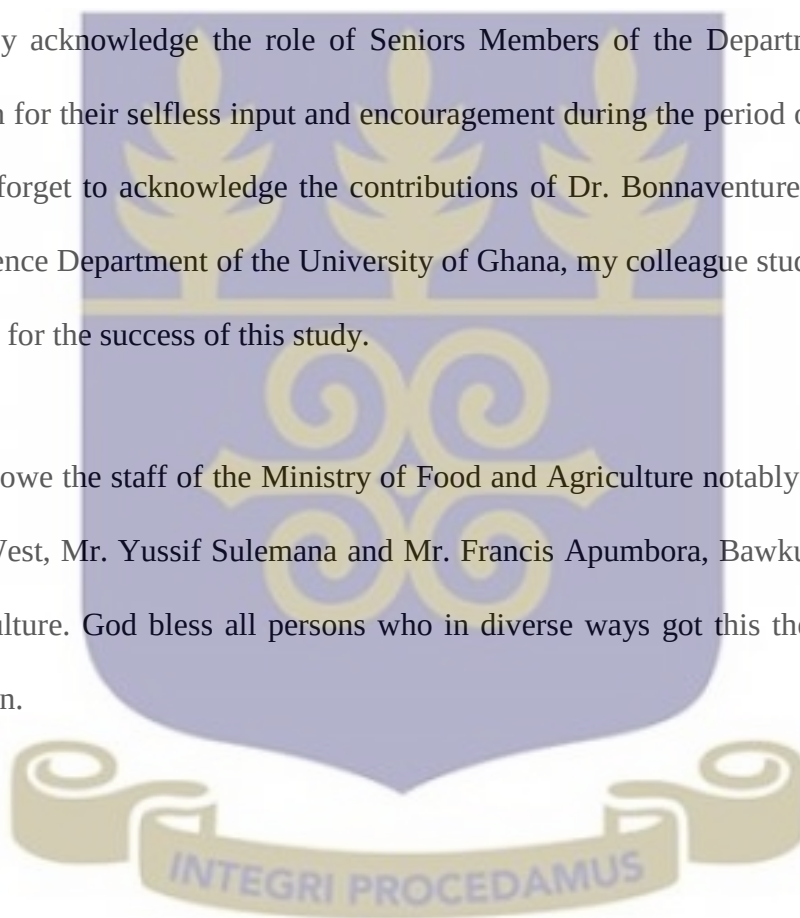


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Abstract

The continuous extraction of shea resources from the natural plantation over the years without any significant conservation management measures has compounded the deforestation of the natural shea vegetation, leading to the fast decline in shea tree population in the northern savannah grasslands. The decline in shea tree densities is quite alarming in the Upper East Region. The main objective of this study was to examine the contribution of farmers' knowledge, attitude, and institutional support towards shea conservation management practices in the Upper East Region of Ghana. The study used a mixed method approach. The qualitative method involved key informant interviews with institutions and organizations to collect qualitative data. The quantitative method involved administering a survey questionnaire to a randomly sampled size of 350 farmers. The qualitative data was content-analyzed for patterns of relationships, while Chi-square and Likert scale were run for quantitative data. The results indicate that there was no statistically significant difference $\chi^2 (1, N=350) = 0.206, p = 0.056$ between male (95%) and female (93%) farmers knowledge in shea protection. The findings further indicate there was statistically significant difference $\chi^2 (1, N=350) = 17.725, p = 0.049$ between male (90%) and female (71%) farmers' knowledge in the importance of weeding around shea trees, pests and disease control and pruning. Also, farmers generally showed a positive attitude towards shea conservation management practices. However, considering the rather low practice in shea tree conservation management by farmers, it is recommended for increased community awareness sensitization by state and private institutions.

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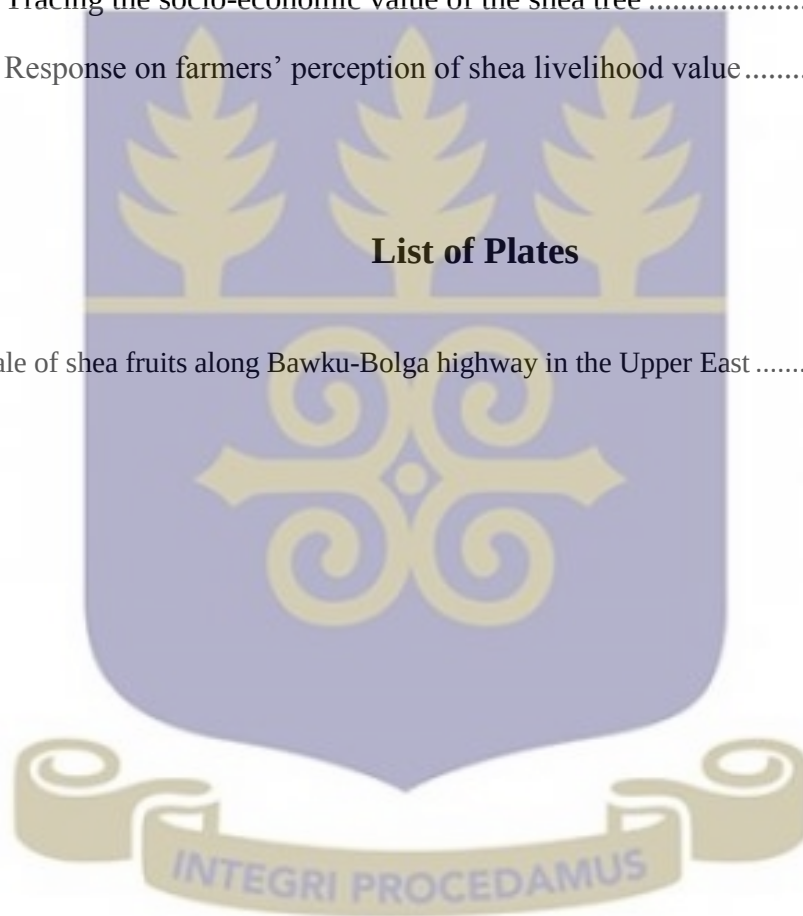


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List of Acronyms

ADRO	Anglican Development Relief Organization
AKIS	Agricultural Knowledge and Information Systems
BUCCOBANK	Builsa Community Rural Bank
CA	Conservation Agriculture
CBE	Cocoa Butter Equivalent
CBO	Community Based Organization
CMB	Cocoa Marketing Board
COVOL	Co-operative Office of Voluntary Organizations
CRS	Catholic Relief Services
CRIG	Cocoa Research Institute of Ghana
CPCRS	Community Participation Conservation Rating Scale
DACF:	District Assembly Common Fund
DFID	Development Fund for International Development
DFSC	Danida Forest Seed Centre
FAO	Food and Agriculture Organization
FSC	Forestry Service Commission
DNFS	Department of National Fire Service
GAPs	Good Agricultural Practices
GNFS	Ghana National Fire Service
ISODEC	Institute of Social Development Centre
ITFC	Integrated Tamale Fruit Company
MDGs	Millennium Development Goals (MDGs)

MMDA	Metropolitan Municipal District Assemblies
MoFA	Ministry of Food and Agriculture
NGOs	Non-Governmental Organizations
PAGEV	Project for Improving Water Governance in the Volta Basin
PAS	Presbyterian Agricultural Station
PBC	Produce Buying Company
SADA	Savannah Accelerated Development agency
SARI	Savannah Research Institute
SNV	Netherlands Development Organization
SPSS	Statistical Package for Social Sciences
TA	Traditional Authority
SRID	Statistics Research and Information Division
UER	Upper East Region
UNDP	United Nations Development Organization
UNIFEM	United Nations International Fund for Energy Management
UDS	University for Development Studies
USAID	United States of Agency for International Development
UV	Ultra Violet
WATH	West African Trade Hub
WB	World Bank
WFP	World Food Programme
ZOVFA	Zuuri Organic Vegetable Farmers Association

CHAPTER ONE

INTRODUCTION

1.0 Background

The shea plant (*Vitellaria paradoxa*) is an economic tree naturally found across the savannah regions of Sub-Saharan Africa, and occurs mostly within the woodlands of the Sudano-Sahelian grasslands. According to Elias, Bayala and Dianda (2006) shea trees are the most prevalent arboreal species and form the most predominant vegetal cover on West African parklands. The 'shea belt' stretches across most of the West African states extending up to Sudan in East Africa, and onto the foothills of the Ethiopian highlands covering a land area measured by 500 -750 km wide and 5,000 km long. It is estimated that over 500 million shea trees are naturally scattered in over 20 African countries along this belt, with densely populated trees occurring in Burkina Faso, Ghana, Nigeria, and Niger (Hall, Aebischer, Tomlinson, Osei-Amaning and Hindle 1996; Dogbevi, 2009).

The shea industry is of tremendous socio-economic value to countries along the shea-belt, providing food, income, employment and offering several domestic and ecological services. Shea butter, the oil extracted from shea nuts constitutes a major source of cooking oil for many households across Sub-Saharan Africa and in Ghana, particularly the northern part of the country (Yidana and Adomako, 2004; Lovett, 2013). The edible shea fruits are a strategic natural food security asset, and according to Hatskevich, Jenicek and Antwi (2011), the ripening of shea fruits usually coincide the period of food scarcity (April to August) in the savannah regions of Ghana, and many households often depend heavily on shea fruits and nuts for their food and income. The processing and marketing of shea products,

particularly the extraction of shea butter generates crucial economic activities along the shea 'value-chain, providing employment and income for many people especially rural women. It is estimated that over 900,000 women in Northern Ghana are engaged in various shea operations, and over two million people depend on the shea industry directly or indirectly for their livelihood outcomes (Asante, Banidiyia and Tom-Dery, 2012). According to Elias et al. (2006), advocates of gender equity, poverty reduction and sustainable development are pursuing increased global demand for shea butter to enhance the incomes of impoverished female producers.

The global popularity of the shea industry is associated with the export of shea commodities on the international market for use in the pharmaceutical and confectionery industries especially as a cocoa butter equivalent (CBE) in the manufacture of chocolate, margarine, biscuits, soap and other cosmetic products due to the presence of desirable properties such as stearin and the low melting temperatures of shea butter (Lovett, 2010). Ghana is among eight West African nations with significant export of shea products namely Benin, Burkina, Cote D'Ivoire, Ghana, Mali, Nigeria, Niger and Togo (Kelly, Olivier, Hardy and Bouvet, 2004; USAID, 2010). Ghana earns over 30 million dollars annually from shea exports, and this is projected to exceed 100 million US dollars if the industry is properly managed (Lovett, 2010).

It is estimated that at least 70 per cent of the World's very poor live in rural areas, with the highest incidence occurring in Sub-Saharan Africa. According to the IFAD poverty report of 2010, majority of the world's poor are women, and over half live in rural areas and depend heavily on natural resources for survival (IFAD, 2010). Resource degradation is an acute problem in rural areas, with some 60% of the world's poorest people living in ecologically

vulnerable areas, and therefore depend heavily on goods and services derived from natural resources (UNDP, 2006).

Poverty is widespread in the dry savannah regions of Northern Ghana, and whilst the overall poverty rates in the country are said to be on the decline, poverty rates tend to be 2-3 times the national average, and chronic food insecurity remains a critical challenge in the three regions of the country. A survey conducted by World Food Programme in the three savannah regions showed that the Upper East Region has the highest incidence of household food insecurity with 28%, while the Upper West and Northern regions recorded 16% and 10 % respectively (FAO, 2012).

The agricultural potential of the Sudan savannah is largely limited by insufficient moisture due to high rainfall variability, characterized by frequent droughts and floods, erosion and poor soil fertility, pests and disease outbreaks. The long dry season with severe weather conditions, complicated by poor technical, managerial and financial capabilities of farmers, and the general structural, economic and institutional weakness in Sub-Saharan Africa have been cited as factors responsible for the low agricultural production and scarcity of natural resources (Apusigah, 2009).

The potential of the shea plant to address food insecurity, rural poverty, women economic empowerment and to a large extent, the Millennium Development Goals (MDGs) in Northern Ghana has been elaborately corroborated by development crusaders (World Bank 2008; USAID, 2010). In spite of the huge economic potential, the contribution of the shea plant has been constrained by a nexus of challenges that hinder the rapid development of the sector to achieve the needed economic impact. For centuries, since the time of Mango Park in 1497, the shea industry has been a function of the natural wild plantation of shea trees,

with the gathering of sheanuts mainly by women from community parklands and the forests trees (Adomako, 1985; Elias et al., 2006). According to Yidana (2004), the collection of shea nuts from the wild has been limited by the hazards of the forests, notably the menace of wild animals, snakes and other reptiles. The long distance coupled with the lack of access to good roads and transportation to the forest areas also reduce the picking capacity of women, and a lot of shea nuts are usually wasted unpicked in the forest. The random uncontrolled harvesting of shea nuts from different species in the wild also imposes difficulties in sorting, grading and standardization of shea products, especially for the international market (Chalfin, 2004; Lovett, 2003).

Despite assumptions that shea nuts are in abundance supply in Northern Ghana, on account of the widespread occurrence of shea trees in the savannah woodlands; irregular supplies and shortage of shea nuts are often experienced and women have complained about the long distances they have to travel in search of shea nuts (Carrette, Malotaux, Van Leewen and Tolkamp, 2009). The long gestation period of shea trees, taking between 12 and 15 years to start fruiting, and reaching economic production between 40 and 45 years makes commercial cultivation unattractive to farmers and business investors (Abbiw, 1990). Research and extension efforts at shortening the gestation period of shea in order to promote commercial cultivation and plantation establishment towards livelihood outcomes and economic development has not achieved much, and several challenges and constraints associated with the industry remain drawbacks on the contribution of the sector towards livelihoods of millions of people in the savannah regions, especially rural women of Ghana (Yidana, 2004; Bawa, 2007).

According to Chambers and Conway (1991) livelihood constitute the capabilities, assets and activities required for a means of living and sustainable when it can cope with, and recover from stresses and shocks and maintain or enhance its capabilities, both now and in the future, while not undermining the natural resource base. In 1980, the World Conservation Strategy of the International Union, argued for conservation as a means to assist development and specifically for sustainable development and utilization of species, ecosystems and natural resources. Following the World Summit on sustainable development in Johannesburg in 2002, sustainable development as a concept, goal and movement has spread rapidly and is now central to the missions of countless international organizations, national institutions and corporate enterprises (Kassam et al., 2009).

Sustainability of agricultural production is largely dependent on the action of farmers and their decision making abilities, given the level of knowledge and information that is available to them. Many promising agriculture policies have failed because they were inappropriate to farmer's needs and perception. Negatu and Parikh (2003) observed that farmers' perception and knowledge is crucial for successful research and development strategies. The relevance of knowledge, attitude and practices in influencing decisions regarding the adoption of innovations has been clearly stated by many researchers. Dervin (2003), postulated that unless there is information from external sources, little change can be expected in farmers' attitudes and behavior. Amezah and Hesse (2002) and Rahman (2003), underscored the relevance of knowledge in agricultural extension and innovations development. Leeuwis (2004) emphasized the importance of communication and knowledge sharing in rural development programmes, and noted that, adoptions of innovations is rapid and sustainable when local people are part of the development planning decisions. Farmers'

knowledge and perception play an important role in their understanding of natural resource conservation management, influencing their attitude towards sustainable management and

According to Rogers (2003), knowledge has an influence on farmers' attitudes and perceptions in the adoption of innovations for farm practices. Whilst traditional communities all over the world have utilized local knowledge systems to sustain their survival, Okiror et al. (2012) cited lack of knowledge on shea seed collection, species selection and planting techniques of farmers as factors responsible for the low adoption rates of shea for agro-forestry in Amuria District in Uganda. Farmers' knowledge and perception play an important role in their understanding of natural resource conservation management, influencing their attitude towards sustainable management and growth of shea trees (IFAD, 2001).

According to Yidana (2004) natural regeneration is the single most important shea conservation management method in Northern Ghana, involving protection of shea plantation by anti-bushfire campaigns, construction of fire belts around shea trees on parklands, bushfire fire-fighting and the ban on indiscriminate cutting of shea trees (Carette et al., 2009). The application of agricultural management practices such as weeding, pests and disease control, pruning, propagation techniques and other cultural practices are important shea conservation management practices (Yidana, 2004; Okullo et al., 2007; Ayuba, 2013). A case research in the University for Development Studies (UDS) found sapling management and grafting, as the way forward in shea domestication (Chimsah et al., 2011).

The role of stakeholders and institutional support has been instrumental in the development and sustainability of industries and local economies. Institutional support in the form of research and extension services, financial and credit support as well as policy are vital in the development of cash crops such as cocoa, cashew, and oil palm towards economic development COCOBOD (2011). Local institutions are key elements in household livelihood strategies and help ensure minimal level of food security as well as govern access to communal natural resources that provide sustenance, especially for the poor. Inappropriate policies, lack of technological changes and poor infrastructure due to institutional bottlenecks and ineffectiveness of research and extension linkages are some of the factors reducing farmers' incentives to invest and produce (Boateng, 2006). Due to increasing environmental degradation, deforestation, desertification, climate change and the consequent rapid decline in livelihood assets and natural resources, conservation management has become a critical development issue in Northern Ghana. Several shea writers (Yidana, 2004; Lovett, 2010) have lamented the depletion of shea trees in Northern Ghana, and according to Apusigah (2009), the situation is quite alarming along the North-Eastern corridor of the Upper East Region. Several bilateral and multi-nationals organizations (WATH, World Bank, UNDP, IFAD, USIAD, etc.) have supported activities towards sustainable shea production and natural resource conservation management in the areas of afforestation and agro-forestry programmes in order to increase shea production. The work of government agencies such as Metropolitan Municipal and District Assemblies (MMDAs), notably the Ministry of Food and Agriculture (MoFA), Forestry Services Commission (FSC) and the Ghana National Fire Service (GNFS) include shea plantation protection activities e.g. anti-bushfires campaigns, bye-laws against deforestation (MoFA, 2011). Despite numerous challenges and constraints associated with the production,

processing, marketing and utilization of shea and shea products, the industry remains a key livelihood asset, making significant contributions towards the socio-economic development of countries in Sub-Saharan Africa, especially.

1.1 Problem Statement

The Upper East Region is one of the most densely populated region among the three regions in Northern Ghana, and estimated to have a population of about 920,089 million people from the 2010 population and housing census (GSS, 2012). The region is considered most deprived and economically vulnerable with a high incidence of food insecurity, unemployment and widespread rural poverty (WFP 2012).

Livelihood outcomes of people in the Upper East Region is heavily dependent on agricultural production. However, production in the agricultural sector is constantly adversely affected by variable weather conditions characterized by frequent floods and droughts, erosion and poor soils among several limiting factors (Apusigah, 2009). The contribution of natural resources towards livelihood outcomes in the Upper East has been a critical livelihood consideration for people in the area; and the shea industry in particular has been recognized for its strategic contributions towards livelihood outcomes and socio-economic development. The impact of the shea industry in the Upper East Region and Northern Ghana in general is evident in rural food security, rural income and employment, especially for rural women, amongst several benefits including socio-economic and environmental (Bawa, 2007). It is estimated that the shea industry has the potential to earn more than USD 100,000 annually from exports alone for Ghana, with an employment

capacity of over 1.2 million regular jobs along the shea commodity value chain, with associated economic development multiplier effects (Chimsah, 2011).

Though the potential of shea to the Ghanaian economy is convincingly immense, obvious social and infrastructural bottlenecks have limited the contribution of the industry towards livelihood outcomes and development. The continuous extraction of shea resources from the natural plantations over the years, without any significant conservation management measures present a worrying phenomenon, and many shea promoters have lamented the status quo, as the practice triggers deforestation, decline in shea tree population and ultimately, depletion of shea resources. The decline in shea tree densities is quite alarming in the Upper East Region, especially along the eastern corridor (*Garu, Bawku, Zebilla*) where shea trees have almost disappeared in communities once dominated by the plant (Apusigah, 2009). This situation signals a looming threat to the sustainability of the shea industry as a strategic livelihood asset for people of a region limited in resources.

Protection of shea trees from destruction by fires and human activities, pruning and weeding around shea trees, pest and disease control, tree planting among other shea conservation management practices have been recommended for sustainable production of sheanuts (Okullo et al., 2004; Abubakari et al., 2012). Lovett (2010), posited that shea conservation management practices represented the most critical regeneration concept for farmers to increase shea tree population and productivity. According to Yidana (2004), shea trees on cultivated lands produce higher yields and bear fruits more consistently than those in the bush. Similar impacts of conservation management practices have been reported in Niger, Mali and Uganda (Bayala et al., 2011; Lovett, 2013).

Available evidence (Apusigah, 2009) reveal that several initiatives implemented by development organizations and agencies towards shea conservation management in the Upper East Region have not resulted in the sustainable conservation of the natural resource. The work of state institutions, donor agencies and NGOs (CODI, ZOVFA, BEWDA) have highlighted activities towards shea conservation management practices in farming communities, where agricultural extension and farmer training by MOFA and NGOs have included anti-bushfire campaigns, pests and disease control, pruning and weeding practices recommended for increased shea production (District Assembly annual work plans, 2011). CRIG and COCOBOD have also reported of improved natural regeneration practices and propagation methods towards increased shea production (CRIG, 2002). Despite several development interventions and innovation promotion towards conservation management of the shea plantation, tree population continues to decline in the Upper East Region. A number of factors have been adduced for this rather troubling trend of decreasing shea population. However, empirical evidence points to inadequate knowledge and negative attitudes on the part of farmers, as well as inadequate institutional support towards conservation management practices.

Available literature on shea has concentrated on processing, value addition and marketing of shea-based products (Elias et al., 2006), and there is hardly any significant evidence on the contribution of farmers' knowledge, their attitudes and institutional support towards shea conservation management practices. This study therefore seeks to examine the contribution of farmers' knowledge, attitudes and the role institutions play towards shea conservation management practices in the Upper East Region of Ghana.

1.2 Research questions

The research questions that need empirical investigations are:

1. How do farmers' knowledge, attitudes and development institutions contribute towards shea conservation management in the Upper East Region?
2. To what extent has farmers' perception of the socio-economic values of the shea tree influenced shea conservation management practices in the Upper East Region?

1.3 Research objectives

The overall objective of the study was to explore farmers' knowledge, attitudes and institutional support towards shea conservation management practices in the Upper East Region of Ghana. The specific objectives of the study were:

1. To determine the relationship between the socio-cultural characteristics of farmers and their knowledge in shea conservation management practices in the Upper East Region.
2. To examine the relationship between farmers' attitude and shea conservation management practices in the Upper East Region.
3. To assess the institutional support and stakeholders contribution towards shea conservation management practices in the Upper East Region.
4. To determine the influence of farmers' perception of the socio-economic values of the shea tree on conservation management practices in the Upper East Region.

1.4 Significance of the study

The shea industry has over the years received very little development attention and shea nut production had been limited to the natural wild shea tree population on farms and parklands across rural communities in Northern Ghana. The continuous degradation and decline of the shea tree population has been identified as a serious threat to the shea industry, and the conservation management of the industry has become more critical than ever.

In addition to the Ministry of Food and Agriculture, a number of institutions and organizations have over the years initiated programmes and activities for farmers towards conservation management of the shea resources. Institutions and organizations are interested in knowing the impact of their interventions and support to farmers and whether beneficiary rural people have gained adequate knowledge and change of attitude towards shea tree conservation management. The research will identify gaps in farmers' knowledge and critical support requirements, so that organizations interested in developing the shea industry can include in their future plan development.

The findings of this research will essentially contribute to the ongoing deliberations on strategies and measures towards sustaining the shea industry, especially information on farmers' knowledge, practices and institutional support towards conservation management of the shea industry. The research will also add knowledge to existing literature on shea, especially on conservation management and sustainability of the industry.

1.5 Operational definitions

Operational definitions refer to the specific way certain terminologies are used in a study. It is done for the purpose of communicating the exact meaning of important terms to readers. Key concepts explained in this study include farmers' knowledge, attitudes towards conservation management, institutional support, natural resource conservation management practices, livelihood outcomes, livelihood assets and shea industry.

1.5.1 Knowledge

Knowledge refers to the awareness or understanding of a circumstance or fact, gained through association or experience. This study relates knowledge to farmers' awareness of relevant conservation management practices such as plantation protection, agricultural practices including weeding around the shea trees, pruning, pest and disease control measures and planting or propagation of shea to increase the tree population and production.

1.5.2 Attitude

This relates to the willingness or readiness of farmers to embark on shea conservation management practices such as protection of shea trees, and agricultural operations including the practice of weeding around shea trees on farmlands, pest and disease control, pruning and shea planting or propagation activities.

1.5.3 Institutional or organizational support

Institutional or organizational support refers to any form of tangible and/or intangible product or services or both received from an organization. These supports may include

extension training, innovations, inputs and credit to farmers in order to increase their capacities and enhance shea conservation management.

1.5.4 Shea conservation management

Shea conservation management comprises of all operational activities or practices relevant for sustainable production of shea trees. The term ‘natural regeneration’ has been used interchangeably for shea conservation management. Conservation management activities on shea plants involves bushfire prevention and control measures, ban on indiscriminate tree felling, and basic agricultural husbandry practices and farm management activities i.e. weeding, planting, pests and disease control, et cetera.

1.5.5 Livelihood outcomes

A livelihood comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.” It is also the ability of people to meet on a sustained basis basic needs to live (World Bank, 2008). Livelihood outcomes constitute the achievements of livelihood strategies such as more income, increased well-being, reduced vulnerability, improved food security and more sustainable natural resource base.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents literature review in relation to the study objectives. Key concepts discussed in this section include livelihood outcomes, knowledge and attitudes of people in relation to natural resource management and sustainable agriculture. Literature pertaining to the role of development agencies and institutions towards natural resource conservation management and sustainable agriculture is also highlighted in this section. The chapter also outlines the socio-economic value of the shea industry, and presents a conceptual framework describing the contribution of policy on people's behaviour and attitudes in relation to the functions of key development actors in the shea industry towards industrializing sector.

2.1 Farmers' knowledge and attitude towards sustainable management of natural resources and livelihood assets

Knowledge acquisition through research and extension teachings have an influence in shaping the attitudes and behaviour of farmers towards farming practices and innovations on livelihood assets and resource management. Asenso-Okyere and Davis (2009) noted that formal and informal knowledge and innovation must be linked to accelerate sustainable agricultural development. Many social scientists believe that knowledge and attitude are linked to each other where attitude is further connected to the behavior (Flamm, 2006). The assumption believes on "if people become more knowledgeable about the environment and its associated issues, they will in turn, become more aware of the environment and its

problems and, thus, be more motivated to act toward the environment in more responsible way” (Zarrintaj et al, 2013:1326). The relevance of knowledge and perception in influencing decisions regarding the adoption of innovations has been reported by many researchers (Yapa and Mayfield, 1978; Rogers, 1995; Negatu and Parikh, 2003). Matthews-Njoku and Asiabaka (2003), in a study on the “relationship between knowledge and adoption of improved cassava technologies”, found that the more farmers are exposed to the improved technologies of cassava production the more they adopted. In a study on sustainable sugar beets production in Kenya, Mandere (2003) observed some bio-physical, social and economic challenges, which if not resolved through farmer’s education, can hinder sustainable sugar beets production. Okullo et al. (2003) also argued that ‘folk knowledge’ is very dynamic and is strongly influenced by indigenous creativity, innovation and contact with other knowledge systems. According to Mazzocchi (2006) traditional communities all over the world have utilized local knowledge systems to sustain their survival for millennia.

Through socialization process, unique patterns of behaviour and values are transmitted from one generation to another, and in this manner, both positive and negative attitudes towards the environmental resources are taught (Talon et al., 2013). According to Shibia (2010), imposing modern conservation paradigm and the establishment of protected areas on local communities had received resistance from members of the public and resulted in a number of negative consequences including restriction of access to traditionally used resources, disruption of local culture and economies by tourists, increased depredation on crops and livestock by wild animals and, displacement of inhabitants from their traditional lands leading to social and cultural destructions.

Talon et al (ibid), citing Smart (1998) observed that there has been an unprecedented change in the earth's environment resulting from the negative attitudes of human towards forest conservation, noting that the earth is under serious threat due to human activities like industrialization, urbanization, logging, agriculture and so on. Conservation practices all over the world are changing from the traditional management approach with emphasis on trees to managing natural resources in a way that ensures greater flow to all stakeholders especially local communities. This means that participation in decision-making process and in the evaluation, monitoring and management of resources and the environment is crucial. Participation is more likely to build a conservation ethics where people understand that their livelihood depends on healthy maintenance of the environment. According to Silori (2007) the lack of involvement of the local community in the decision making processes in forest management groups, were important determinants of negative attitudes toward protected areas. He posited that people are more likely to appreciate protected areas if benefits from them offset the associated costs.

A study on classification of shea trees in Mali utilized local and traditional knowledge in the given culture. According to Okiror et al. (2012) lack of knowledge on shea seed collection, species selection and planting techniques were among factors of low adoption rates of shea for agro-forestry in Amuria District in Uganda. Okullo et al. (2003) reported that there are places where farmers lack access to improved seeds, and planting techniques for most tree species. Development of the shea sector has been hindered by the lack of a unified and holistic view of the shea commodity chain, which spans from the initial resource base (the tree) to the point of final product consumption and this lack of vision stems from inadequate knowledge sharing across stakeholders working in the shea sector. Elias et al.,(2006) notes

that urban shea processing women have access to good roads, electricity, storage and export firms, and are therefore better able to take advantage of market information, technical transfers, trainings, credit opportunities, and so benefit disproportionately from donor interventions than their rural counterparts.

Farmers' knowledge and increased awareness, with consequent influence on farmers' attitudes and perception towards shea conservation management practices notably protection of the natural shea plantation, weeding, pest and disease control, pruning and planting, could promote sustainability of the shea industry. A study on natural resource conservation in Ethiopia found that extension contact and knowledge of benefits from conservation resulted in higher positive attitudes from local people towards conservation programmes (Tsehaye and Mohammed, 2013). Similar studies on attitudes towards environmental subjects in Malaysia reported that majority of farmers were positive about environmental conservation issues (Zarrintaj et al., 2013). According to Ahnstron et al., (2008), the involvement of farmers in the conservation of natural resources is largely governed by their awareness of the problems, attitudes and apparent benefits of conservation practices.

According to Fakoya et al. (2007), while men generate environmental problems, the women deal with the consequences, and therefore attempts to tackle the age long problem of land degradation should take into consideration the pivotal role of women in land management. Okali (1991), explained that the involvement of women in environmental management will not only ensure their active participation, but would also aid the participation of men, as they exercise a lot of influence on the men.

A study by Leeworthy (2013), found that there was significant relationship between knowledge and attitude, where participants with higher knowledge showed positive attitudes towards environmental issues, compared to those who had lower knowledge. Citing Nabin (2005), Odebiyi et al., (2015) observed that the probability of conservation actions increases if people have favourable attitudes, and concluded in their studies on Communities' Attitudes towards conservation in Gashakagumti National Park in Nigeria that attitudinal surveys could be conservatively used as an indicator of participation by local people in collective actions.

Thus, in order to achieve sustainable management of the shea industry, farmers must develop sustained positive attitudes towards conservation management practices such as protection of the trees from destruction, weeding around shea trees, pests and disease control, pruning and planting. Capacity building programs through training, education and sensitization to highlight the benefits and value of shea trees towards livelihood outcomes has the potential to increase farmers' knowledge, and ultimately change their attitudes to achieve full conservation management of livelihood assets for sustainable agricultural production and the shea industry as well.

2.2 Conservation management practices and sustainable development

Sustainable development relates to development that meets the needs of the present without compromising the ability of the future generation to meet their needs (WECD, 2010; Elobeid, 2012). Sustainability is the process suggested to improve the quality of human life without the limitation of the environment. It involves solutions for improving human welfare that does not result in degrading the environment or impinging on the well-being of other

people. Sustainable resource use and sustainable development are achieved by the application of sustainable strategies at local, national and regional levels.

Sustainability of the shea industry could largely be achieved with sustainable use of the natural shea resources through effective conservation management practices. Shea conservation management practices comprise those operations or activities towards preserving and increasing the shea plantation for sustainable production. These activities generally include operations or practices by farmers towards protecting and preserving the natural shea plantation, and the application of basic agricultural practices relevant for improved shea production. For the purpose of this study shea conservation management practices are discussed under the broad concepts of ‘protection’ of the natural shea plantation, involving activities directed towards bushfire prevention and control, ban on shea tree cutting and farmers management of young shea plants on farmlands and parklands. It includes the general agricultural practices relevant to shea production such as weeding, pests and disease control, pruning, planting, etc.

According to Danielson (2004), sustainable development is a set of concepts that attempt to harmonize a number of seemingly competing goals. These include providing better conditions of life and more opportunity for people, especially the poor, and bringing production and consumption within limits that the ecosystems can tolerate in the long run.

In Zambia, for example a Forest Resource Management Project embarked on a series of community-based activities to raise incomes and enhance the sustainable use of forest resources, whilst in Lesotho, the ‘Machobane’ farming system was used in the Soil and Water Conservation and Agroforestry Programme to replace the traditional mono-cropping

with intensive relay cropping on contours in order to control erosion and conserve moisture (IFAD, 2001). The Bututsi Agro Pastoral Development Project also established private nurseries managed by farmers' groups and providing training in the production and distribution of seedlings.

Traditional natural resource management in Ghana and other parts of Africa, is shaped around local rules and regulations, and often categorized by the protection of particular animals or plant species, and regulation of the exploitation of particular natural resources (Ntiama-Baidu, 1995; Boateng, 1998). According to Eilu et al., (2003), across the savannah regions of Africa, subsistence farming systems are characterized by dispersed trees that are deliberately retained on cultivated or on fallowed land for their multiple products including fodder, wood, fruits, charcoal, timber, and medicine e.g. *Vitellaria paradoxa*, *Tamarindus indica*, *Borassus aethiopum* and *Prosopis African*

Natural regeneration is the term used by Yidana (2004) to describe the conservation management of shea plantation, which is largely achieved by sensitization of farmers on bushfires prevention, construction of fire belts, firefighting during outbreaks, and the ban and enforcement of bye-laws on indiscriminate cutting down of shea trees often by charcoal and fuel wood operators. Lovett and Haq (2002) argued that the term semi-domestication is the more appropriate, since the natural shea plantation has over the years undergone decades of atrophic selection based on age, size and quality of fruits, yield and growth rate.

Barrow (2002) observed that weeding of woody perennials is always carried out alongside agricultural crops while pollarding, pruning, and thinning of trees and shrubs are done by men to reduce the effect of shading, stimulate flowering, increase fruiting, and facilitate

harvesting. He noted that the promotion of local practices; offer a great opportunity to conserve shea trees since farmers are usually critical in the success of biodiversity conservation. Special shea management strategies reported by farmers in the Amuria district in Uganda included weeding, thinning, pruning, pollarding, and spraying coppices and seedlings against pests and diseases (Okiror et al., 2012). A study by Dwomoh (2003), noted that a caterpillar (*Cirinia spp*), affect the foliage and fruits of the shea tree, but according to farmers the problem would normally go away automatically, especially following rainstorms. However, Sheail et al. (1997) contended that leaving nature alone defeats the purpose of nature conservation; and advocated that the management of indigenous fruit trees on-farm are necessary.

Quoting Boffa (1995), Okiror et al. (2012) underscored the importance of pruning in minimizing the effect of the parasitic plants like *Tapinanthus spp* (mistletoe), and recommended the transfer of efficient techniques to farmers to promote shea conservation. Yidana (2004) also observed that numerous young shea trees sprouted from existing old stumps on lands protected from bush fires, with minimal use of heavy agricultural equipment (e.g. ploughing with tractors); and where these plants are not destroyed by farmers, bushfires or browsing animals, grow rapidly into mature trees, producing fruits after only seven years instead of the normal 12 to 15 years under natural conditions. Systematic measures such as the felling of dead or diseased trees; maintaining a weed-free circle as a firebreak around each tree; application of manure to the base of young trees to stimulate growth; and pruning of mature trees are among useful agricultural practices to improve shea productivity (Adomako, 1985). Byakagaba, Eilu, Okullo, Tumwebaze and Mwavu (2011) reported that in Mali the planting of shea trees by farmers has resulted in

increased shea plant population and improved utilization of shea resources for livelihoods. As noted by Asante et al., (2012) there is the need to assess the potential of domesticating shea trees in Northern Ghana in order to establish shea plantations to supplement the natural sources.

Similarly, farmers in Burkina Faso and Nigeria embark on management and conservation measures to increase production of quality shea to take advantage of the increasing international market for shea products (Lovett, 2010). According to Sanou et al. (2004) attempts to shorten the fruiting age of shea by genetic improvements and grafting have met with some success and planted shea seedlings tend not to produce high quality nuts (Lovett and Haq, 2000). As noted by Seweh (2011), in Ghana shea trees virtually cover about two-thirds of the country's landmass mostly in the wild, however, trees on cultivated grounds in farms and around villages are often the finest (Abbiw, 1990). According to Carette et al. (2009) young shea trees are easily killed by fire and this affects tree regeneration. Chiefs and traditional rulers enforce bye-laws against shea tree cutting for charcoal (Bonkougou, 2005; Carette et al., 2009) and in Northern Ghana this has led to the arrest and prosecution of offenders. Akwode (2010), reported that in Chiana in the Upper East Region a 33 year old man was sentenced into prison for cutting down shea trees.

Apusigah (2009) noted that excessive bushfires and lack of protection from wood fuel miners could have accelerated the decline of shea tree population in the Upper East, since there is no evidence of impacts of soil variability on shea tree population. Once the tree survives the first five years of its early stages after germination and growth, it grows slowly and takes about fifteen years to reach maturity and can live for up to about three hundred years bearing fruit (Dogbevi, 2009).

The Shea butter (*Butrespermum parkii*) and Dawadawa (*Parkia clappertoniana*) trees in the Guinea and Sudan savannah zones are protected for their economic importance and among some ethnic groups in Northern Ghana, such as the Dagomba and the Mamprusi there are chieftains in charge of useful trees to ensure that they are not cut or destroyed in any way. According to Kwapong (2011) bushfires destroy beehives and bees, which are the main pollinators of shea and bushfire outbreak during flower, could render shea plants unproductive for that year season, and a loss to production. Protection of the natural shea plantation is the most fundamental initiative in shea conservation management, since shea is not easily cultivated. The application of basic agricultural practices including weeding around shea trees, pests and disease control, pruning and trimming of shea trees, planting and pollarding of sprouted shea plants, are amongst other forms of conservation management practices. The sensitization and awareness promotion to increase farmers and community awareness in the management practices of shea could lead to proper care of the natural plantation and sustainable production.

Yidana (2004) and Chimsah (2011), have cited in different studies that pruning is effective in the control of parasitic plants on shea trees. According to farmers in the Kolpelgo community in the Garu-Tempane District, the practice of pruning needs to be controlled and directed to ensure effective conservation management of shea trees. The practice is generally associated with trimming of the shea trees on farmlands during land preparations to reduce the effect of shade from the tree canopy on food crops. Women largely contribute to shea pruning by selectively cutting unwanted branches for firewood. The study revealed that, though most farmers in the Upper East Region believe that planting the shea tree could

increase shea tree population and improve the livelihood outcomes, knowledge in planting the shea tree is expressly inadequate. Apart from the long gestation period and slow growth of the plant especially in the dry season, lack of improved planting materials of early maturing types of shea were some of the reasons given by farmers for the non-cultivation of the plant as in the case of cocoa, cashew, etc. This assertion was earlier reported by Yidana (2004) and Lovett (2010) that research findings on improved techniques of shea propagation has not reached farmers and investors.

Natural Resources provide fundamental life support, in the form of both consumptive and public-good services. Ecological processes maintain soil productivity, nutrient recycling, and plant genetic diversity were found to support the breeding programs necessary to protect and improve cultivated plants and domesticated animals (World Bank 2000). Conservation management is therefore fundamental to sustainable management of the shea industry, and there is much to suggest that with application of relevant conservation management practices, the shea industry could be of tremendous economic value to countries and people in Sub-Sahara Africa.

2.3 The role of institutions in sustainable agriculture

Institutional support, and the work of development agencies towards conservation management of the shea industry is as important as managing natural resources and practicing sustainable agriculture for livelihood outcomes and development. The successful adoption of policies that ensures sustainability will depend crucially on the institutions of a given country. The aim of public and private institutions and organizations is to enhance the sustainability of agricultural production and natural resource use.

According to North (1990), institutions are the formal and informal norms that constrain and shape economic decisions. These institutions and organizations determine the property rights of transaction cost that together with technology and transformation cost affect economic performance. Markovic and Bboois (2006), noted that even well-developed agricultural sectors still needs to be supported, and described institutional support as a crucial thing, which is often a precondition for other supports including direct support to the farmers, implementation of quality standards, support to investments and implementation of new concepts of rural development policy and so on, and lamented the situation whereby in many countries, building appropriate institutional capacities that can meet all developmental needs are often not taken so seriously.

The ability to effectively support farming communities represents the social dimension and agricultural production may fall if the communities and institutions on which it depends deteriorate. Poor agricultural policy, insecure land tenure, war, social disruption, and changing labour conditions can lead to non-sustainable agriculture (FAO, 2012). Extension innovations describe the scientific agricultural technologies produced by research, including methods and practices to increase agricultural productivity and production of farmers. Research produces innovations which are passed on to extension, which in turn passes them to farmers. In Ghana, agricultural extension services is deployed in every community by MOFA, and most agricultural and rural development interventions involve technology and transfer of best agricultural practices.

According to Uphoff and Louise (2006), farming and agricultural development had long depended on the work of agricultural extension services to facilitate the transfer of scientific

and modern technologies for increased productivity. FAO and the World Bank (2001) reported that Agricultural Knowledge and Information System (AKIS) links people and institutions to promote mutual learning and generate, share and utilize agriculture-related technologies (Amezah and Hesse, 2003). The system integrates farmers, agricultural educators, researchers and extensionists to harness knowledge and information from various sources for better farming and improved livelihoods. Uphoff and Louise (ibid), lamented that conservation of savanna lands is considered less of a priority by most governments and donors than that of tropical rain forests. In their contribution to strengthening rural institutional capacities for sustainable and equitable development, they noted that usually in any rural area there exists considerable variety of local institutions –local government bodies, civil society organizations, private sector entities, and others; and some of these may be playing positive roles in economic and social development. They further indicated that institutions can make it easier, cheaper and more profitable for people to invest in activities that produce more income and employment in rural areas, for themselves and for others. According to Barrow (2002), law enforcement, collaborative management, and sensitization of local communities are very important factors for the success of any conservation programme. The effects of political and policy environments, especially for those institutions addressing poverty and rural livelihoods, land tenure and access to credit, set limits on what local institutions can do including traditional institutions.

To give shea butter processing in the Northern Region a boost, the Japanese government provided GH¢80,665 grant for the improvement of facilities for shea-nut processing centre at Walewale, and the expansion of an existing facility at Sagnarigu in the Northern Region (*Daily Graphic* 28th June, 2012). A number of institutions and organizations are involved in

supporting women in processing shea butter for livelihood in Northern Ghana, including OXFAM, USAID, OLAM, SNV, CRS, etc., but very few support investment in conservation management. According to Okullo et al. (2007) the conservation and management of traditional parkland farming systems in Uganda has enhanced shea production and the work of some NGOs (COVOL) have improved sustainable management of shea resources. Plantation of cash crops play vital role in earning considerable foreign exchange and elevating the socio-economic status of millions who directly or indirectly depend on these crops. The employment and income value of shea for women has led advocates for gender equity, poverty reduction and sustainable development to pursue increased global demand for shea butter to enhance the incomes of impoverished female producers leading to the proliferation of shea nut projects by UNIFEM, UNDP, Aid Agencies, NGOs (Elias et al., 2006).

Carette et al (2009), observed that the shea industry has received little support in contrast to other cash crops like cocoa and oil palm, yet there is an increased international demand for shea butter and not only is it an avenue for employment for the youth and women, but eventually protect and conserve the shea tree. Organizations and government institutions carry out interventions like the supply of inputs, training, transport and marketing of agricultural produce in various ways (DFID, 1999). Policy makers in various government departments decide on where interventions proposed by NGOs are implemented to ensure equitable distribution of community development projects and avoiding duplication of development efforts. For this reason alone, both domestic and international NGOs and private companies collaborate with government structures and defined government policy frameworks to ensure the smooth and orderly implementation of development projects

(Nkala, 2012). As noted by Bayala et al. (2005) failing to study the shea species leaves the possibility of ameliorating its genetic characteristics and derived butter traits. This has in recent years prompted the scientific community to promote effective, locally driven shea conservation measures, to enhance cultural practices, and to accelerate shea tree domestication and improvement (Elias et al., 2006).

An enabling government policy and institutional environment is needed to promote the mainstreaming of Conservation Agriculture (CA). This in practice requires that all the stakeholders must become engaged in the management and production of the natural resource base in a sustainable manner (FAO, 2012). The international demand for unrefined shea butter over the raw kernel has led to the establishment of small to large scale processing plants by individuals, companies and NGOs in the Northern and Upper East regions to process and add value to the kernel to guarantee fair prices from international buyers.

As pointed out by Elias et al., (2006) the importance of the ecological aspects of shea is frequently downplayed among public and private shea consultants and many practitioners, including government officials, NGOs and other aid organizations. However, scientists stress the importance of considering the tree as an integral part of the chain, and underscored that focusing on shea tree conservation is indispensable to the continued existence of the commodity chain. Bonkougou (2005) contend that if producing countries continue to rely entirely on wild trees, which are not planted but are preserved, the unstable nut supply from a tree base of variable quality will hinder butter yields and characteristics. Additionally, the

wild nature of the species does not allow the actors to forecast and/or generate accurate statistics on the productivity of shea trees and the quantities of shea derivatives produced.

Casadei (2005), stated that the shea sector requires an integrated sectoral framework encompassing all stages of the commodity chain. He noted that cash crops such as coffee, cotton, and cocoa have benefited from integrated development efforts, within which substantial investments are made to improve crop genetics, develop appropriate farming systems and related agricultural and commercial extension activities. Since 1999, a wide body of research on cocoa has confirmed that such investments in agricultural efficiency have a multiplier effect in terms of reducing poverty and affording rural peoples' opportunities and choices (Shapiro and Rosenquist, 2004).

Thus, sustainable management of natural resources requires a more comprehensive approach which includes strengthening the organization and technical capabilities of rural communities as well as engendering support for sustainable resource use from larger community group (Bisong, 1998). A study in Boki community in Nigeria found that people tend to demonstrate negative attitude towards natural resource conservation, and to maximize the chances of sustainable conservation initiatives, rural communities need to be involved in both the concept and approach. North (1990) argues that institutions also play the role of reducing uncertainty by providing a structure to everyday life, and they are a guide to human interaction. In relating the institutional role to economic development, he adds that institutions have their effects upon the performance of the economy by their effect on the costs of exchange and production. In addition to the costs of technology utilized in the production process, institutions constitute the remaining part of total cost. Therefore, institutions play a key role in the costs of production, and hence, the profitability and

feasibility of engaging in economic activity. Furthermore, North argues that the most fundamental role of institutions in societies is that they are the underlying determinant of the long-run performance of economies (North, 1993).

Institutional support and stakeholders' contribution are crucially essential in providing technical and financial assistance, to equip and empower farmers with the requisite knowledge and attitudes towards conservation management of the shea industry for livelihood outcomes. National shea development policy direction, outlining the development programmes and projects of ministries, departments and agencies (MDAs), will clearly define and implement relevant interventions and institutional support towards building farmers' capacities. Training, education, and provision of credit and logistics will make knowledge and innovations available to farmers.

2.4 Importance of the shea industry towards livelihood outcomes

A livelihood comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.” It is also the ability of people to meet on a sustained basis basic needs to live (World Bank, 2008). Livelihood Outcomes are the achievements or outputs of Livelihood Strategies.

The livelihoods of rural dwellers are strongly dependent on the natural resources of water, soil, and forests as they earn their living from farming. Desired livelihood outcomes including increased household incomes, food security, general well-being, reduced vulnerability and sustainable use of natural resources are generally below optimum or desirable levels in most rural farming communities (IFAD, 2001). The principles of

conservation agriculture are applied through locally-formulated and locally-adapted practices to all agricultural production systems, including arable, horticulture tree crop plantations, agro-forestry, organic and crop-livestock systems with manual, animal-drawn or mechanized farm power. Asante et al. (2012) enumerated a number of factors that make shea nuts an important vehicle for poverty reduction in Ghana:

- Majority of the poor in Ghana are farmers who live in rural areas, and most in the northern parts of the country.
- Annual rainfall of the northern parts of Ghana is about 1000 mm per year which makes the area not suitable for the cultivation of crops like palm and cocoa, but suitable for the shea tree to grow (Carette et al., 2009).
- Initial investment for shea nut production is minimal since the shea tree is an indigenous species and it occurs in large numbers in the whole of northern Ghana. It is only labour - and time intensive as the trees are scattered.
- The uniqueness of shea is that it generates income specifically for women, and seen as women's business traditionally (Elias & Carney, 2005; Carette et al., 2009).
- Moreover, shea is one of the few natural resources accessible for the landless poor.
- There is significant demand for shea products both within Ghana and on the international market, which is important for the income generating potential of shea (Carette et al., 2009).

As cited by Asante et al. (2012), the Vice President of Ghana, His Excellency John Dramani Mahama noted that over 900,000 women in the three northern regions collect over 130 000

tonnes of dry nuts every year to process and use locally; about 95 percent of who are rural households benefiting from the shea industry. According to Yidana and Lovett (2006) the shea industry earns about 30 million USD of foreign exchange for the Ghanaian economy. Although shea nuts are a major commodity, it is not a plantation crop and the nuts sold on the international market are harvested from village tree populations in several West African countries. According to Boffa (1999) shea is protected for its edible fruit pulp and butter, income generation, cosmetics, medicines, wood, and soap production, and is one of the most abundant indigenous tree species within the Sudan savannah zone that forms the backbone of livelihoods of most people in the 5,000 km long shea-belt in Africa. Dogbevi (2009), estimated that about 9.4 million shea trees grow in Ghana, with a potential yield of one hundred tons of shea nuts worth about 100 million USD per year.

Okullo et al.(2010) and Saeed (2012) reported that the shea fruit is an important resource for managing high blood pressure. The roots and bark also have numerous medicinal uses, and are boiled or ground into powder for the treatment of dysentery, suppurating wounds and other ailments (Millee, 1984; Soladoye, 1989; Fobil, 2007). Saul et al. (2003) in his contribution stated that shea butter is an important edible oil for the people of Northern Ghana and much of Western Africa, and is the most essential source of fatty acids and glycerol in their diets. It is also useful in the pharmaceutical and cosmetic industries as an important raw material and a precursor for the manufacture of soaps, candles, and other cosmetics (Adomako, 1985). Shea fruits serve as an important source of food for many organisms and animals including birds, bats, elephants, sheep and pigs (USAID, 2004). The importance of shea fruits in food security in Northern Ghana; is underscored by the ripening of the shea fruits during the lean season of food production, between April and July (Fobil,

2010). Currently, shea butter is mostly treated as a substitute for cocoa butter and priced like other vegetable oils. The future development of shea butter will depend on uses being found for its high UV (ultra violet) absorption properties and the unsaponifiable matter (steroids) which displays several interesting physical and biomedical properties that could have pharmacological and cosmetic applications (Louppe, 1994).

The livelihood value of shea trees include source of food security, income and employment, environmental and agro-forestation usefulness, which contributes to the positive climate change impacts in Northern Ghana. On the basis of the economic and ecological importance of shea trees, there are enough considerations to support plantation development and conservation management to ensure sustainability of the shea industry. The products of shea butter are widely used around the world in lotions, chocolate and other products (DeMoss, 2001). According to Quansah (2010), shea has begun attracting attention in other industries, and its cultivation could expand, especially with the growing interest in the biodiesel industry. Currently significant progress is being made in undertaking biodiesel production from shea butter on a small scale; and the interest in harnessing the full potential of shea butter in Ghana has grown stronger in recent years.

It is currently estimated that over 60% of the world's poorest people live in ecologically vulnerable areas and ecological degradation threatens not only the natural resources within the region but contributes to furthering the poverty and disempowerment of women (FAO, 2012). The Upper East Region is ranked next to the Upper West region on the poverty scale, and the most densely populated of the three regions within the shea-zone in Ghana (MoFA, 2011; GSS, 2012).

This study combined the primary and secondary data, especially to assess the contributions of earlier studies on farmers' knowledge, attitudes, practices and institutional support towards shea conservation management. An assessment of institutional support towards shea conservation, and examination of farmers' knowledge and practice of shea conservation management practices and their perception on the value of the industry towards livelihoods and how this has contributed to conservation will form the core of this study.

The shea industry makes significant contributions to food security, income, employment and the general socio-economic development of people in Northern Ghana. It is argued that adequate institutional support towards the shea industry will largely promote improved livelihood outcomes of people in the Upper East Region. Technical and financial assistance to farmers aimed at sustainable conservation management practice of shea will lead to increased production and development.

2.5 Conceptual Framework

Figure 1 shows the relationship between farmers' knowledge and attitudes towards shea conservation management practices, and the role of stakeholders and institutional support towards sustainable development of the shea industry. The main factors conceived in this study relate to the concept of farmers' knowledge and attitudes in the context of natural resource conservation management practices and agricultural activities towards sustaining the shea industry for improved livelihood outcomes. The conceptual framework traces the critical role of government policies, translated through the district assemblies and relevant government agencies (MMDAs, MOFA, CRIG, COCOBOD, etc.), and the work of NGOs and donors. The framework recognizes the importance of institutional support in the form of

credit, subsidy and promotion packages with technical assistance to enhance the work of farmers, business agencies operating in the shea industry, particularly towards conservation management.

Effective conservation management practices which involve the protection of shea trees from annual bushfire outbreaks, ban on indiscriminate tree cutting and the application of agricultural crop management practices; will help maintain and increase shea tree population and improve shea production and consequently livelihood outcomes. Research and extension innovations with early maturing and high yielding varieties, improved processing and storage techniques will also result in higher economic returns from shea, and ultimately improve the livelihood outcomes of food security, increased employment and income, improved health and housing, better education, and to a large extent, poverty alleviation and rural development, leading to the achievement of the Millennium Development Goals (MDGs) 1 and 3. The reverse arrow indicated by dashes between institutional support and farmers, suggests that farmers' knowledge, attitudes and perception towards shea conservation management could inform institutions and stakeholders on the necessary policies and interventions needed to ensure sustainable management of the shea industry. The framework also recognizes the collaboration between MMDAs and private sector in development arrangements.

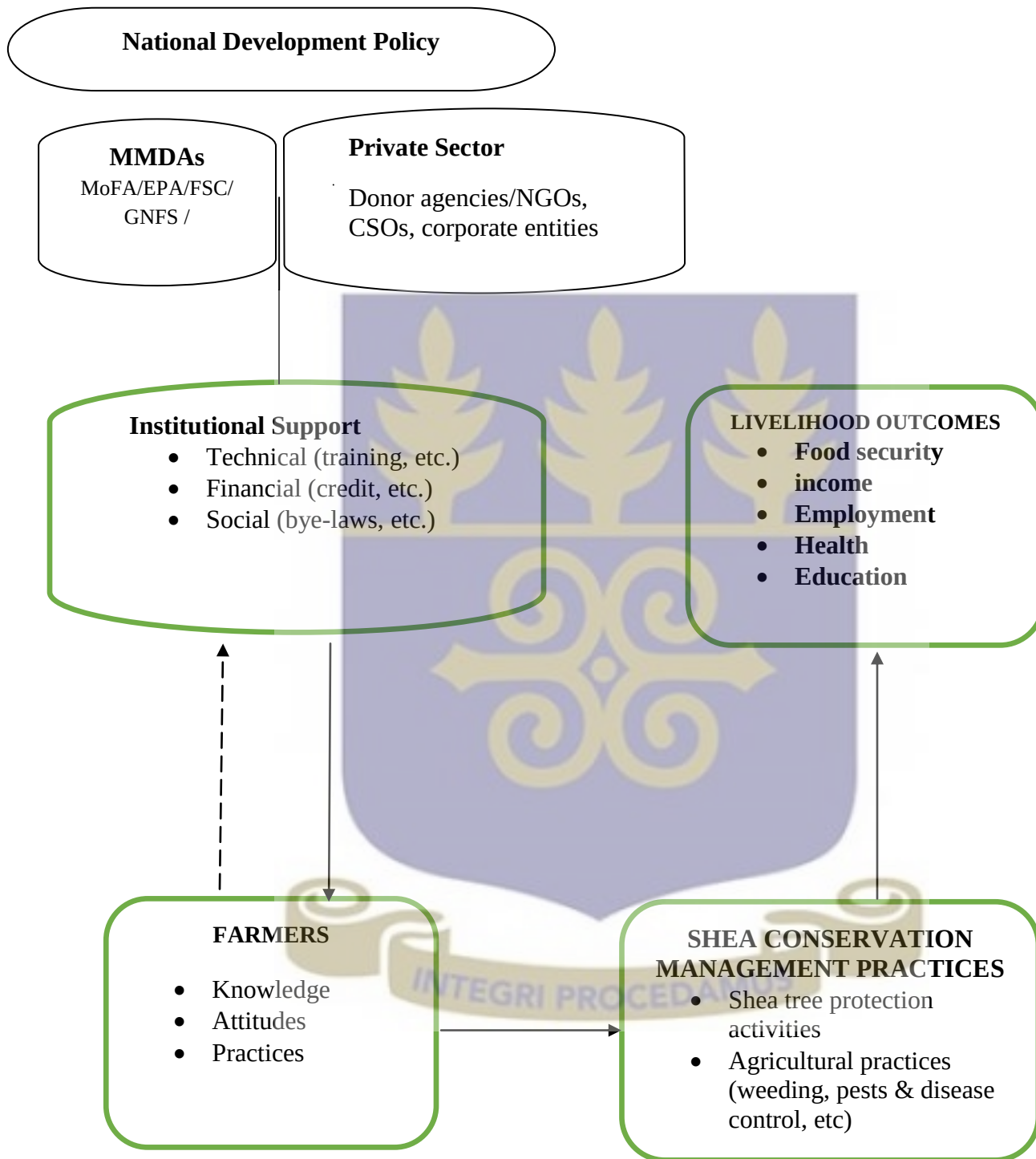
Policies related to shea production seek to promote production, processing, marketing and utilization of shea products in Ghana. Various shea development strategies have been designed to effectively harness shea resources towards national development. Policies on research and innovations development for shea production is part of CRIG mandate, whilst COCOBOD is responsible for marketing and export promotion of shea. As a key livelihood

asset for rural people in Northern Ghana, MMDAs, and development agencies are actively engaged in programs towards increasing production, processing and utilization of the natural resource.

Technical support in the form of capacity building and skills development trainings, awareness and sensitization campaign programs, together with financial support (credit, logistics, equipment, etc.) provided by institutions and stakeholders have the potential to positively impact on the management and sustainable production of the shea industry to increase livelihood outcomes in the Upper East Region.

The 2012 Ghana Forestry and Wildlife Policy directs the stimulation of political and institutional support for the implementation of the forest and wildlife policies and programmes at all levels of governance i.e. national. Regional, MMDAs for development.





Source: Author's construct

Figure 1: Conceptual Framework

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter outlined the methodology employed for the research. The chapter gives a description of the study area, defined the study population and research approach or study design. The sampling techniques, types of data and data collection instruments and method of data analysis are indicated. The variables considered for the study, as well as the unit of analysis are also presented.

3.1 Study area

The Upper East Region is situated in the north-eastern corner of Ghana, lying between Longitude 00° and 10°W and Latitude 10°30'N and 11°N (*Appendix D*). The region is bordered by Burkina Faso to the North, the Republic of Togo to the East, to the South by Northern Region and to the West by the Upper West Region. The region is made up of 13 Districts Assemblies, 4 of which were newly created in 2012 (GSS 2012). This study considered the nine old district assemblies since these had well defined institutions and administrative structures for development processes. The major economic activities include farming, fishing, hunting, extraction of forestry and natural resources, etc.

3.2 Research design

A research design is a plan, structure and strategy of investigation conceived for collecting data and obtaining answers to research questions. The study mainly employed quantitative survey methods using structured and semi-structured questionnaires to collect data from respondents. Purposeful sampling technique was adopted given the socio-cultural context of shea in the study

area. Data was analyzed using quantitative statistics including chi square, frequency tables and likert scale to describe, explain and interpret farmers' knowledge, attitudes, perception and institutional support towards shea conservation management in the Upper East Region. The quantitative approach was found to be relevant in addressing the research questions and objectives of this study. Abdallah (2012) employed quantitative methods in data collection for a study on assessing people's livelihoods, modifying access to the assets, and its implications to poverty. In a study on farmers' knowledge in sugar beet in the Nyandarua and Butere/Murias Districts in Kenya, Simasiku et al., (2010), made use of stratified purposeful sampling in selecting farmers, including snowball sampling procedure in which samples are selected with the aim of identifying information-rich cases in order to allow for an in-depth case study.

3.3 Study population

The target population of this study comprised all farmers in the Upper East Region and development actors operating in the shea industry, especially organizations and institutions concerned with livelihoods and poverty alleviation. Shea producers are mostly farmers, and the picking and processing of shea nuts is largely the business of rural women. Key development actors in the shea industry include shea butter groups and associations, research institutions (CRIG, Universities), government agencies (District assemblies, MOFA, forestry department), export agencies and corporate entities operating in the shea nut industry (e.g., CMB, PBC), NGOs and multinational donor agencies (FAO, USAID, IFAD, UNDP) (Bayala et al., 2006).

3.4 Sampling techniques

Sampling enables the researcher to study relatively small number of units of the target population so as to obtain data that is representative of the whole population. Richards (2005), refers to sampling as a process of selecting the research units of a target population, which are to be included in the study. Sampling refers to a sub-set of or a portion of a total population often viewed as an approximation of the whole rather than itself (Explorable.com, 2009). In spite of the fact that shea is a natural plant that grows almost everywhere in the region, districts were purposively sampled to reflect the socio-cultural dynamics of the various tribal groups in the region.

Two communities were selected in each district using purposive sampling techniques in order to capture areas with significant population of shea trees. Respondents were then randomly selected based on their involvement in shea operations, especially conservation management activities.

Table 1: Sample communities and respondents

Name of districts	# of communities	Communities selected	# of respondents	Estimated population of sampled community
Garu Tempane	2	Kupeila, Gozesi,	67	1,100
Bawku West	2	Binaba, Kobore	77	1,500
Kasena-Nankani	2	Moyoro, Gia	75	1,300
Builsa	2	Kadema/ Fumbisi	72	1,000
Talensi-Nadam	2	Pwalugu, shega	59	950
Total			350	5,850

Source: Field survey, 2012.

The use of the multiple sampling techniques was essentially, to capture key shea actors including shea pickers, processors and shea retailers who in most cases are farmers in the rural communities and also to take care of possible diversities in knowledge, attitudes and interest of the different shea users towards conservation management practices. In all 350 respondents (farmers) were interviewed from the five (5) sampled districts (Table 1).

According to the Research advisor (www.researchadvisor.org), for populations of 5,000 or more a sample size of 384 is representative. The Upper East Region has an estimated population of more than 500,000 farmers (MOFA/SRID, 2011). However, due to challenges including cost implications the researcher worked with a slightly reduced sample size of 350. The study however, took cognizance of the sample size during analysis and interpretation of results to minimize any associated errors. The population of sampled districts was taken into consideration for the sample size in each district, and derived by a percentage of the total population of farmers in the sample communities (Table 1).

Type of stakeholders

Relevant stakeholders and development institutions operating within each sampled districts were interviewed. Respondents included District Directors and WIAD officers of MOFA, Planning Officers of District Assemblies and District Forestry Officers. Two NGOs were purposively sampled in each district based on their participation in shea operations to answer the questionnaires on stakeholders' contribution towards shea conservation management in the Upper East Region. Two well recognized research institutions operating in the crop sector, SARI

and CRIG also responded to questionnaires on stakeholders' contributions to shea conservation management practices. The type of stakeholders and number of respondents are in Table 2.

Table 2: Type of stakeholders

Type of stakeholders	No. of sampled districts	No. of Respondents	Total No. of stakeholders interviewed	Remarks
Ministry of Food & Agriculture	5	2	10	DDA and WIAD Officer
Municipal/District Assemblies	5	1	5	Planning Officers
Forestry Services Commission	5	1	5	District Forestry Officer
NGOs	5	2	10	World Vision, Action Aid, etc.
Research Institutions (RI)	-	2	2	SARI, CRIG

Source: Field survey, 2012.

3.5 Data collection methods

The study made use of both secondary and primary data collected from farmers and stakeholders through personal interviews using semi-structured questionnaires. According to Fraenkel & Wallen (2006) questionnaires are basically interview instruments that give a set of questions to be answered by the study respondents. Whilst in a questionnaire, the subject responds to questions by writing more or commonly, by marking on items in an answer sheet, including multiple choice, true or false, matching or interpretive exercise questions; interview guide is conducted orally and the answers to the questions are recorded by the researcher or anyone trained research assistant (Fraenkel & Wallen, 2003).

3.5.1 Primary data

Primary data was collected from 350 farmers across the five sampled districts in the study area. Data in relation to respondents' knowledge, attitudes and institutional support towards shea conservation management, was collected from farmers using questionnaires and interview guide. Data on stakeholder's activities towards shea conservation management was also collected from personnel of MOFA, District Assemblies, Forestry Services Commission, NGOs, SARI, CRIG and traditional authorities. Table 3 presents the sources of primary data and the information collected from the respondents. Farmers' knowledge in shea conservation management practices was measured by the respondent indicating Yes or No to his awareness of the importance a particular conservation management practice. Respondents also indicated their level of agreement to a set of attitudinal statements, to measure farmers' attitude towards conservation management practices by indicating very much disagree (1), disagree (2), undecided (3), agree (4) and very much agree.

3.5.2 Secondary data

Secondary data was basically obtained from reports, journal articles, websites and portals of relevant institutions e.g., COCOBOD, CRIG, UDS, and international organizations such as USAID, GSA, IFAD, World Bank, et cetera.

Table 3: Primary data collection tools and techniques

Objective	Information Required	Source	Method
To determine the relationship between farmers' knowledge and shea conservation management practices in the Upper East Region	Farmers knowledge in shea conservation management activities • Protection practices of shea trees (fire belts, firefighting, etc.) • Shea agricultural practices (weeding, pest/disease, control, pruning etc.)	Farmers	Questionnaires
To examine the relationship between farmers' attitude and shea conservation management practices in the Upper East Region	Farmers' practice towards shea conservation management activities • Protection (bushfires, tree cutting, etc.) • Shea agricultural practices (weeding, pests and disease control, pruning, planting, etc.)	Farmers	Questionnaires
To assess the institutional support and stakeholders contribution towards shea conservation management practices in the Upper East Region	Type of institutional support to farmers towards shea conservation management • Research technologies transfer • Inputs/logistics • Credit/financial support • Training/capacity building on shea protection, weeding, pest disease control, pruning, planting, etc.	Farmers, DAs, MOFA, Forestry, GNFS NGOs Research Institution	Interview guide and literature review
To determine farmers' perception of the socio-economic values of the shea tree on shea conservation management practices in the Upper East Region	Livelihood value of shea and conservation management • Food security • Increase come • Rural employment • Housing • Medicine/health	Farmers	Farmer interview and Questionnaires

Source: Field survey, 2012.

3.6 Method of data analysis

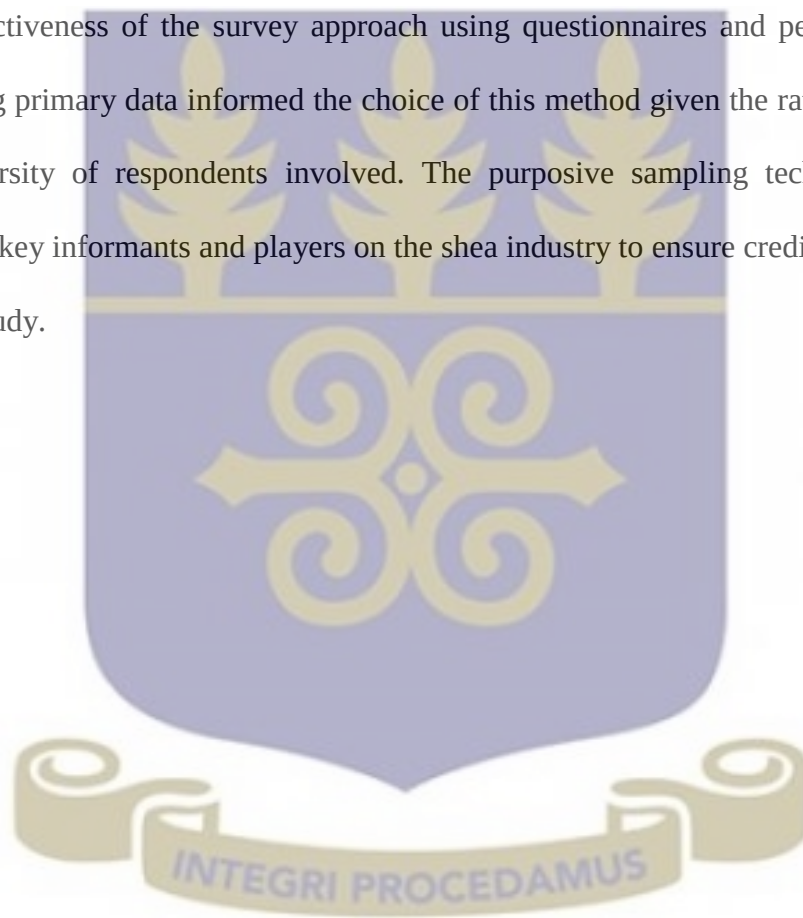
Method of analysis used for this study included tables, charts, frequency, percentages and means. Primary data was analyzed using Statistical Package for Social Sciences (SPSS) software. The Chi-Square test has been applied in two ways in this study: as a descriptive statistic to inform about the strength of association between two variables or their independence status, and also as an inferential statistic to inform about the probability that any association emerging are likely to be due to chance factors. Three assumptions are stated in relation to the use of the Chi-Square test employed as follows: variables are independent of each other; measurement is in terms of frequency of occurrence; and where two variables are involved they are assumed to be independent of each other under the null hypothesis.

The Chi-square test was employed in this study to test the hypotheses stated and to explore the relationship between knowledge and conservation management practices. Given the socio-cultural dynamics of shea, data was analyzed using the chi square test and frequency tables taking into consideration the socio-cultural characteristics of respondents e.g. sex, age and educational groups, to reflect knowledge in shea conservation management practices of the different social groups.

In terms of the decision rule, the planned cut off for the associated probability (significance level or Alpha) was 0.05. The attitude of farmers towards sustainable conservation management practices was measured by summing up the reactions of positive, negative and neutral responses to a list of questions that seek knowledge and attitude of the farmer towards sustainable practice. To achieve this, a 5 point Likert scale containing items with

response categories ranging from very much disagree to very much agree. Between a score of 1 - 2 was regarded 'negative attitude', 4 - 5 was regarded as 'positive attitude' and 3 was regarded as neutral. A commonly used attitude scale is the Likert scale constructed by compiling a number of topical statements that are equally divided among those items that express a clearly favorable attitude and those items that are clearly unfavorable (Harris 2010).

The effectiveness of the survey approach using questionnaires and personal interviews in collecting primary data informed the choice of this method given the rather large population and diversity of respondents involved. The purposive sampling techniques consciously included key informants and players on the shea industry to ensure credibility of the findings of this study.



CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

This chapter presents finding of this study analyzed from data collected from sampled farmers in the Upper East Region, in relation to the phenomenon under investigation i.e. shea conservation management practices. Results of the study are presented in response to the research questions and specific objectives under investigation, which include:

- To determine the contribution of farmers' knowledge towards shea conservation management practices in the Upper East Region.
- To examine the effects of farmers' attitudes towards shea conservation management practices in the Upper East Region.
- To examine the roles played by institutions and organizations towards shea conservation management in the Upper East Region.
- To assess the socio-economic values of shea trees towards livelihood outcomes in the Upper East Region.

Specific variables examined in this study are farmers' knowledge and attitudes in relation to basic shea conservation management practices, namely protection of shea plantation, weeding around shea trees, pest and disease control, pruning and planting of shea trees.

Section 4.1 gives a summary of respondents' characteristics, whilst sub-section 4.2 presents results on farmers' knowledge on key shea tree conservation management practices. Sub-section three looks at the attitude of farmers in relation to shea conservation management practices. Sub-section four however, describes the types of support farmers receive from institutions or organizations for sustainable management of shea trees. Finally the last sub-

section presents findings on farmers' assessment on the socio-economic values of shea trees to farmers' livelihood outcomes.

4.1 Summary of demographic characteristics of respondents

The demographic characteristics considered relevant in this study were sex, age and educational level of respondents. The socio-cultural and economic characteristics of the respondents is considered critical to this study in that it has an implication on the way respondents' perceive knowledge and attitudes in shea conservation management practices in the Upper East Region of Ghana. The gender distribution of respondents showed that there were 148 males representing 42% and 202 females representing 58%. The age distribution showed that majority, 146 representing 42% were aged between 41 - 50 years. The mean age of farmers was 45.4 years which is an indication of the youthfulness of the farmers and their likely amenability to change and education. The educational profile of respondents showed that 204 respondents representing 58% had no formal education.

4.2 Contribution of farmers knowledge towards shea conservation management

4.2.1 Farmers' knowledge in shea tree protection

Table 4 indicates that 95% and 93% of male and female farmers respectively have knowledge in shea tree protection in the study area. The bivariate analysis shows that there was no statistically significant difference between male and female respondents ($\chi^2 = 0.395$, $df=1$, $p = 0.03$). This means that the proportion of male respondents who have knowledge in shea tree protection is not different from the proportion of female respondents, who have knowledge in shea tree protection. This implies that both male and female farmers in rural

communities in the Upper East Region are aware of bye-laws and campaign programmes against bushfires and indiscriminate felling of shea trees. Key informant interview with the Directors of MoFA indicates that MOFA in collaboration with the District Assemblies and Fire Service department annually sensitize and train farmers on bushfire prevention.

The high level of farmers' awareness of the importance to protect shea trees confirms reports that people in shea growing communities have in place control measures against bushfires and destruction of shea trees by human activities such as charcoal burning and farming activities (Bayala, 2012; Okullo et al., 2006; Yidana, 2004). According to Bayala (2012) conservation of shea trees in most communities is a social responsibility and there are bye-laws and regulations strictly enforced.

Table 4: Farmers' knowledge in shea protection

Sex of respondent	Knowledge in shea protection						χ^2 test
	Yes		No		Total		
	Freq.	%	Freq.	%	Freq.	%	
Male	141	95.3	7	4.8	148	100.0	$\chi^2 = 0.395$ df=1 p = 0.03 Sig.
Female	188	93.1	14	6.9	202	100.0	
Total	329	94.0	21	6.0	350	100.0	

Source: Field survey, 2012.

4.2.2 Farmers' knowledge in weeding around shea trees

Table 5 shows that 91% of male respondents and 86% of female respondents have knowledge in weeding around shea trees. The bivariate analysis shows that there was statistically significant difference between male and female respondents' knowledge in weeding around shea trees ($\chi^2 = 1.178$, $df=1$, $p = 0.020$). This means that the proportion of male farmers who have knowledge in weeding around shea trees are different from the proportion of female farmers who have knowledge in weeding around shea trees.

Table 5: Farmers' knowledge in shea weeding

Sex of respondent	Knowledge in shea weeding						χ^2 test
	Yes		No		Total		
	Freq	%	Freq	%	Freq	%	
Male	134	90.5	14	9.5	148	100.0	$\chi^2 = 1.178$ df = 1 p = 0.020 Sign.
Female	174	86.1	28	13.9	202	100.0	
Total	308	88.0	42	12.0	350	100.0	

Source: Field survey, 2012.

The practice of weeding around shea trees is associated with normal agricultural activities in shea growing communities and this may be the reason for the high percentage of respondents reported to have knowledge in the conservation management practice. The study findings corroborates Apusigah's (2011) assertion that generally more men do weeding on farms than women due to the physical nature of men.

4.2.3 Farmers' knowledge in pest and disease control

The results also indicate that 29% and 4% of male and female respondents, respectively have knowledge in pest and disease control. The Chi square analysis shows that there was statistically significant difference between male and female respondents' knowledge in pest and disease control ($\chi^2 = 43.610$, df =, p = 0.050). This means that the proportion of male respondents who have knowledge in pest and disease control are different from the proportion of female farmers who have knowledge in pest and disease control.

Table 6: Farmers knowledge in pest and disease control

Sex of respondents	Knowledge in pest and disease control						χ^2 test
	Yes		No		Total		
	Freq	%	Freq	%	Freq	%	
Male	43	29.1	105	70.9	148	100.0	$\chi^2 = 43.610$ df = 1 p = 0.050 Sign.
Female	7	3.5	195	96.5	202	100.0	
Total	50	14.3	300	85.7	350	100.0	

Source: Field survey, 2012.

This is in line with IFAD (2001) study that male farmers dominated in the purchase and use of chemicals. Key informant interviews show that a parasitic plant called *Tapinanthus sp* (mistletoe) leads to the destruction of shea trees which reduces the shea yield. The key informants indicated that the outbreak of caterpillars (*cirinia forda*) a leaf eating insect as well as fungal diseases of shea, such as leaf spots and various moulds that attack fruits and nuts cause serious defoliation of shea trees.

The low percentage of farmers having knowledge in this conservation management practices is attributed to the general notion by farmers in the study area that the shea tree is naturally grown, and pests and disease outbreaks are naturally controlled. Focus group discussion with farmers indicates that outbreaks of the leaf eating worm (*cirinia forda*) often disappear following rainstorms or windy weather conditions. As a result of this believe, farmers hardly appreciate pests and disease control practices on shea trees. This confirms findings by Bayala et al., (2012) in a study in Uganda that shea is regarded a wild natural resource and farmers though benefit from it do very little to conserve the plant for sustainable production.

4.2.4 Farmers knowledge in pruning

Table 7 shows that 50% of male respondents and 32% of female respondents have knowledge in pruning. The Chi square results show that there was statistically significant difference between male and female respondents' knowledge in pruning ($\chi^2 = 9.372$, $df=1$, $p = 0.045$).

Table 7: Farmers knowledge in pruning

Sex of respondents	Knowledge in pruning						χ^2 test
	Yes		No		Total		
	Freq	%	Freq	%	Freq	%	
Male	74	50.0	74	50.0	148	100.0	$\chi^2 = 9.372$ df = 1 p = 0.045 Sign.
Female	67	32.0	135	67.0	202	100.0	
Total	141	40.3	209	59.7	350	100.0	

Source: Field survey, 2012.

This means that the proportion of male respondents who have knowledge in pruning is different from the proportion of female respondents who have knowledge in pruning, suggesting that more male farmers are aware of the importance of shea pruning than their counterparts. Commenting on the distribution of gender roles in farming communities, IFAD (2008) reported that in some rural farm households in Northern Ghana male farmers are responsible for digging, tree cutting, weeding, chemical handling, whilst women do planting, harvesting, etc. A study by Chimsah (2012) underscored the importance of pruning in the control of mistletoes, a parasitic plant on shea. CRIG (2006) reported among other cultural practices that pruning was capable of improving the fruiting quality of shea. Yidana (2006) and Lovett (2004) in separate studies have also reported of vigorous growth of shea plants after pruning.

4.2.5 Farmers knowledge in planting

In terms of knowledge in shea tree planting, the results indicate that 20% of male and female respondents respectively have knowledge in planting (Table 8).

Table 8: Farmers knowledge in shea planting

Sex of respondents	Knowledge in planting						χ^2 test
	Yes		No		Total		
	Freq	%	Freq	%	Freq	%	
Male	29	19.6	119	80.4	148	100.0	$\chi^2 = 1.660$ df = 1 p = 0.357 Not Sign.
Female	41	20.3	161	79.7	202	100.0	
Total	70	20.0	280	80.0	350	100.0	

Source: Field survey, 2012.

The bivariate analysis indicates that there was no statistically significant difference between male and female farmers' knowledge in shea tree planting ($\chi^2 = 1.660$, $df=1$, $p = 0.357$). This means that the proportion of male respondents who have knowledge in shea tree planting is not different from the proportion of female farmers who have knowledge in shea tree planting. The focus group discussion indicate that farmers have had series of education and training on how to propagate shea trees by international and local organizations and private individual. Farmers however, contended that more education and institutional support in the form of technical and logistical assistance was necessary to promote cultivation and commercial plantation establishment of shea. According to Zarrintaj et al., (2013), if people become more knowledgeable about the environment and its associated issues, they will in turn, become more aware of the environment and its problems and, thus, be more motivated to act towards the environment in more responsible way.

4.2.6 Age distribution of farmers' and knowledge of shea conservation management practices

Table 9 shows that majority of farmers between the ages of 40 and 59 years (adults) have knowledge in shea protection (40.3%) compared with 29% of the respondents in the age group of (20-39 years). Also, the findings show that 35% and 29% of farmers in the age group of 40-59 years and 20-39 years, respectively have knowledge in weeding around sheas trees. The findings indicate that 17% of farmers in the age category of 40-59 and 13% of farmers in the age category of 20-39 years have knowledge in pruning.

Table 9: Age of respondents and knowledge of conservation practice

Age of respondents	Protection		Weeding		Pest & disease		Pruning		Planting	
	F	%	F	%	F	%	F	%	F	%
20-39	103	29.4	101	28.9	13	3.7	47	13.4	24	6.9
40-59	141	40.3	124	35.4	19	5.4	60	17.1	15	4.3
60+	85	24.3	85	23.7	18	5.1	34	9.7	18	5.1

Source: Field survey, 2012.

These findings suggest that there are more adults having knowledge of shea conservation management practices than the youth. This may be due to dwindled advocacy and campaign on afforestation and tree protection and planting initiatives towards the fight against desertification in recent times as a result of probably lost of focus or reduced funding.

4.2.7 Farmers' level of education and knowledge of shea conservation management practices

Farmers' education and their knowledge of shea conservation management show that about majority of farmers with no formal education have knowledge in shea protection (53%), weeding (54%), pests and disease control (58%), pruning (46%) and planting (72%) (Table 10).

Table 10: Educational level of respondents and knowledge of conservation

Level of education	Protection		Weeding		Pest & disease		Pruning		Planting	
	F	%	F	%	F	%	F	%	F	%
No education	184	52.6	189	54.0	202	57.7	162	46.3	252	72.0
Basic	108	30.9	117	33.4	127	36.3	136	38.9	35	10.0
Secondary	35	10.0	21	6.0	14	4.0	28	8.0	46	13.1
Tertiary	23	6.6	23	6.6	7	2.0	24	6.9	17	4.9

Source: Field survey, 2012.

The results also indicate that more farmers at the basic education level have knowledge in shea protection, weeding, pests and disease control, pruning and planting compared with the other formal education category. The findings point to the possible fact that highly educated farmers could be less informed on the importance of shea conservation management, and more than likely pay attention towards shea conservation management. This may be due to the fact that public workers mostly use hired labour on their farms and are likely to be unfamiliar with agricultural practices associated with shea conservation activities. According to Zarrintaj et al (2013), if people become more knowledgeable about the environment and its associated issues, they will, be more motivated to act towards the environment in more responsible way. The relevance of knowledge and perception in influencing decisions regarding the adoption of innovations has been severally reported Rogers (2003) and Matthews-Njoku and Asiabaka (2003).

Summary of farmers' knowledge in shea conservation management practices in the Upper East Region

Findings of this study suggest that most farmers in the Upper East Region have knowledge in the importance of most shea conservation management practices. Whilst farmers have expressed knowledge in the protection of shea trees as important livelihood assets, their knowledge in the importance of weeding around shea trees, pests and disease control and pruning, is viewed important in the context of these operations in the general crop management system prevalent in the study area.

Although many farmers are knowledgeable in shea conservation management practices, individual initiative towards shea management operations is low. Vigorous advocacy and sensitization regarding conservation management practices involving the various segments of the community is required to increase their knowledge in shea conservation management practices e.g. youth, aged, educated, non-educated, male and female.

4.3. Farmers' attitudes towards shea conservation management practices

4.3.1 Respondents agreement on attitudinal statements on shea conservation management practices

Table 11 shows the analysis of farmers' agreement to statements on their willingness or readiness to participate or carry out shea conservation management practices, measured on the five point likert scale. The results indicate that majority of respondents (75%) agree very much that farmers in the community readily participate in bushfire prevention and control measures. The results also show that 73% of the farmers said that they construct fire belts

around shea trees on farmlands, parklands and forest so as to prevent bushfires from destroying shea trees. Moreover, 54% of farmers said that they very much agree to the enforcement of bye-laws against indiscriminate felling of shea trees in the community (Table 11). Furthermore, only 35% of farmers said that they very much agree on the practice of weeding around shea trees. These findings are consistent with reports that chiefs and traditional rulers enforce bye-laws against shea tree cutting for charcoal in Northern Ghana and this has led to the arrest and prosecution of some offenders ((Bonkougou, 2005; Carette et al., 2009)

On the statement that “shea propagation or planting is done by myself and many farmers in my community to ensure increased shea tree population and production” the analysis show that 20% of the farmers very much disagree. The focus group discussants said that attempts to propagate the shea tree hardly succeeded in raising the tree to fruiting stage. Almost all the discussants said that the slow growth of the tree is discouraging its cultivation. This corroborates Yidana’s (2006) findings that the long gestation period of shea and delay in return to investments is among the key reasons for farmers’ unwillingness to plant the crop.

As to whether pruning of shea trees is a regular practice on farms in the communities, 27% agreed very much, 42% of the farmers said they agreed, 20% were neutral and 8% of the farmers disagreed. Even though farmers observed that trees pruned produce better fruits, the reduced production or break in fruiting following pruning overshadows the importance of this practice, and farmers have hardly appreciated the value of pruning. The study concluded that even though farmers in the study area showed a generally high level of interest and willingness to practice shea conservation management activities, the lack of community sensitization and education on the importance of these practices makes farmers disregard the practice.

Generally farmers in the Upper East Region show a high level of positive attitude measured in their agreement on statements in relation to the various shea conservation management practices. It was however, evident that farmers are not actively practicing recommended conservation management activities, assigning several reasons including ownership and difficulties associated with carrying conservation management activities. The communal ownership or public nature of the shea plant where harvesting of the crop is opened to everyone in the community reduces the incentive from individuals to embark on conservation management of the shea trees, especially those on community parklands and forest. Effective conservation can only be achieved by involving all and sundry in the exercise. This study found that the involvement of community members in shea conservation management efforts in the zeogo community near Binduri in the Bawku area, has resulted in the successful protection shea trees in the community. The findings of this study is consistent with Ahnstron et al., (2008). They observed that the involvement of farmers in the conservation of natural resources is largely governed by their awareness of the problems, attitudes and apparent benefits of conservation practices.



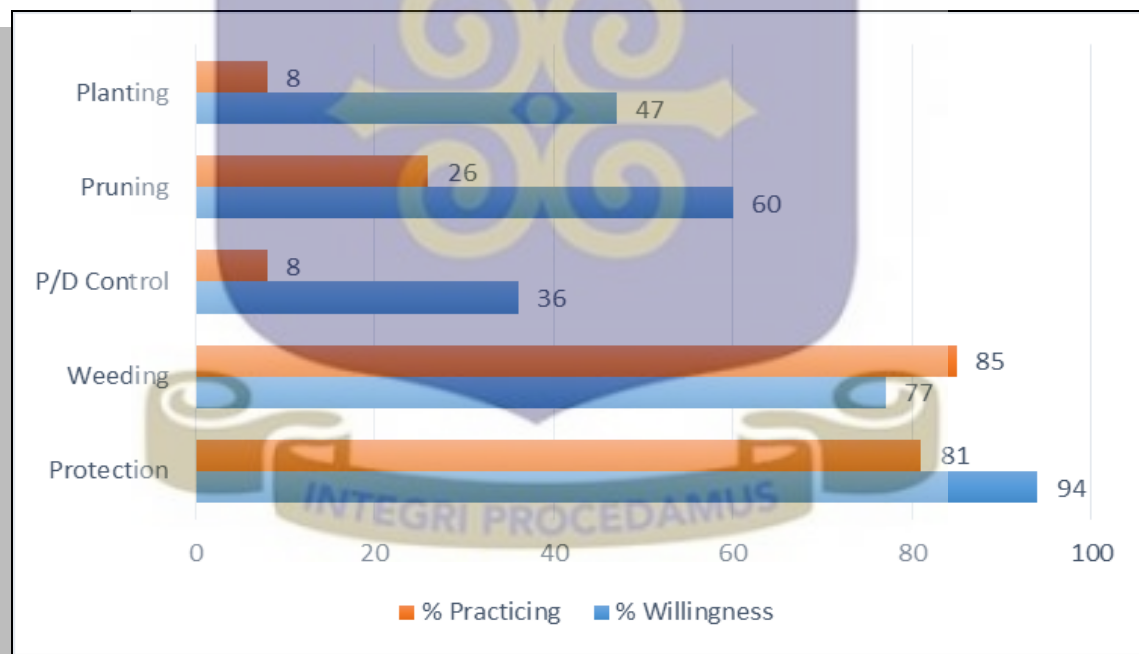
Table 11: Summary of farmers' agreement on shea conservation management activities

Statement on farmers' attitudes	Very much disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Very much agree (%)
Farmers have positive attitudes participating in bushfire prevention and control activities towards shea tree protection	0 (0.0)	0 (0.0)	22 (6.2)	66 (18.9)	262(74.9)
Farmers' construction of fire-belts around shea trees on farmlands, parklands and forest is a common practice on your farm and community against bushfires	0 (0.0)	7 (2.0)	14 (4.0)	75 (21.4)	254 (72.6)
The ban and bye-laws against indiscriminate cutting or felling of shea trees are seriously enforced by community members including yourself	0 (0.0)	0 (0.0)	0 (0.0)	161 (46.0)	189 (54.0)
You regularly weed around shea trees on your farmlands to improve on shea production	7 (2.0)	7 (2.0)	66 (18.9)	146 (41.7)	124 (35.4)
Pest and diseases on shea trees are promptly controlled on my farms and communities during outbreaks to ensure shea production	7 (2.0)	73 (20.9)	145 (41.4)	74 (21.1)	51 (14.6)
Pruning of shea trees is a common agricultural activity regularly carried out on shea trees on my farm and others	7 (2.0)	29 (8.3)	105 (30.0)	113 (32.3)	96 (27.4)
Shea propagation or planting is done by myself and many farmers in my community to ensure increased shea tree population and production	62 (17.9)	60 (17.0)	64 (18.3)	91 (25.9)	73 (20.9)

Source: Field survey, 2012

4.3.2 Farmers' willingness to practice against actual practice of shea conservation management activities

A comparison of the percentage of farmers' expressing the desire or willingness to practice shea conservation management activities indicated by their agreement (attitudes) towards key conservation management activities, to the percentage of farmers who really practice shows that whilst 94% and 77% have the willingness to practice shea plantation protection and weeding around shea trees, with 81% and 85% actually practicing (Figure 2). The study revealed that fewer farmers (36%) and (47%) respectively have the willingness to practice pests/disease control and planting activities respectively, with only 8% are actually practicing these conservation management operations.



Source: Field survey, 2012

Figure 2: Farmers' Willingness to practice and actual practice of shea conservation management activities

About 60% of farmers indicated their willingness to practice, whilst 26% actually practice pruning on shea trees to improve production.

The higher percentage practicing weeding was attributed to the importance of this activity within the farming system prevalent in the Upper East Region. Generally the shea tree is regarded a natural plant and farmers do very little in terms of planting, pests and disease control, pruning to increase the shea vegetation. Farmers did not only indicate their frustrations about the slow growth of shea, but the lack of improved varieties and financial support to propagate shea. Lovett (2010), and several shea researchers have lamented the poor conservation management and fast decline of the natural shea plantation in Northern Ghana, tracing the problem to the negative attitudes of farmers due to inadequate technical understanding of the value of shea conservation management practices on shea production, coupled with low institutional support.

4.4 Institutional support towards shea conservation management

Stakeholder analysis on interventions towards shea conservation management practices indicated that most stakeholders operating in the shea industry hardly offer support towards shea conservation management. The analysis show that apart from shea plantation protection, activities of key stakeholders in the shea industry clearly excludes shea conservation management activities such as weeding, pest and disease control, pruning and planting (Table 12).

The study found that USAID is engaged in the market promotion and value chain development of shea products towards livelihood outcomes and rural development in countries and across most of the communities visited. The World Bank has also supported women shea operating groups or associations to increase income from shea production.

Global Shea Alliance (GSA) is the platform for shea marketing development and standardization for the world market. SNV, CRS, World vision have found shea butter processing a lucrative livelihood strategies and a number of intervention have been implemented to improve and enhance income of many shea growing communities. MoFA as the leading state agency responsible for agricultural and rural development encourages the management and utilization of natural resources. Over the years, the sector has provided technical assistance in bushfire prevention and protection of shea trees. Logistics and training on improved shea butter extraction methods, including the provision of credit and equipment had been provided by MoFA for improved quality shea butter production.

Besides the annual sensitization of farmers on shea protection and picking, the WIAD sector of MoFA carried out shea butter utilization activities for women. Most District Assemblies have enacted by-laws against bush burning and indiscriminate cutting down of shea trees for fuelwood and charcoal towards conservation management of the natural resource. The Forestry Services Commission (FSC) protects forestry resources, including 'shea trees within the forest reserves. According to key informants the Ghana COCOBOD is the mandated organization to develop the shea industry, especially for plantation establishment and improvement of shea products for the export market. Initiatives to promote shea picking (production) and marketing include the supply of logistics e.g. bicycles, wellington boots, jute sacks, and cutlasses with the aim of increasing shea picking from the distant forests. The CRIG sub-station at Bole in the Northern Region established by COCOBOD in 1976 is mainly to promote shea production with improved technologies and innovations.

Various NGOs in Northern Ghana are engaged in livelihood interventions for women groups in the shea industry to improve their livelihood outcomes. Support by NGOs is mainly in the form of technical assistance, credit and logistic support (equipment) for shea butter processing and marketing. Elias et al. (2006) indicated that the work of NGOs has been very instrumental in networking and sharing vital information within the shea sector in order to reduce the gap between rural producers and international market. According to Uphoff and Louise (2006), usually in any rural area there exist considerable variety of local institutions, and some of these may be playing positive roles in economic and social development, and lamented the situation where conservation of savannah lands is considered less of a priority by most governments and donors than that of tropical Rainforest.



Table 12: Overview of institutional operations in the shea industry in Ghana

Institution	Type of support	Specific activities on shea conservation	Beneficiaries	Remarks
MOFA/FSD (MMDAs)	Technical assistance on protection	Bushfire bye-laws, training on fire-belts constructions, fire-fighting & campaigns, volunteers, etc.	Farmers (pickers)	Collaborate with Ghana National Fire Service
	Support for shea butter processing & extraction	Training on shea nut/butter processing and utilization.	Women processors	
COCOBOD/ PBC/CMB	Logistics and technical assistance for shea picking	Training on picking, drying, storage, packaging	Producers (pickers), processors, traders	Provided in the 1990s
	Logistics and Credit (for processing and marketing)	Equipment and tools, jute sacks, cutlasses, transport, storage facilities		
RESEARCH (CRIG, UDS, etc.)	Technology and innovation development, etc.	-Grafting techniques -Nursery and transplanting techniques -Natural regeneration/domestication techniques (improved agronomic practices e.g. weeding, pest & disease control, etc.)	Research stations, collaborating institutions, etc.	CRIG substation at Bole and UDS
FORESTRY SERVICE COMMISSION (FSC)	Natural resource development, planting and protecting tree species	-Training and advocacy on awareness of shea management practices -Distribution of shea planting materials (seedlings, etc.)	Forestry staff and collaborating agencies	Provided seedlings to farmers in 1999
NGOs	Livelihood support, technical assistance, credit, logistics, etc.	Credit provision, training on shea management and production	Farmers, rural households, shea actors	SNV in Tamale, BEWDA in Bawku,
TRADITIONAL AUTHORITY	Shea tree protection/management of natural resources	Enforcement of bye-laws on bushfires, tree cutting, etc.	Community volunteers	Tindanas, chiefs, etc.

Source: Field survey and literature, 2012

Farmers' response on institutional support for shea conservation management

Table 13 presents a summary of farmers' response on institutional support towards shea operations in the Upper East Region of Ghana. Key participating institutions include MoFA, MDAs, and NGOs, providing support to farmers for shea picking, processing, marketing, protection and management of existing shea trees, with possible cultivation. MOFA has included technical support in training of women groups in shea butter processing and utilization, under WIAD activities (MoFA District Annual Work plans, UER; 2012). The results show that very few farmers, less than 20% in most districts, indicated institutional support is provided for shea picking, processing and marketing. Majority of farmers contended that there is no institutional support towards shea operations.

Even though many NGOs were found operating in the study area, in most cases in collaboration with MOFA to enhance livelihood outcomes of farmers, there was hardly any significant intervention or development program for sustainable shea production and conservation management. Institutional support in the shea industry has focused on women groups in shea butter processing and marketing. The presence of church NGOs such as PAS in Garu, ADRO in Bawku West and BUCCO bank in Builsa districts; and a number of CBOs provide support for women groups and shea butter associations including credit, equipment and training to improve their operations in shea butter production.

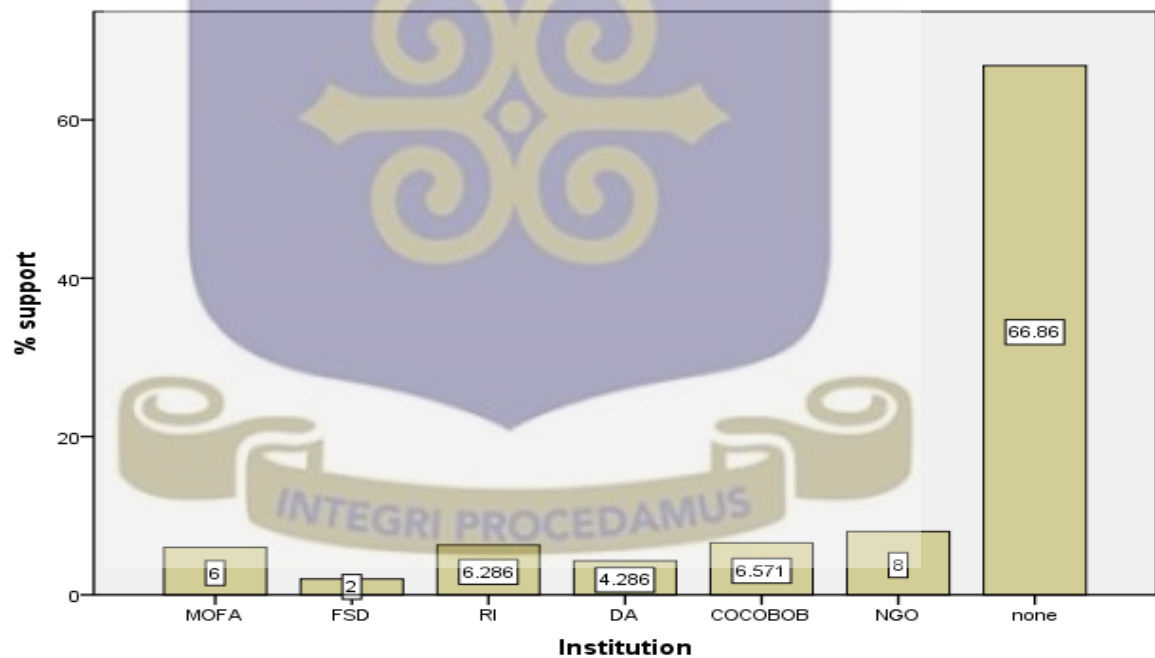
The findings on institutional support to the shea industry revealed that, not only has stakeholder interventions in the shea industry been infinitesimal and unsustainable over the years but largely uncoordinated, between the various development agencies operating in the study area.

Table 13: Farmers' response on institutional support in shea trees conservation management

District		Protection		Picking		Processing		Marketing		No support		# of Respondents
		Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	
Garu-Tempane	MOFA	7	10.4	-	-	15	22.4	20	29.9	25	37.3	67
	MDA	-	-	-	-	-	-	-	-	67	100.0	
	NGOs	-	-	7	10.4	-	-	-	-	59	89.6	
Bawku West	MOFA	10	13.0	7	9.1	15	19.5	7	9.1	53	51.3	77
	MDA	-	-	-	-	-	-	-	-	77	100.0	
	NGO	7	9.1	-	-	-	-	-	-	70	81.9	
Kasena-Nankani	MOFA	7	9.3	-	-	22	29.3	-	-	46	61.3	75
	MDA	7	9.3	-	-	-	-	-	-	68	90.7	
	NGO	-	-	-	-	15	20.0	-	-	60	80.0	
Builsa	MOFA	15	20.8	15	20.8	15	20.8	-	-	27	37.5	72
	MDA	-	-	-	-	20	27.8	-	-	52	72.2	
	NGOs	-	-	-	-	15	20.8	15	20.8	42	58.4	
Talensi Namdam	MOFA	-	-	-	-	7	11.9	10	16.9	42	71.2	59
	MDA	-	-	-	-	-	-	-	-	59	100.0	
	NGOs	-	-	-	-	15	25.4	-	-	44	74.6	

Source: Field survey, 2012.

Figure 3 shows a bar chart indicating farmers' response on institutional support towards shea conservation management practices. Majority of farmers (67%) are of the view that no institution or stakeholder supports the conservation management of shea towards sustainability of the industry. Only a few farmers, less than 10% recognized the support of MoFA (6%), District Assemblies (4%), COCOBOD (7%), NGOs (8%), etc. The most important institutional support towards shea conservation management is the protection of shea trees from bushfires and indiscriminate cutting down of trees. MOFA in collaboration with the District Assemblies and the Fire Service department provide training and sensitization programmes on firefighting techniques and construction of fire belts to prevent outbreaks.



Source: Field survey, 2012

Figure 3: Farmers' responses on institutional support towards shea conservation management

Most stakeholders expressed lack of expertise and techniques in shea planting, pruning, pest and disease control, accounting for the low response towards these initiatives. Also research findings, particularly from CRIG, especially on vegetative propagation techniques, pest and disease control methods, planting; have not been made available to extension institutions, and activities of MOFA, the largest agricultural extension organization in the study area does not include these research findings. According to Okullo et al (2005) the work of COVOL, an NGO in Uganda resulted in increased shea population and production of shea products for farmers' livelihoods. In Ghana the SNV, a Danish NGO is reported to support shea conservation management in the Northern and Upper West Regions to increase shea nuts production for improved livelihoods of women. The cultivation and conservation of the shea has been strongly advocated by leading development agencies such as ISODEC, USAID and Global Shea Alliance (Lovett, 2010).

Napier et al., (2008) observed that unless the attitudes of all stakeholders in a concerned area are assessed and represented, conservation planning and program implementation efforts may not achieve its anticipated outcomes. The low level of institutional support towards shea conservation management practices reported by this study could be attributed to inadequate information on key roles key stakeholders could play in promoting sustainability of the shea industry livelihood outcomes.

Institutional and stakeholders support towards conservation management of the shea was found to be woefully inadequate. Except the occasional interventions from a stakeholders, e.g. MOFA, COCOBOD, GNFS and FSC towards shea protection, key development institutions hardly implement shea conservation management programs. The economic

importance of shea requires that conservation management be made central in the development agenda of stakeholders especially under the SADA programme.

4.5 Relationship between farmers' perception of the socio-economic value of shea trees and shea conservation management

This section of the study addressed issues relating to the shea industry and how the socio-economic and livelihood values of shea have contributed towards farmers and community practices of conservation management of the industry. Farmers traced various parts of the shea tree and the usefulness to livelihood outcomes and economic development. Farmers' response on the perception of food security, income and employment values of the shea industry is graphically summarized (Figure 3). Respondents mentioned the various parts of the shea plant, indicating its usefulness or value to livelihoods and economic development. Key parts of the shea plant identified by respondents included the roots, stem, leaves, fruits, flowers, and other by-products e.g., gum or latex, etc. Knowledge and perception of the socio-economic values of various parts of the shea plant, and products so associated, can influence farmers' perception towards basic shea conservation management practices.

The shea roots

Farmers indicated the medicinal value of shea roots and its application in the treatment of various ailments. The root of shea is added to certain herbal preparations for the treatment of ailments in the rural communities. Farmers mentioned the shea roots with pawpaw leaves, guava leaves, neem and other herbs for the treatment of jaundice, stomach pains, etc. The study observed that farmers are aware of the binding effects of shea roots in checking erosion and improving soil fertility for their food crops. According to Fobil (2007) the roots and bark of shea have numerous medicinal uses, and are boiled or ground into powder for

the treatment of dysentery, suppurating wounds and other ailments. As reported by Teklehaimot (2004), shea trees on farm lands contribute to crop growth through soil improvement and decreasing evapotranspiration.

The stem

The shea stem was identified by respondents to include the bark and the branches (woody parts). The bark is useful in the treatment of stomach pains, especially children. Mothers and local herbalists add shea bark in preparation of traditional concoctions for the treatment of various ailments. The branches of shea were identified to have multiple uses in the rural household, ranging from artifacts materials, e.g. walking sticks, hoe handles, utensils, mortar and pestle, drums, timber and roofing sticks. The sticks of shea are termite resistant and good in erecting hats and constructions of rooms. Shea wood is the major source of charcoal and fuelwood in most rural communities. The shea tree is also involved in several traditional applications, and a shea branch is the preferred stick or wood for the customary announcement of first born babies of a couple in the Kusasi tradition. (Carette et al., 2009) noted that almost every part of the tree has some uses, with the fresh fruit is eaten and the leaves are used as fodder and also as an ingredient for making alkaline and paint. . According to Teklehaimanot (2004), shea trees on farmlands can contribute to crop growth through soil improvement and decreasing evapotranspiration

Shea leaves

Shea leaves are added to herbs for the treatment of jaundice, stomach pains and cough. Farmers mentioned the use of shea leaves for domestic applications in the fermentation process of dawadawa (local magi), and in customary rites (funerals and birth) (figure 6). In the past, shea leaves were customarily worn by widows and old ladies on fashionable

occasions, but this respondents added, had faded with the present generation. Respondents also implicated the value of the shea leaves in soil fertility on decay, especially beneath the tree. According to (Carette, 2009) soil fertility improves around the outer surroundings or the canopy of shea trees. Some respondents however, observed that shea leaves decay quite slowly and take a rather longer period to provide manure. The study noted that given the abundance of shea trees and the minimal social requirements for shea leaves, this aspect of shea value will not rapidly promote conservation management practice of the industry.

The shea fruits

The shea fruits contain the edible portion (mesocarp) and the nut which produces the shea butter. The fruits form a good source of protein and in some communities is a major source of food especially during the lean period. The nuts are processed locally into butter, which is used for food preparation locally and as a raw material for the manufacture of local cosmetics (soap, body creams), and in the preparation of medicines in the pharmaceutical industries

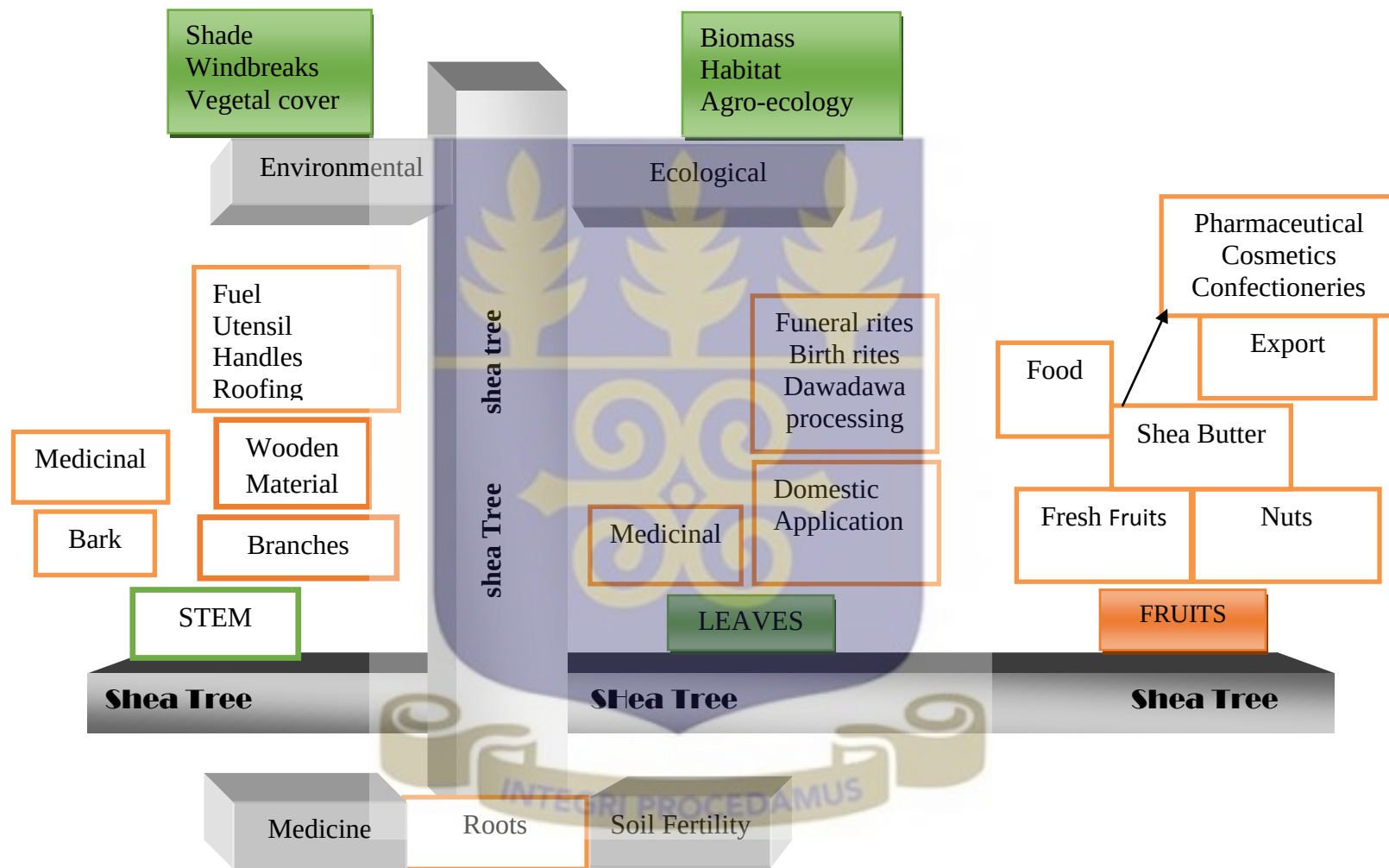
Farmers and stakeholders were familiar with the direct export of nuts on international market, which is essentially processed into shea butter for use in the confectionery, cosmetics and pharmaceutical industries. The shea butter produced locally is also exported as raw material for manufacturing purposes. It is the fruit/nut value of shea that has the greatest influence in shea conservation management, and any sustainable program must target this aspect. The economic and livelihood values of shea fruits and nuts has been adequately documented in the confectionery, cosmetic and pharmaceutical industries on the international market (Bonkougou et al., 2005; Yidana, 2004). According to Saeed (2012)

and Okullo et al., (2010), the shea fruit is an important resource for managing high blood pressure.

The ecological importance of shea tree

The shea tree is the most predominant plant species in the three regions of Northern Ghana, Upper East, Upper West and Northern Regions. The plant is of such ecological importance in environmental protection and influences ecological and climatic changes especially in fighting desertification and climate change. Farmers described the shea tree as a ‘friend in life’ given the range of benefits derived from it. Apart from providing shade for people and animals especially during the long dry season, shea trees also serve as windbreaks in protecting crop and roof of houses. The tree is also the habitat for many creatures e.g., birds, bats, reptiles, and thus useful in the ecosystem equilibrium of the savannah grasslands. Several writers on shea have corroborated the usefulness of the plant, and according to Yidana (2006) shea is a universal economic plant and a ‘free gold’ or ‘green gold’ for women in the savannah area.



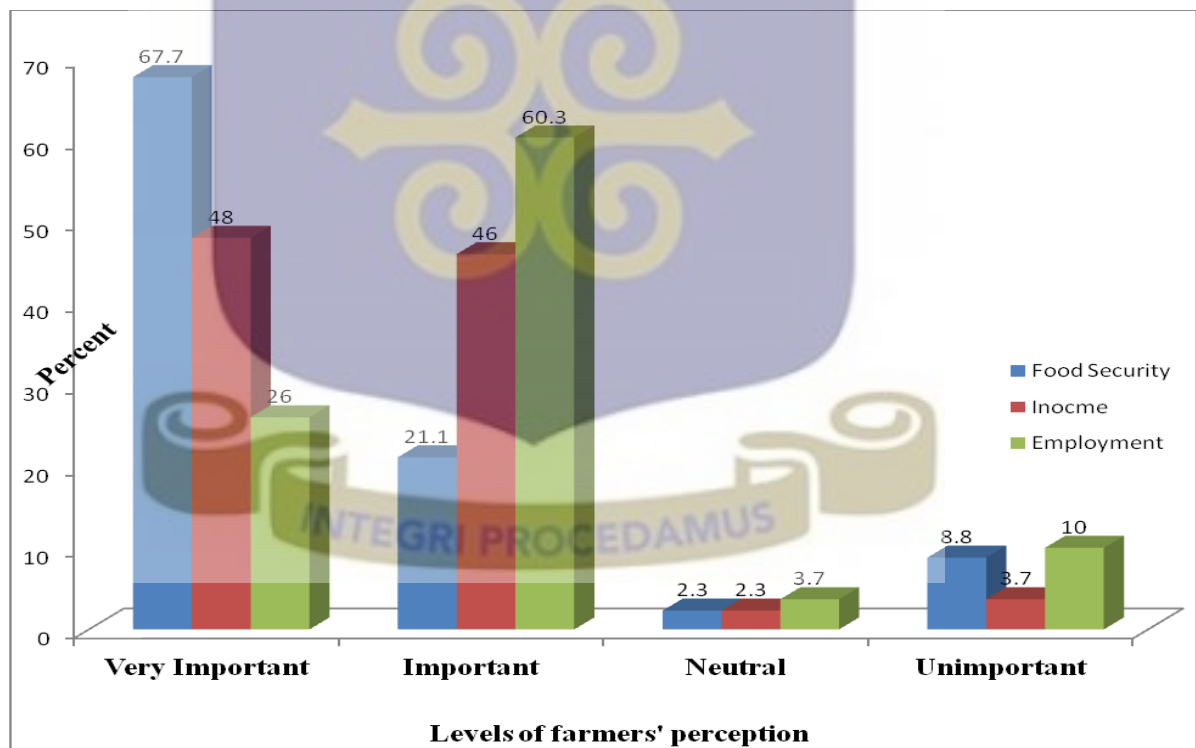


Source: Field survey, 2012.

Figure 4: Tracing the socio-economic value of the shea tree

4.5.1 Farmers' perception of the livelihood values of shea on conservation management

Figure 5 shows a bar chart depicting farmers' perception on the importance or value of the shea industry towards livelihood outcomes such as food security, increase income, employment, etc. The results show that farmers were of the view that shea trees are very important because it gives food security (68%), income (48%) and employment (26%). Also, less than 10% of farmers held the perception that shea trees were unimportant for the livelihood outcomes of farmers. The study therefore concluded that farmers are generally of the opinion that the shea industry makes significant contribution towards food security, income and employment in the Upper East Region.



Source: Field survey, 2012

Figure 5: Response on farmers' perception of shea livelihood value

The sale of shea fruits along some major highways, and in urban markets has become a popular business with children and women participating in the business in the Upper East Region (Figure 6). According to Bayala et al. (2011), 60% of rural women in Mali rely on the shea industry for livelihood. As noted by Abukari et al (2013), the export of shea offers employment to over 1.2 million people in the Sub-Saharan Africa and in Ghana more than 900, 000 women are engaged in the shea industry for their livelihood. Whilst many shea writers have alluded to the socio-economic potential of the industry and have continuously emphasized on the need to concentrate on management of the natural resource to ensure sustainable contribution to livelihood outcomes; it is reported that less than 40% of shea resources are utilized, and the remaining is wasted due to difficulties in resource management (Bonkongou, 2005).



Plate 1: Sale of shea fruits along Bawku-Bolga highway in the Upper East

Source: Field survey (Credit: Aboyella, 2012)

This study observed that the income and employment, rather than the food security values of the shea plant, may have the greatest influence on farmers' conservation management of shea plants.

4.6 Respondents views on appropriate strategies for industrialization of the shea industry.

Table 14 shows the results on the views of respondents on the appropriate strategies for the development and industrialization of the shea industry for sustainable livelihood outcomes in the Upper East Region. A total of 121 (82%) Males and 195 (97%) females indicated the need for market development, especially providing sales centers and export promotion activities to increase international marketing of the shea products. Plant improvement and shea genetic material development was found to be an essential aspect of the shea value chain, for hybrid and early maturing varieties of the plant for cultivation and possible investment in plantation establishment; as indicated by 97% male and 68% female respondents. Provision of capital investments for key actors in the shea industry to increase production was also considered an important strategy indicated by 60% male and 94% of female respondents. Capital investment is a motivating factor for rural people especially the women to actively engage in shea production business.

In Burkina Faso investment support (capital) provided by UNIFEM increased shea picking and processing (Elias et al., 2006). Similar interventions are reported in Niger, Mali, Niger and Ghana in the form of credit and logistics support including equipment and tools e.g., processing machines, means of transport, cutlasses, sacks, field boots, etc.

Table 14: Strategies for development of the shea industry

Strategy	Description	Male		Female	
		Freq.	%	Freq.	%
Market development	➤ More market centres/agents ➤ Stable prices ➤ Export promotion	121	82	195	97
Plant improvement	➤ Improved varieties/research ➤ Nursery establishment/supply of seedlings ➤ Agronomic/husbandry management	136	92	137	68
Capital investment	➤ Loans for shea operations e.g. processing, value addition, marketing ➤ Logistics support (Tools & equipment, transport, etc.)	89	60	190	94
Education & Capacity building	➤ Awareness creation & training (on recommended practices and innovations, etc.) ➤ Mass media education & sensitization	83	56	178	88
Policy direction	➤ Defining community and role of traditional leaders ➤ Promotion/motivation packages ➤ Establishment of Shea BOARD ➤ Mainstreamed into SADA programme ➤ MMDAs/Stakeholders contribution towards development of the sector	98	66	152	75

Source: Field survey, 2012.

According to some farmers and key development partners interviewed (MoFA, NGOs), this strategy by PBC and other NGOs and Church agencies increased shea production significantly in the 1970s and 1980s (COCOBOD, 2011). They lamented that the absence of these initiatives was partly the reason for the poor management of shea resources in the study area. Complaints of the lack of market and poor prices for shea products was quite a disincentive for farmers picking the shea nuts from the interior of the forests in the savannah woodlands.

The general opinion from respondents, especially those of public institutions and partner organizations showed a lack of clear policy direction on issues of shea development for sustainable management and production. Farmers suggested the inclusion of the plant in the list of crops promoted by MoFA, COCOBOD and GEPC to ensure the effective implementation of projects and programmes, especially value addition towards sustainable livelihoods.

Stakeholders recommended the establishment of a Shea Governing Board with the mandate to oversee the development of the shea industry. The study found that there is a strong feeling amongst the general public that making shea the central theme of the SADA programme, with well-defined business promotion activities along the entire shea value chain will realize rapid development. Carrette et al., (2009), reported similar suggestions from Dr. Yidana and noted that the National Association of Shea Farmers, Processors and Buyers established in 2007 advocated for a separate board for shea from the cocoa board, to focus more on the opportunities and making improvements within the shea market.

The potential of the shea sector to contribute to job creation, employment and sustainable incomes for rural poverty reduction was adequately endorsed by most MMDAs, with suggestions of a mandate to direct a percentage of the District Assembly Common Fund (DACF) towards research and innovations development to promote business in the shea sector.

The role of traditional leaders and communities was highlighted during this study and any sustainable strategy for the shea industry must involve local institutions and beneficiary stakeholders.

Despite key role of shea in the livelihoods of people in the Upper East Region, conservation management is yet to be appreciated by farmers in the area. The alarming deforestation and decline in production of shea nuts needs to be adequately highlighted by development programs to prompt beneficiaries for actions towards conservation and sustainable use of the resource.

Even though farmers showed high level awareness of the importance of key shea conservation management activities, there is low participation in these activities amongst farmers in the Upper East Region. The negative attitudes of farmers towards shea conservation was strongly linked to the socio-cultural context of the plant as a free natural resource community members. Whilst the socio-economic value of the plant has the potential to motivate farmers to be keen in conservation activities, inadequate investment and institutional support towards shea management has adversely contributed to the poor response of farmers towards conservation management.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This section contains summary of this research findings, and recommendations for possible future action for industrialization of the shea sector. The chapter highlights the relationships between farmers' knowledge, practices, perception and shea conservation management, and the contributions of stakeholders and institutional support towards shea conservation management in sustaining the shea industry for improved livelihood outcomes in the Upper East.

5.1 Summary of the study

The shea plant (*Vitellaria paradoxa*) is an economic tree naturally found across the Sudan and Guinea savannah regions of Sub-Saharan Africa, stretching across most of the West African states extending up to Sudan in East Africa, and onto the foothills of the Ethiopian highlands covering a land area measured by 500 -750 km wide and 5,000 km long.

The declining density of shea trees in the Upper East Region of Ghana poses a threat to the livelihood of a large number of people who depend on the natural resource. This phenomenon is attributed to the lack of knowledge, negative attitudes of users of the shea natural resource and the nature of institutional support towards shea conservation management. Sustainability of agricultural production is largely dependent on the action of farmers and their decision making abilities, given the level of knowledge and information that is available to them. Many promising agriculture policies have failed because they were

inappropriate to farmer's needs and perception. The overall objective of this study was to explore farmers' knowledge, attitudes and institutional support towards shea conservation management practices in the Upper East Region of Ghana. The findings of the study are as follows:

5.1.1 Farmers' knowledge of shea tree conservation management

The results generally indicate that more male farmers have knowledge in shea tree conservation management practices as compared to female farmers. Besides shea protection, the other conservation management activities i.e. weeding around shea tree, pests and disease control, pruning and planting are conjoined practices with crop farming in the study area. The chi square results shows that there is significant difference between male and female farmers in protection, weeding, but not in pests and disease control, pruning and planting. The age and educational influence on farmers' awareness or knowledge in shea conservation revealed that protection is a well-known practice amongst the communities. Generally fewer farmers have knowledge in the importance of weeding around shea trees, pests and disease control, pruning and planting activities related to shea. Despite the fact that the declining tree population of the shea is a worry to farmers and communities in the UER, inadequate investment and institutional support are responsible for the poor conservation management of the shea natural resources.

5.1.2 Farmers' attitudes towards shea conservation management practices

The study showed that majority of respondents agreed very much with the statement that farmers in the community readily participate in bushfire prevention and control measures. The statement on construction of fire belts in protection of shea trees equally indicated a

high percentage farmers agreed very much with the statement. Farmers also showed readiness or high level of willingness towards enforcement of bye-laws against indiscriminate felling of shea trees in the community, sometimes leading to arrest and prosecution of offenders. Farmers' response to the statement on the practice of weeding around shea trees found that 35% and 42% of farmers very much agreed and agreed respectively with the statement, with fewer than 5% in disagreement. Responses to the statement on shea planting to increase shea plant population showed that over 80% of farmers were in agreement with the statement. Farmers were however divided as to whether pruning of shea trees is a regular practice on farms in the communities. The results revealed that more farmers were of the opinion that pruning is an important practices regularly carried out by farmers.

5.1.3 Institutional support for development of the shea development

The contribution of stakeholders and institutions towards shea conservation management was found to be grossly inadequate. The study found that key development agencies such as MoFA, MMDAs, FSC, NGOs and donor partners pay very little attention towards conservation management of the shea industry. The inadequate investment in the shea sector was traced to the long gestation period and slow growth of the plant, and other challenges confronting the shea sector. The study realized that policy direction on the shea industry is quite unclear, and the involvement of development organizations in shea operations was limited to organizational choice. This has resulted in the concentration of stakeholder participation in shea processing and marketing, to the detriment of conservation management interventions, mostly due to long period required for returns on investments in shea conservation, especially planting.

5.1.4 Farmers' perception of the value of shea trees and conservation management

Knowledge and perception of the socio-economic values of various parts of the shea plant, and products can influence farmers' perception towards basic shea conservation management practices. Farmers indicated the medicinal value of shea roots and its application in the treatment of various ailments. They also mentioned that shea roots with pawpaw leaves, guava leaves, neem and other herbs are added for the treatment of jaundice, stomach pains, etc. The study observed that farmers are aware of the binding effects of shea roots in checking erosion and improving soil fertility for their food crops. The shea stem was identified by respondents to include the bark and the branches (woody parts). The bark is useful in the treatment of stomach pains, especially children. Mothers and local herbalists add shea bark in preparation of traditional concoctions for the treatment of various ailments.

The branches of shea were identified to have multiple uses in the rural household, ranging from artifacts materials, e.g. walking sticks, hoe handles, utensils, mortar and pestle, drums, timber and roofing sticks. The sticks of shea are termite resistant and good in erecting hats and constructions of rooms. Shea leaves are added to herbs for the treatment of jaundice, stomach pains and cough. Farmers mentioned the use of shea leaves for domestic applications in the fermentation process of dawadawa (*local magi*), and in some customary rites (*funerals and birth*).

The shea fruits contain the edible portion (mesocarp) and the nut which produces the shea butter. The fruits form a good source of protein and in some communities is a major source of food especially during the lean period. The nuts are processed locally into butter, which is used for food preparation locally and as a raw material for the manufacture of local

cosmetics (soap, body creams), and in the preparation of medicines in the pharmaceutical industries. Farmers and stakeholders were familiar with the direct export of nuts on international market, which is essentially processed into shea butter for use in the confectionery, cosmetics and pharmaceutical industries. The plant is of such ecological importance in environmental protection, ecological and climatic influence especially in fighting desertification and climate change. Farmers described the shea tree as a ‘friend in life’ given the range of benefits derived from it. Apart from providing shade for people and animal especially during the long dry season, shea trees also serve as windbreaks in protecting crop and roof of houses. The tree is also the habitat for many creatures e.g., birds, bats, reptiles, and thus useful in the ecosystem equilibrium of the savannah grasslands

5.1.5 Strategies for development of the shea industry

Respondents identified market development, plant genetic improvement, education and capacity building, investment support and clear policy framework to be the priority initiatives that could ensure industrializing of the shea industry. The main strategies for development of the shea industry include market development, plant improvement, capital investment, education and capacity building of farmers to adopt best agronomic practices to increase shea population.

5.2 Conclusion

The study had the main objective of determining the relationship between farmers’ knowledge, attitudes and the role of institutional support towards shea tree conservation management in the Upper East Region of Ghana. It was found that individuals and communities in general had high knowledge in the importance of most of the shea

conservation management practices considered under this study, but either lacked the capacity or were reluctant to practice shea conservation management. The study also observed that the numerous important livelihood outcomes to be derived from shea has the potential to encourage farmers into practicing conservation management of shea trees in the study communities. The study has contributed in identifying shea conservation management practices that needs critical support from key development organizations, such as Ministry of Food and Agriculture. This research will also add knowledge to existing literature on shea, especially on conservation management and sustainability of the industry.

Whereas majority of farmers showed positive attitude towards shea conservation management practices, a significant percentage expressly showed a negative or neutral attitude towards conservation management practices. This was attributed to ignorance on the part of farmers as majority of them are not aware of the beneficial and/or damaging effects of certain practices. The present level of farmers' knowledge and awareness cannot support the technicalities of certain practices towards ensuring the sustainable shea tree management.

5.3 Recommendations

The higher level of willingness and positive attitudes shown by farmers towards shea conservation management practices indicate the importance of the plant to people in the Upper East Region. Increasing farmers' knowledge and awareness in key conservation management practices through sensitization and advocacy could highly improve conservation management of the natural resource towards sustainable production for livelihood outcomes. Increasing farmers' access to resources such as inputs, credit, capacity

building, especially for women has the potential to enhance their contribution towards the conservation management of shea trees, and consequently take advantage of market opportunities for better incomes.

The study further recommended for adequate institutional support in the area of research and extension to promote commercial cultivation of the plant. This will encourage conservation management practices, given the wider social role of the plant. There is the need for a broader consultation and stakeholder involvement in discussions and planning on programs and projects towards sustainable conservation management of the shea industry. Traditional and community leaders are central to the development of the shea industry and the suggestion for the establishment of a Shea BOARD should translate to the development of local structures to ensure sustainability of programs. Actively engaging all relevant stakeholders including the private sector in the management and production of shea has been strongly advocated by this study and the need for a clear policy on investment support to attract the participation of key stakeholders within the study area is strategic.



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Appendix I: Questionnaires

TOPIC: THE INFLUENCE OF FARMERS KNOWLEDGE, PRACTICE AND INSTITUTIONAL SUPPORT TOWARDS SHEA CONSERVATION MANAGEMENT FOR LIVELIHOOD OUTCOMES IN THE UPPER EAST REGION:

SECTION A: BACKGROUND INFORMATION OF RESPONDENT

Code Date of interview...../...../2012. Community.....

(i) Name of Respondent Sex ☐ Age ☐

(ii) Marital Status: (a) Married (b) Single (c) Divorced (d) Widow(er) (e) others

(iii) Educational level of respondent: (a) No education (b) Basic education

(c) Secondary education (d) tertiary education (e) Non-formal education

(iv) Main occupation of respondent: (a) Farming (b) Trading (c) government worker

(d) Private sector employee (e) Others, (specify)

(v) Status in the Household (a) head (b) housewife (c) dependent (d) Others

(vi) Number of dependents in your household

(vii) Type of shea business engaged in; if any (a) production /picking (b) processing

(c) Marketing (d) Other specify.....)

(viii) Number of years operating or working in the shea business?

- (a) below 10 years (b) 10 -20 years (b) 21-30 years (c) 31- 40years (e) Over 40 years
- (x) How long have you been farming? (a) less than 10 years (b) 10 – 20 years
- (c) 21 – 30years(c) 31 – 40 years (d) over 40 years

B. Test of farmers’ knowledge on shea conservation and management practices

1. (i) What agricultural/crop production system (s) do you practice?
(a) subsistent (food) crop (b) cash/commercial production (c) both
- (ii) What type of crops do you grow? (a) cereals (b) legumes (c) root and tubers
- (d) tree crops (d) none.
2. (i) Do you have shea trees on your farms? (a) Yes (b) No (c) use to have some
- (ii) If yes above, how did you get them on your farm? (a) by planting (b) naturally grown and inherited on the farmland (c) planted and inherited on the farm lands
- (d) don’t know
- (iii) Who owns the shea trees on your farmlands? (a) My family (c) my community
- (d) The tindana (e) personal ownership
4. (i) Where do you pick or harvest your shea nuts? (a) trees on my farmland (b) trees on other people’s farmlands (c) trees in the bush or forest
- (ii) The shea trees on the farm fruit better than those in the bush. True or False
5. Which of the following shea management/conservation practices do you know about? *Tick as many as applicable.*

Shea management or conservation practices	Knowledge in practice
Protection from bushfires	
weeding and clearing around shea trees	
Pests/disease control	
Pruning	
Planting	
Natural regeneration	
Irrigation	
Fencing or protection from animals	
Nursing	
Transplanting	
Others	

6. Do you think the protection and/or planting of shea trees can lead to increased shea production and improved livelihood in your family or community? (a) Yes (b) No (c) don't know (d) somehow
7. (i) What do you do when you see germinated shea seeds or young shea plants on your farm? (a) Protect and care for them (b) Weed them out (c) just ignore them
- (ii) Have you seen any young shea plant(s) of (1-5 yrs) within the past 3 years

.....

8. (i) Do you have knowledge in the following agronomic management practices on shea plants?

(a) Planting methods (Yes/No). Give details.....

(b) Method of weed control (Y/N).....

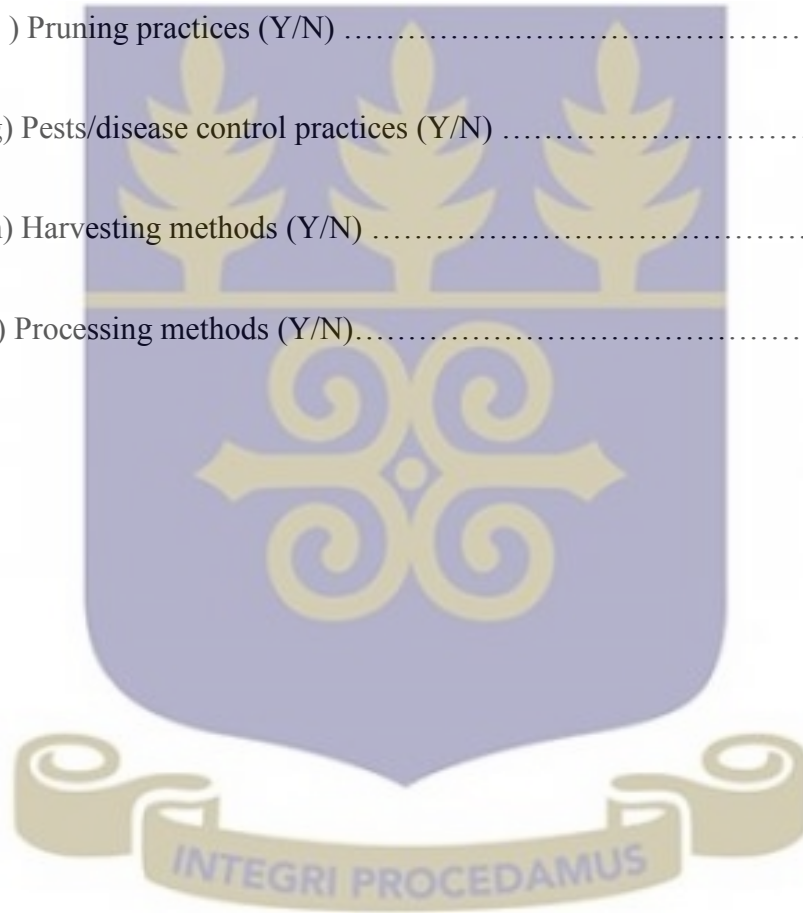
(c) Soil management and fertilizer requirements of shea (Y/N).....

(e) Pruning practices (Y/N)

(g) Pests/disease control practices (Y/N)

(h) Harvesting methods (Y/N)

(i) Processing methods (Y/N).....



C. Test of farmers' attitudes towards shea conservation management practices

9. How important are the following conservation & management practices in shea production?

1. Disagree 2. Highly disagree 3. Undecided 4. Agree 5. Highly agree

No	Farmers' practice of shea conservation management	Answer
(i)	Fire-fighting and the construction of fire-belts to protect shea trees on your farm or community?	
(ii)	Preventing indiscriminate cutting or felling of shea trees on your farm or community	
(viii)	Cutting or felling of shea trees for charcoal and fuel wood is a major cause for the fast decline of shea trees in my community.	
(iii)	Weeding or clearing of weeds around shea trees on your farms	
(ii)	The pruning and removal of dead, old branches and twigs on shea trees is a good practice that improves vegetative growth and fruiting of shea nuts	
(iv)	Farmers promptly control pests and diseases on shea trees on your farm or community when they is an outbreak	
(vi)	Pruning or cutting of dead twigs and branches on shea trees is a regular practices	
(vii)	Planting or growing of shea trees, including vegetative propagation (grafting, budding, seed planting, etc)	
(viii)	Nursery establishment and management of shea seedlings	
(ix)	Natural regeneration (i.e selection and protection of naturally grown shea trees on farms and parklands, etc.)	

10. (i) Which of the following shea management/conservation do you practice?

Tick as many as applicable

Shea management or conservation practices	Knowledge in practice
Protection from bushfires	
weeding and clearing around shea trees	
Pests/disease control	
Pruning	
Planting	
Natural regeneration	
Irrigation	
Fencing or protection from animals	
Nursing	
Transplanting	
Others	

(ii) Would you need support to plant shea trees as an economic crop? Yes/No.

State types of support needed



10. (i) Which farming/cropping systems do you think is best suited for shea trees management in your community? Rank in order of priority (1 – 4)

Cropping/Farming system	Rank
Pure shea tree plantation crops	
Mixed cropping with food crops	
Mixed cropping with other tree crops e,g cashew, mango, etc.	
Pastoral farming with shea trees (animal rearing,)	

- (ii) Do shea trees interfere with your food crop farming? (a) yes (b) no(c) some how

- (iii) Do you practice agro-forestry management on your farms? Yes/No.

If yes above, do you use shea for agro-forestry? Give reasons for your answer.....

11. Have you ever planted shea trees on your farm? Yes/No.

If no above, why?

12. What factors do you think account for the poor management of shea trees?

(a) Lack of market for shea products (b) Lack of storage facilities for shea products

(c) lack of improved shea varieties for planting (d) Low prices of shea product.

(e) Shea is in abundance (f) Others

Test of farmers' perception of the importance of shea for livelihood outcomes

13. Say how far do you agree with the following statements?

1. Very important 2. Important 3. Averagely important 4. Unimportant 5. Highly

unimportant

No.	Statement on farmers' perception on the importance of shea livelihood value on conservation management	Answer
(i)	The fruits are an important source of food for many people in my family and community.	
(ii)	The income obtained from shea contributes significantly towards household income and livelihoods of rural families.	
(iii)	Shea business is an important source of employment and offers jobs to a lot of people in my family and community	
(iv)	Shea butter is the most important source of cooking oil to my family or community	
(v)	The planting of shea trees will increase sheanut production and improve livelihood outcomes in your community or family.	
(vi)	The removal of shea trees from this community will NOT have any adverse effect on household livelihoods and food security	
(vii)	Improving the shea industry can address hunger and lead to poverty alleviation in my family or community.	

14. Do you get enough shea nuts or shea products for your shea business activities?

(a) Yes (b) No (c) get too much (d) enough occasionally

15. (i) Do you have a shea nut group or association in your community? (a) Yes (b) No

(ii) If yes above, state the type and roles of the group/association.

16. How often do you use shea butter in your household or family? (a) everyday (b) every week (c) twice a week (d) fortnightly (e.) rarely

17. Which oil is most preferred for cooking in your family? (a) Groundnut oil (b) soya oil

(c) palm oil (d) shea butter (e) others oil types

18. Which of the following constitute the most popular use of shea butter in your community? (a) Home cooking (b) local chop bars (c) Restaurant cooking (d) School feeding (e) others

19. What benefits do you derive from the shea tree and its products?

(i) Benefits derived from tree (stem/root/bark/flower). List them

a.....b.....

c.....d.....

(ii) Benefits derived from shea products (fruits/nut/butter). List them

a.....b.....

c.....c.....

(iii). Bye-products (shells/paste or cake). List them

- a.....b.....
- c.....d.....

iv. Other benefits of shea

(ii). Do you know the role shea in the following:

- (a.) Food security (Yes/No). Give details.....
- (b) Medicinal properties (Y/N). Details.....
- (c) Employment and job opportunities (Y/N). Give details.....
- (d) Domestic uses (Y/N). Details.....
- (f) Soil improvement (Y/N). Details.....
- (h) Spiritual/religious (taboos/beliefs) (Y/N). Details



F. Institutional support towards shea conservation management

20. (i) Indicate the type of shea interventions provided by the under-listed development organizations/agencies in your community?

NB: type of interventions include a. cultivation b. picking/harvesting

c. processing/extraction d. marketing e. export f. others

Institution	Type of shea Intervention	Year
MOFA		
Forestry Dept		
Research Institutes		
District Assembly		
COCOBOD		
PBC		
NGOs (name them)		

(ii) Which of the above institutions provide support for the conservation and management of shea to farmers in your community?

21. Are the following innovations or research technologies promoted for the development of the shea industry?

No.	Innovations or technologies	Yes/No
(i)	Improved agronomic management Techniques/cultural practices (weeding, pruning, fertilization, etc)	
(ii)	Improved varieties (early maturing/high quality)	
(iii)	Planting Techniques (seed and vegetative, spacing, etc.)	
(iv)	Processing and marketing techniques (quality control, packaging, etc.)	

22. Will you practice shea tree maintenance and/or cultivation if given the necessary support? (a) Yes (b) No (c) maybe. Give reasons If any.

23. What support do you need to grow or plant shea? (a) improved planting material (seedlings/seeds) (b) ready market (c) processing machines (d) improved propagation techniques/methods (e) credit and financial support (f) others
(circle as many as applicable)

24. The supply of logistics such as bicycle, cutlasses, sacks, clothing, can help you increase she nut picking from the bush? True or false.

25. Do you think that with logistics support you can pick enough shea nuts from the bush/forest? Yes/NO

26. Which of these shea production activities will you most need support to undertake?

Rank 1-4

No.	Shea Production Activities	Rank
(i)	Cultivation and shea plantation establishment	
(ii)	Picking or collection of nuts/fruits from the bush	
(iii)	Processing/butter extraction	
(iv)	Marketing/trading in shea products	
(vi)	Others	

G. Strategies for sustaining the shea industry for livelihoods outcomes

27. Indicate the major problems facing the shea sector?

No	Major problems facing shea industry	Rank
I	The long gestation period and lack of improved shea varieties	
Ii	Lack of market and low prices of shea products (nuts/butter)	
iii	Lack of appropriate tools and equipment for picking and production of sheanut.	
Iv	Lack of institutional support and training on shea production and management	
V	Others	

28. Suggest ways to improve the shea industry?

i

ii.....

H. Stakeholder questionnaire (DAs, MOFA, Research institutions, NGOs)

(i) Name of organization

(ii) Name officer..... Position.....

(iii) Type of organization; (a) government agency (b) private entity (c) NGO

(d) Traditional institution (e) others

1. State the main purpose or mission of your organization:

2. Main activities of your organization.....

3. Who are clients.....

4. What livelihood interventions or programs does your organization carry out in respect of shea? :.....

5. What aspect of shea operations do you promote or undertake? (a) picking
(b) processing [oil extraction] (c) trading/export

6. Do you provide any services or support for famers towards sustainable management of shea trees? Yes/No. State type of services or support; if any:

7. Do you train farmers or rural people on conservation management practices?
(protection, weeding, pests and disease control, pruning, planting)

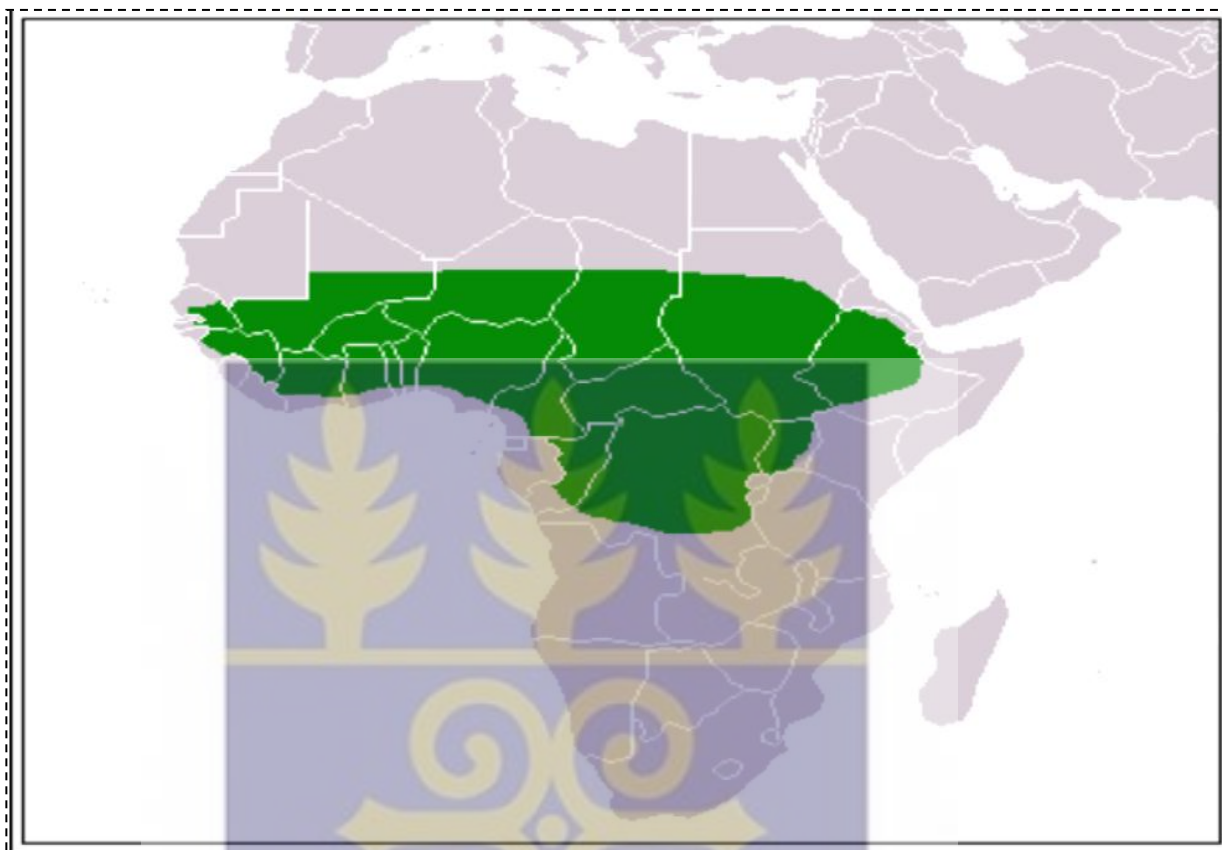
8. Do you know of any organization or agency that provides support for shea conservation management? Yes/No; if yes, name of organization and type of support.....

9. Do you think the shea tree is useful to the livelihoods and economic life of farmers rural people? (a) Yes (b) No (c) somehow
10. If yes above, does your livelihood activities or poverty alleviation programs include conservation management? If no, why?.....
11. Do you think it is important to include shea development in your organization's program? Yes/No; state any reasons for answer:
State any research findings or contributions toward development of the shea industry.....
13. Does your organization offer any extension services or technical support on shea operations? Yes/No; State type of services
14. Have you heard of any improved technologies or innovations for shea management? Yes/No; Explain
15. State any constraints or difficulties that the industry face:
i
ii
16. Suggest strategies for the development of the industry?
i.....
ii.....

THANK YOU

.....THE END.....

Appendix II: Shea distribution in Africa (Shea-Belt)



Shea producing countries		
Senegal	Mali	Cameron
Gambia	Ghana	Sudan
Burkina Faso	Togo	Chad
Niger	Benin	CAR
Cote D'Ivoire	Nigeria	DR Congo
Guinea	Guinea Bissau	Uganda
		Ethiopia

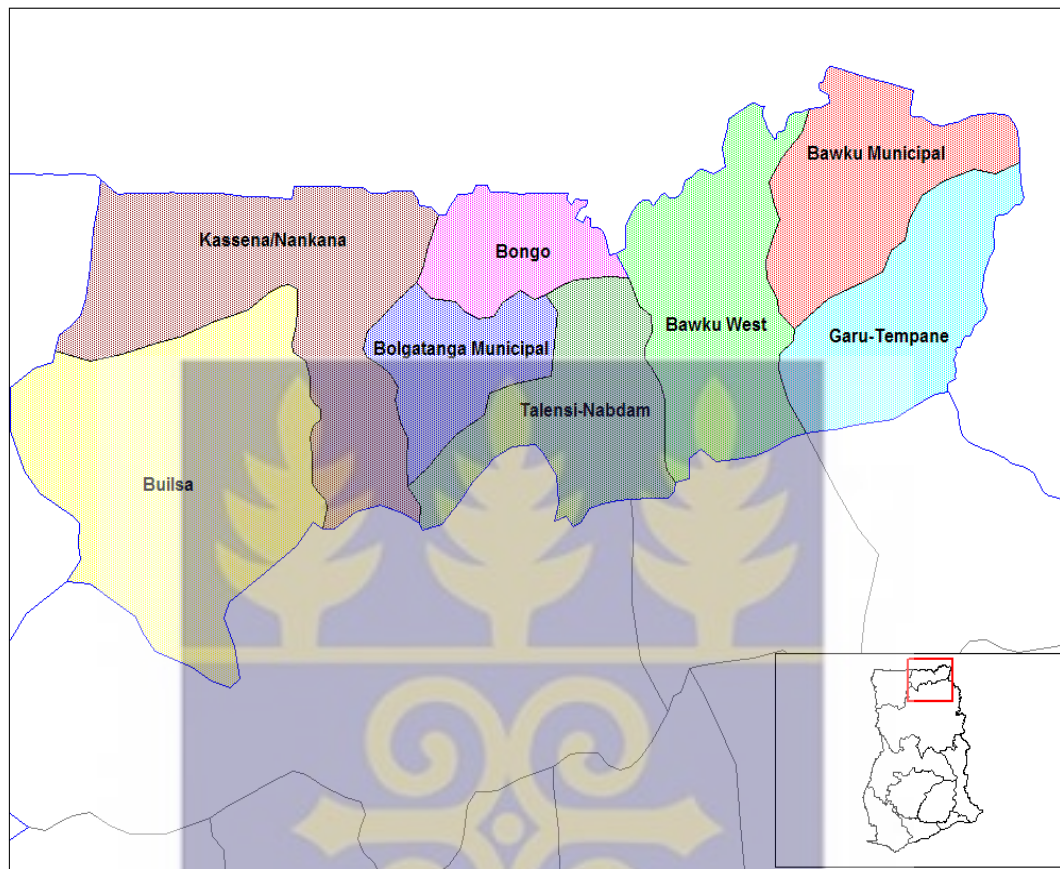
Source: Adopted from shea network

Appendix III: Shea producing countries in Africa

Country	Est. Total Potential Production	Est. Actual Collection	Estimated Consumption	Total Exports	Export as Shea kernels	Exports as Shea butter
Benin	80,000	50,000	14,900	35,100	35,000	100
Burkina Faso	150,000	75,000	35,000	40,000	37,000	3,000
Cote D'Ivoire	150,000	40,000	15,000	25,000	15,000	10,000
Ghana	200,000	130,000	70,000	60,000	45,000	15,000
Mali	220,000	150,000	97,000	53,000	50,000	3,000
Nigeria	250,000	100,000	80,000	20,000	20,000	0
Togo	50,000	40,000	10,000	30,000	15,000	15,000
Gambia	100	0	0	0	0	0
Guinea	25,000	5,000	4,500	500	450	50
Niger	5,000	5,000	4,000	1,000	0	1,000
Senegal	10,000	500	490	10	0	0
Cameroon	30,000	5,000	2,500	2,500	2,500	0
Chad	10,000	2,000	2,000	0	0	0
Sudan	100,000	10,000	9,800	200	0	200
Uganda	70,000	6,000	5,900	100	0	100
Central African Republic (CAR)	15,000	2,500	2,500	0	0	0
Democratic Republic Congo	5,000	750	750	0	0	0

Source: Global Shea Alliance (2010).

Appendix IV: Map of the Study Area: Upper East Region of Ghana



Source: www.Ghanadistricts.com.



