KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,
KUMASI, GHANA
FACULTY OF RENEWABLE NATURAL RESOURCES

LOCAL COMMUNITIES' WILLINGNESS TO PAY TOWARDS SUSTAINABLE SHEA TREES CONSERVATION AND PRODUCTION IN BONGO DISTRICT, GHANA.

BY
ASEBILA, ALFRED NYAAPIKA
(BSC. RENEWABLE NATURAL RESOURCES, UDS)

A THESIS SUBMITTED TO THE DEPARTMENT OF SILVICULTURE AND FOREST MANAGEMENT
COLLEGE OF AGRICULTURE AND NATURAL RESOURCES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PHILOSOPHY
NATURAL RESOURCES AND ENVIRONMENTAL GOVERNANCE

JULY 2016.

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DECLARATION

I hereby declare that this submission is my own work towards my masters of philosophy degree in Natural Resources and Environmental Governance and that, to the best of my knowledge, it contains no material previously published by another person, nor material which has been accepted for the award of any other degree of the university, except where due acknowledgement has been made in the text.

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DEDICATION

This work is dedicated to my mother Mrs. Agengre Atampugre, my wife and daughter; Mary and Awinisum for their financial and moral support throughout my study

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ABSTRACT

Shea tree, *Vitellaria paradoxa* is a tree that does well in arid and semi-arid areas of Northern Ghana. Due to recent competing demands for various uses of the tree without conservation, its stock is declining continuously. The study seeks to examine the monetary value that local people are willing to pay as well as investigate socioeconomic factors that influence respondents' WTP towards sustainable shea tree production and conservation to halt its decline. A total of 100 respondents were selected using multistage and systematic random sampling. A structured questionnaire was used to conduct a face-to-face interview to collect data for the study. The mean willingness to pay was estimated at GH¢11.00 to GH¢16.500 per year. Ordinary least square regression results show that, income, educational level, livelihood activity and marital status were statistically significant and positively influenced respondents' willingness to pay. There were no institutional arrangements or structures that can facilitate and coordinate any payment scheme for environmental services. It is recommended that, government provides subsidies to encourage commercial shea seedlings production and conservation of existing trees as well as establish legal and institutional arrangement that would support effective design of PES to boost shea tree production in the area.

Keywords: Willingness to pay, conservation, payment for environmental services, institutional arrangement

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LIST OF ABBREVIATIONS

CIFOR	-	Center for international forestry Research
CITIES	-	Convention on International Trade in Endangered Species
CoP	-	Change in productivity
CREMAS	-	Community Resources Management Areas
CRIG	-	Cocoa Research Institute of Ghana
CV	-	Contingent Valuation
CVM	-	Contingent Valuation Method
DBDC	-	Double Bounded Dichotomous Choice
ES	-	Environmental Service
FAO	-	Food and Agric Organisation
GSS	-	Ghana Statistical Service
HPM	-	Hedonic Pricing Method
IUCN	-	International Union for the Conservation of Nature
MA	-	Millennium Ecosystem Assessment
MoFA	-	Ministry of Food and Agriculture

NGOs	-	Non-Governmental Organization
OLS	-	Ordinary Least Square
PES	-	Payment for Environmental Service
REDD	-	Reducing Emissions from Deforestation and forest Degradation
SADA	-	Savanna Accelerated Development Authority
SPSS	-	Statistical Package for Social Sciences
TCM	-	Travel Cost Method
TEV	-	Total Economic Value
UNESCAP	-	United Nations Economic and Social Commission for Asia and the Pacific
VPA	-	Voluntary Partnership Agreement
WTA	-	Willingness to Accept
WTP	-	Willingness to Pay
WVI	-	World Vision International

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Non-timber forest products are crucial to the sustenance of rural livelihoods across all regions in Sub-Saharan Africa (CIFOR, 2005).They are major source of food and income for most rural people especially women in Africa (FAO, 2013).Women exploit wood, nuts, fruits and fibre to help sustain their families (Timbko *et al.*, 2010). Sustainable conservation of tree resources has over the years recorded if any, little efforts towards conservation of existing non-timber forest resources especially those found in the savanna areas.

In Ghana, though, the forest and wildlife policy makes provision for sustainable conservation of tree resources in the forest and savanna zones of the country, previous and current conservation programs appear to be concentrated in the forest zones neglecting tree resources especially shea trees found in the savanna zone (Shea Network Ghana, 2014). Examples of such conservation programs over the past decades include; Taugya System (program that interplant trees with crops), Modified Taugya System, Voluntary Partnership Agreement and Reducing Emissions from Deforestation and forest Degradation -REDD (Ansong *et al.,* 2014).

A typical tree that contributes significantly to the economy of Ghana, yet is often neglected among others in the savanna zones is the shea tree (Shea Network Ghana, 2014). This tree is a major source of livelihood to most rural women and children (Carette *et al.*, 2009). The neglect has made the tree vulnerable to a state of continuous decline in stock due to challenges such as; ageing, bushfires, charcoal burning, construction, and agricultural activities (Bup *et al.*, 2014). In 2012, the Government of

Ghana launched Savanna Accelerated Development authority (SADA) to oversee the greening of the north, but the authority has still not been able to execute a pragmatic plan of conserving these trees towards achieving its objective of greening the north.

Several attempts have also been undertaken by non-governmental organizations and individuals to conserve and plant shea trees (Carrette *et al.*, 2009) with the overall objective of halting shea tree decline in the savanna zones but have still not achieved defined results. Notwithstanding, it is recognized that, sustainable conservation of tree resources depends on the support and collaboration of local communities (Ansong *et al.*, 2014). This support depends largely on the values or utility they derived from the resources. These values can be measured using several valuation techniques such as stated and revealed preference methods depending on whether such goods can be traded in the market or not.

For comprehensive measurement of non-market and market goods Carson *et al* (2001) recommends the use of contingent valuation method (CVM). According to Carson *et al* (2001), CVM is the most widely used and accepted survey method for valuing non-market goods and services. It is a method that brings out individuals willingness to pay (WTP) for an environmental benefit (e.g. to preserve the view of a beautiful landscape, improve air quality), or how much money the individual respondent would be willing to accept (WTA) for a change in environmental quality. It employs field interviews or questionnaire surveys to induce respondents to make a hypothetical market decision regarding the non-market goods such as forest (Carson *et al*., 2001).Despite some criticisms about the hypothetical nature of valuing non-market goods and service, Carson *et al* (2001) indicates that, CVM is widely used among academics and other research and development practitioners.

Various elicitation methods such as direct open-ended question, payment card, bidding games, referendum, and contingent ranking are usually employed. In this study referendum/double bounded dichotomous choice elicitation method is employed to induce respondents' WTP. Referendum elicitation method has been reported to be widely used for CVM studies because it is not vulnerable to weaknesses such as starting point bias as in bidding games or lead to missing values as in open-ended questions (Carson *et al.*, 2001). CVM has been applied in the valuation of various environmental services in estimating individuals' willingness to pay towards improvement of various ecosystems in other countries (Hadker *et al.*, 1997; Engel *et al.*, 2014).In Ghana, the method has been applied in the valuation of various natural resources. Notable studies include the study conducted by Ansong *et al.*, (2014) to assess local communities willingness to pay for sustainable forest management in Subri forest reserve, assessment of visitors willingness to pay entrance fee to Kakum national park (Navrud and Vondolia, 2005) and a study conducted by Acheampong and Marfo (2011) to estimate chainsaw operators' perception of the availability of timber resources and the willingness of these operators to pay for timber harvesting rights. This method has also been used to investigate farmer's willingness to pay for improved irrigation services as well as agricultural improvement (Alhassan *et al*., 2014; Baidoo and Amoatey, 2012). Despite the importance of understanding the Total Economic Value (TEV) of environmental goods in policy making, previous studies have not assessed total economic value of savanna tree resources especially shea trees. The present study seeks to fill this knowledge gap by estimating the monetary value that local people are willing to pay towards sustainable shea tree production and conservation to reduce shea tree stock decline.

1.2. Statement of the problem

Shea trees, the source of nuts that produce one of the world's most valuable vegetable fats, are declining in number and will get extinct if actions are not taken to protect the trees now and in the future (Poudyal, 2010). Studies have identified land tenure security, bushfires, firewood/charcoal production, population growth, construction and parasites/pest as major challenges/constraints to shea tree conservation in the shea producing belts (CRIG, 2002: Ferris *et al*., 2001; Masters *et al*.,2004; Okullo *et al*., 2011).

Previous literature has demonstrated extensive results on the ethno botany and economic botany of the shea tree (Boffa *et al*., 1995; Boukoungo *et al*., 2002). Moreover, a lot of initiatives and projects have also been carried out on shea resource diversity and domestication (Boffa *et al*., 1995; Boukoungo *et al*., 2002). Applied research on technical improvement of shea production and processing has attracted the attention of many scholars in the past few decades with little results to show on adoption of improved shea production methods (Addaquah *et al*., 2004; Bup *et al*., 2014, Lovett *et al*., 2004; Okiror *et al*., 2011; Poudyal, 2010). Scholars such as Carette *et al*., (2009), Hatskvich *et al*., 2011 and Scholz *et al*., (2009), have also investigated the market development potentials and value-chain of shea trees.

Missing in the literature, are on whether stakeholders in the industry would be willing to pay towards sustainable conservation and production. Additionally, there has been very little work on the identification of local institutional arrangements that would facilitate payment for sustainable conservation and production in the shea industry. Therefore, ascertaining stakeholders' willingness to pay and identifying local institutional arrangements that would facilitate payment for a sustainable conservation and production of the shea is worth investigating.

1.4. Justification of the study

Over the years, shea trees have gained importance because of the heavy demand for its products, both locally and internationally. In recognition of the need to maximize economic exploitation of the vast shea resource in Ghana, the Cocoa Research Institute of Ghana (CRIG) was established in 1979 by the government of Ghana to carry out scientific research into the cultivation and processing of shea nuts (CRIG, 2002). Additionally, several conservation efforts are currently being pursued by farmers, conservation activists, governments, NGOs, shea butterprocessors and buying companies across various regions in the shea production belts. The findings of this study are expected to give insight on the monetary value that stakeholders are willing to pay towards shea tree conservation initiatives. Systematic sampling method was used to select farmers, shea butter processors and nut pickers in various cooperatives/association to help inform socio-economic factors of respondents that are likely to influence their decision to support or reject such policies. It is also expected to provide inputs and guidelines towards policy by helping in the identification and design of local institutional arrangements that would facilitate effective payments for the conservation of shea trees. The study will also help address research gaps and deepen the understanding of researchers and other development practitioners on shea tree conservation and production

1.5. Aim of the study

The aim of the present study is to examine the monetary value that local people are willing to pay as well as investigate socioeconomic factors that influence respondents' WTP towards sustainable shea tree production and conservation to halt its decline.

1.6. Research questions

- Are stakeholders willing to pay towards shea tree conservation and production?

- What socioeconomic factors will influence the willingness of people to pay towards shea conservation/production?
- Are there local institutional arrangements that would facilitate payment towards sustainable shea tree conservation/production?

1.7. The specific Objectives

- To assess respondents' willingness to pay towards shea tree conservation and production.
- To identify socioeconomic factors that influence respondent's willingness to pay towards shea tree production/conservation.
- To examine local institutional arrangements that would facilitate payment for sustainable shea conservation and production.

1.8. Statement of Hypothesis

- Stakeholders are not willing to pay towards shea trees conservation and production.
- Socio-economic factors (age, gender, marital status, livelihood activities, educational status and income) do not influence respondents' willingness to pay towards shea trees conservation/production.
- Weak local institutional arrangements do not promote payment towards shea trees conservation/production.

1.9. Scope of the study

The study was carried out in three clusters (area councils) in the Bongo District, Upper East Region. The context/scope was limited to valuation techniques, shea trees conservation and production, local institutional arrangements and willingness to pay.

1.10. Limitations of the Study

Majority of stakeholders (farmers, shea pickers and butter producers) in the shea industry in the study area cannot read and write. This presented a challenged since interview guides and questionnaire were used for the data collection. Hence, translations were employed in such cases to capture their views to reflect the realities of their thoughts with regards to the solutions to shea conservation challenges.

The difficulty of attaching values to the non-market aspect of the shea tree poses a great challenge. However, previous knowledge on the value of other trees with similar values minimizes some of the limitations. Moreover, some respondents thought that the bids were actually going to be implemented. Thus, some were offering low bids. Those that also wanted to please the researchers, offered high bids WTP. This development made the researchers to waste substantial amount of time clarifying the concept of WTP by telling them it was an attempt of economic valuation towards shea trees.

It will require a lot of time and substantial funds to capture the views of all stakeholders from all the shea producing districts in the region. Thus, one district from the region was selected and a sample size of 100 respondents selected to save time and money. Thus, multi-stage sampling technique was employed to select the individual respondents'; the results produced therefore reflect the phenomenon in the district and the region at large.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Key concepts discussed in this chapter include; economic values of natural resources, valuation techniques, environmental goods and services, the concept of payment for

environmental services, conceptual framework on WTP, overview of WTP, governance and local institutional arrangements.

2.2 Economic values of natural resources

Neo-classical economist adopts a distinct value system based on a utilitarian framework (Mohd-Shahwahid, 2001). They explain that, only things that give human beings happiness have value. For instance, if shea trees can offer us butter and fuel wood/charcoal to meet our needs, it means shea trees have value. Because, the value of natural resources such as shea trees to society can change in both quantity and quality, it is always ideal for them to be measured or valued. These values are revealed by the amount the individual is willing to pay for a change when the resources are owned by other stakeholders or how much they are willing to accept in compensation for a loss in environmental goods and services when they own them (Pagiola and Platais, 2007). For appropriate valuation of these resources, natural resource values are categorized into several groups under the total economic value framework.

2.3. Total economic value

The total economic valuation (TEV) theory categorized values from any ecosystem into two; use and non-use values (Gomez *et al*., 2010). The first aggregated value of an ecosystem service benefits provided in a particular state in relation to the concept of TEV is often known as output value. The second aspect relates to the ability of the system to maintain these values in the face of climatic changes and disturbance usually described as insurance value (Gomez *et al.*, 2010).The ensuing describes the various categories of total economic values of forest natural resources such as shea trees (Mohd-Shahwahid, 2001; Gomez *et al.*, 2010).

2.3.1. Use-values

2.3.1.1. Direct use values

These values refer to ecosystem goods and services that are normally utilized directly by human beings. They are either directly used for consumptive or nonconsumptive purposes. Harvesting of food or fruit products, timber for fuel or construction, medicinal products, and extraction of oil/butter from shea trees are all examples of direct use values. Non-consumptive uses of ecosystem services include enjoying recreational and cultural amenities such as spiritual and social utilities that do not require moving or harvesting of the products (MEA, 2005; Pagiola *et al.*, 2004). In this study, some of these values that may come with shea tree conservation and production include; shea parkland landscape beauty, watershed protection and carbon sequestration.

2.3.1.2 Indirect use values

A lot of ecosystem goods act as intermediate inputs for the production of final goods and services to humans such as water, soil nutrients, and pollination services for food production. Thus, these ecosystem goods contribute indirectly to the enjoyment of other final amenities, such as water purification, waste assimilation, and other regulation services leading to clean air and water supply and thus reduced health risks (MohdShahwahid, 2001). Nectar/pollen from shea trees offer a vital intermediate input for the production of honey by bees. Moreover, shea trees act as carbon sinks and also help filter a lot of poisonous gases from the atmosphere resulting in enhanced quality environment.

2.3.1.3. Option values

These are derived from preserving the choice to use future ecosystem goods and services that may not be used presently, either by oneself (option value) or by others/heirs (bequest value). Ecosystems that provide; direct use benefits, regulate natural cycles, and

offer cultural services are all part of option value if they are not used now but may be used by future generations (MEA, 2005). Although, shea trees are grown in Ghana, literature reveals that, demand for shea products in international markets outstripped local demand (Carette *et al*., 2009). This implies that, some people are concerned about the sustainability of the tree to meet this value of either using it in the future themselves or conserving it for others. This explains why farmers within the shea production belt have been selectively conserving shea trees over several centuries yet they were not having any immediate use of the tree (Boffa, 2015).

2.3.1.4. Bequest Value

Bequest value refers to utility that is derived from ensuring that certain ecosystem goods and services are preserved for future generations. For example, many people are concerned with future damages from global warming and its associated impacts and would be willing to pay towards interventions that will reduce them, although a lot of the damages are expected to affect the earth after this generation is no more. Policies linked with either a long-term or irreversible impacts/damages can usually lead to losses/damages that forms part of bequest value (Pagiola *et al*., 2004). The conservation of shea trees several million years ago by farmers who consciously selected and conserve trees in agroforestry parklands demonstrate this value of preserving for future generations (Boffa, 2015).

2.3.1.5 Quasi-option value

This is a kind of option value that represents the value of avoiding irreversible decisions until there are available new information that reveals whether some ecosystem goods have values that are currently unknown (MEA (2005). Farmers within the shea

producing belts have been selectively protecting and conserving shea trees over several centuries though; some of them never knew full benefits of the tree (Boffa, 2015).

2.3.2.0. Non-use values

Non-use values refer to utility that people may derived by simply knowing that a resource exists even though they may never expect to use it directly themselves (Pagiola *et al*., 2004). Many conservation activist and donor agencies are funding a lot of conservation projects involving shea trees in Africa, but may never use products of the tree directly or even travel to places where these trees are grown.

Existence value refers to utility derived from simply knowing that a certain good and service exists. For example, some people derive utility from the fact that many endangered species of plants or animals are protected against extinction. Many people are willing to pay for the protection of these species and their habitats, even those located in remote or hard to reach areas. Though, those placing the value on the good may likely not travel to these places to enjoy any utility from its existence, they value the knowledge that such species exist (Pagiola *et al*., 2004). Sound understanding of these values has been the brain behind the protection of endangered tree species across the globe by Convention on International Trade in Endangered Species (CITIES). This explains why some donor agencies are reportedly assisting some communities in Ghana to conserve shea trees though; they may not use the tree and its resources.

2.4. Valuation techniques for valuing natural resources

There are four basic approaches to valuing environmental or natural resource goods. These are price-based valuation methods, surrogate market valuation methods, hypothetical market approach, and cost-based approaches (Pascual, 2010).

2.4.1 Price-based valuation methods

The price-based valuation methods, either the direct market prices or their shadow price versions, are best adopted when formal markets exist for environmental goods and services to be transacted. Using market prices gives an underestimate of the true WTP, since consumer surplus is ignored (Pascual *et al*., 2010). They present a positive strength when market prices reflect WTP for cost and benefits of forest land use option that are traded in various markets. Forest goods traded in the market includes; food, fibre, medicine, wood and timber (Gomez, 2008). Price data are relatively easy to obtain to established markets by observing data of actual consumer techniques. On the other hand, Gomez (2008) reveals that, priced based valuation methods are not ideal for valuing forest ecosystems because, market data may not be available to a lot of goods and services provided by various ecosystems. Thus, it may also not reflect the value of all possible beneficial uses of resources. Moreover, such market failures often lead to distortions in market prices which subsequently fail to reflect the economic value of goods and services including shea trees to society.

2.4.2. Surrogate market valuation methods

Surrogate market valuation techniques are used when there is no formal market to measure an environmental value but there exists information about a related good or service transacted in the marketplace that can be used to infer the value. Techniques where the value can be derived from other markets include the hedonic pricing method (HPM), the travel cost method (TCM) and the change in productivity (CoP) approach (Pascual *et al*., 2010). According to Abaza and Rietbergen-McCracken (1998*)*, travel costs are useful for recreational facilities and eco-tourism activities because they are more accurate when travel distances are short.

The TCM estimates how much people value an environmental location by the costs they are willing to incur in travelling to it. It implicitly considers the environment in terms of the provision of recreational services rather than basic ecological goods and services. The fact that people incur costs to visit these sites enables a demand function for the attraction to be established, in which the visitor rate is related to the travel cost. Once this relationship has been established, it is possible to trace out a demand curve by examining the effects of a change in entrance fees on visitor numbers (Pascual *et al*., 2010).

The CoP method can be used whenever an environmental service or function acts as an input into the production of marketable goods. For example, the watershed protection functions of forests (shea trees) help control the quantity and quality of water flows. Deforestation can contribute to a reduction in agricultural productivity through soil erosion, sedimentation and flooding. This technique estimates the changes in output as a result of loss of environmental services. The application of these methods is often characterized with several limitations where markets are distorted and information about environmental conditions is not widespread and data is scarce Gomez (2008). Thus, identifying and measuring the complex ecological linkages can be very difficult, unless data and models exist (Pascual *et al*., 2010). Thus, application of this method for valuing shea trees goods and services will likely pose a lot of limitations due to unavailability of accurate date and models to measure environmental values.

2.4.3. Cost-based approaches

The most widely applied techniques in this grouping are the preventative/defensive expenditure and replacement costs techniques. The former captures people's valuation of ecological services by observing their actual expenditures to prevent the loss, or to defend themselves from the consequence of the loss (Pascual *et al*., 2010). These costbased

approaches are based on a number of assumptions: that such actions are effective and able to perfectly substitute environmental quality; there is complete information and therefore environmental risks are well perceived and understood and there are no capital constraints. In principle, the costs incurred voluntarily in a free-market situation to mitigate or reverse an environmental impact will be equal to or less than the value of the impact (Abaza and Rietbergen-McCracken, 1998 and Pascual *et al*., 2010). On the other hand, these methods are not suitable for measuring forest ecosystem because, they are likely to either understate or overstate values significantly if there is substantial consumer or producer surplus (Gomez, 2008). Moreover, diminishing returns and difficulty of restoring previous ecosystem conditions make application of these methods questionable. Additionally, it is sometimes difficult to ensure net benefits of the replacement do not exceed those of the original environmental function.

2.4.4. Constructed or hypothetical market approach

In situations where market values cannot be observed, either directly or indirectly, market-like behaviour can be inferred through surveys or direct questions. The most widely used technique of this type is the contingent valuation method (Pascual *et al*., 2010). By setting up a carefully worded questionnaire, CVM elicits individuals willingness to pay (WTP) for an environmental benefit (e.g. to preserve the view of a beautiful landscape/improve air quality), or how much money they would be willing to accept (WTA) for a loss of environmental quality. The aim of CVM is to elicit valuations that are as close as possible to what would be revealed if a market actually existed. To be carried out successfully, CVM requires careful sampling, training of enumerators and long periods of preparation and analysis. Information can be obtained directly from respondents or via a personal interview or mail questionnaire. It is the only technique able to capture non-use environmental values.

For the purpose of the present study, contingent valuation method would be used to estimate respondents' willingness to pay towards shea tree conservation and production. Though, this method has been criticized for its sophisticated design and complex implementation procedure in developing countries, it is worth noting that, CVM provide the best theoretical estimate of WTP (Gomez, 2008). It also has the strength of capturing both option and existence value and provide true measure of total economic value of ecosystems. Additionally, CVM generate estimates for a range of products and services without having to elicit WTP for each ecosystem service (Gomez, 2008).

2.5 Environmental goods and services

According to the millennium ecosystem assessment report (MEA, 2005), ecosystems provide the following environmental goods and services for mankind; regulating, provisioning, cultural and supporting services. Regulatory services deals with the role of various ecosystems in regulating and protecting climate systems, water systems and diseases. Provisioning services cover services that are derived from ecosystems in the form of food, fibre, fuel and water for our very survival. Cultural services explain the spiritual, aesthetic, recreational and educational services derived from ecosystems. On the other hand, supporting services covers primary production and soil formation services offered by various ecosystems (Mea, 2005).

Wunder (2005) indicates that, environmental services that are traded/paid-for in various Payment for environmental service (PES) market schemes are categorized into four types; biodiversity protection, carbon sequestration, watershed protection and landscape beauty Though, there are other bundle of services (such as forest plantation providing pollination services to agriculture) that can be traded in the market, studies have restricted to the four identified above (Wunder, 2005).

2.5.1 Biodiversity conservation and protection

Biological diversity is the variations that occur among living organisms from the atmosphere, land, marine/aquatic and other water resource ecosystems (FAO, 2007). Payments are often done to protect and conserve biodiversity habitats, to gain access to the habitats/species and to promote biodiversity conservation related businesses (Katomba Group, 2008). Establishing shea tree plantation and conserving existing shea trees could potentially protect a lot of diverse savanna biological organisms whose habitats have been threatened for decades or would be threaten in the near future.

2.5.2 Landscape beauty

Landscape beauty describes the aesthetic and recreational values created by various ecosystems. Payments are done to reward the hedonic properties of these landscapes in various property markets and recreational facilities (Wunder, 2005). For instance, a lot of tourists (both domestic and international tourist) are always willing to pay and enjoy such properties in various recreational/national parks (Wunder, 2005). The conservation of shea trees or establishment of shea plantation can help create beautiful landscape (shea parklands) which could attract this form of payment.

2.5.3 Watershed protection

Watershed protection refer to a wide array of services such as flood control or water quality control, and are related to specific natural ecosystems such as forests and freshwaters. Limitations to water service payments include political leverage of watershed service providers as well as scientific justification for the provision of water services (Wertz, *et al.,* 2006).

2.5.4 Carbon sequestration

Carbon sequestration is the process of removing excess carbon dioxide from the atmosphere and storing it on land to helps mitigate global warming (Jindal and Kerr, 2016). Various land-uses can absorb or sequester carbon. For instance, when barren lands are converted to forest, the growing trees sequester carbon from the atmosphere and store it as woody biomass and soil organic matter. Thus, forest ecosystems belong to the most important providers of carbon sequestration services. Payments for carbon sequestration services from avoided deforestation, however, are still challenged by high transaction costs and uncertainties with respect to international carbon-trading rules and long-term effectiveness (Wertz *et al.*, 2006). Thus, a lot of carbon could be sequestered if there is an initiative to convert most of the vast grassland of savanna ecosystems to shea parklands. REDD+ presents a positive alternative option for carbon sequestration in the savanna if well designed.

2.6. Payment for Environmental Services (PES)

Literature reviewed so far have different opinions regarding the definition of payment for environmental service. For the purpose of this study, few of these discussions are considered. Payment for environmental services refers to a voluntary transaction involving at least a minimum of two parties; one environmental service provider and a buyer where the ecosystem is likely to provide the service which is being sought for by the buyer on the basis of satisfying certain conditions (Wunder, 2005).

FAO (2000) defines PES as an approach to ecosystem management which uses cash payments and other form of in-kind compensations to motivate and encourage the conservation and restoration of ecosystems by resource managers. It includes direct payments from ecosystem service resource users, as well as indirect payments earned through eco-certification. On the contrary, Vatn (2010) indicates that, these scholars

omitted an important agent (intermediaries) in defining PES. The intermediary plays crucial important roles in defining the service, establishing who the sellers and buyers are and even set a predefined price for buyers. The work of these intermediaries helps reduce transaction cost which is a challenge to successful PES schemes and should not be neglected when defining PES. A review of the literature shows that, the underlying theme of PES is to ensure that; the payment (money or barter) compensates or defrays the cost of producing the service by the service provider (Salzman, 2010). The provider on the other hand, must demonstrate beyond reasonable doubt, ownership and control of the environmental service offered for PES (conditionality). This will assure buyers to pay and have some guarantee that, there will be continuous provision of the service agreed upon among the two parties. According to Salzman,(2010) this can be achieved by ensuring well defined property rights (i.e defining the right to either occupy, use, derive income, sell or exclude others from the resources).

In this study efforts have been employed to identify potential service providers (shea tree owners; community land owners, farmers, chiefs and NGOs), the buyers (government, corporations, NGOs, certification companies/shea butter buying companies) to establish whether there can be a voluntary transaction among the two which defines PES. Although literature reviewed so far indicates that, most PES schemes in developing countries have failed to prove "conditionality". The study attempts to investigate whether the issue of conditionality could be established under a PES scheme for shea tree conservation.

The Katomba Group (2008) outlines steps for setting up successful PES scheme. First and foremost, the framework requires an examination of the types of environmental/ecosystem services (carbon sequestration, watershed protection, landscape beauty) which flows from a particular habitat, and who they benefit. Further, an estimation

of the economic value of the benefits to different groups of beneficiaries is needed. The final step is the design of a policy, subsidy, or market to capture this value and reward landholders or resource managers for conserving the source of the ecosystem services.

2.7 Types of market for environmental services

There exist several market schemes for the trading and payment of environmental services. These markets include; public payment schemes, regulatory ecosystem service markets, voluntary markets and private PES market schemes (Katomba Group, 2008).

2.7.1 Public payments schemes

They are government driven schemes which involve public institutions and include user fees, land purchase and granting of rights to use land resources as well as fiscal mechanisms based on taxes and subsidies (Greiber, 2009). Under this schemes government or public institutions can offer subsidies to encourage the production of ecosystem goods and services that have environmental benefit to the state. This scheme could be ideal for the promotion of shea plantation/parklands if government provide subsidies to encourage conservation of existing shea trees and commercial production of tree seedlings

2.7.2 Regulatory ecosystem service markets

These are markets that are established through legislation that creates demand for a specific ecosystem service by setting a 'cap' to the level of acceptable damage on an environmental good/service (Katomba Group, 2008). The users of the service, or at least the people who are responsible for diminishing that service, respond either by complying directly or by trading with others who are able to meet the regulation at lower cost. For instance the, the Kyoto Protocol mandates all industrialized countries who are signatories this protocol to reduce their carbon emissions to 5.2% below 1990 levels by 2012 (Jindal and Kerr, 2016). Under this Protocol, a Clean Development Mechanism (CDM) was constituted to enable

countries achieve their targets by investing in carbon emissions reduction or sequestration projects in developing countries. These projects earn carbon sequestration offsets (called Certified Emission Reductions or CERs) for the investor.

2.7.3 Voluntary markets

Voluntary markets are usually common with private PES schemes. These schemes often receive the least government support or intervention. In this case, both buyers and sellers of environmental services are private entities, such as private companies, individuals, or groups of individuals (Greiber, 2009). Public institutions only play intermediaries roles within such schemes to ensure successful transaction among market players (Greiber, 2009). These schemes are often controlled by demand and supply. For instance, if a private person has a demand for the provision of a specified ecosystem services such as shea trees to sequester carbon and another private individual has the capacity to provide such services, a PES contract can be develop independently without any governmental support. REDD+ is a typical voluntary market scheme that attempts to reward land users, communities and governments to reduce emissions from deforestation and forest degradation. For instance, Blaser *et al* (2014) reveals that, the intensification of shea nut production supported by a tailor-made REDD+ mechanism, is possible and has the potential to sustainably increase people's income and reduce net greenhouse gas emissions from agricultural and forestry practices.

2.8 Conceptual framework on WTP

The conceptual framework (Figure 2.1) provided insight and guided this study. Ndetewio *et al*., (2013) indicated that, factors that are likely to influence resource users WTP includes; age, gender, marital status, educational status, livelihood activity, income, land size, family size and land tenure. The payments made by the resource users will be used to

compensate or pay stewards of the natural resources to ensure sustainable production and conservation of the shea trees. Notable environmental services that would be provided alongside direct use values of shea trees include; biodiversity conservation, carbon sequestration, watershed protection, landscape beauty and biodiversity conservation.

Ensuring improved and sustained production/conservation of shea trees by stewards would guarantee availability of both environmental goods and services as well as direct use values of shea trees to users. In this study, the users willingness to pay for these services will depend largely on socio-economic factors such as; age, gender, income, educational status, marital status and livelihood activity.

The money paid by people who benefit from shea trees products and services will be saved at a conservation fund which will be used to compensate/pay people who produce or conserve the trees.

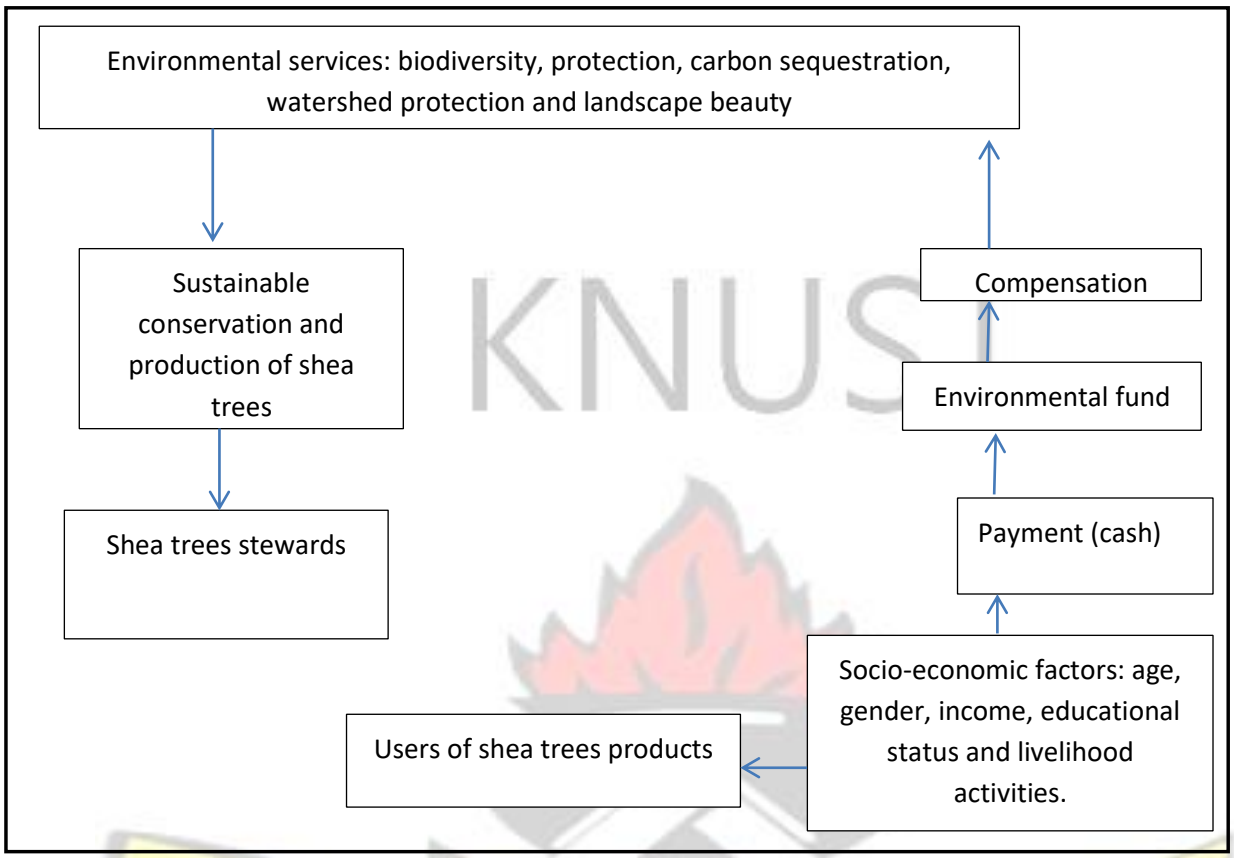

Figure 2.1: Conceptual framework on willingness to pay.
Source: Ndetewio *et al* (2013).

2.9 Overview of willingness to pay and factors influencing willing to pay

This section sought to give an overview of willingness to pay studies and socioeconomic factors influencing willingness to pay.

Lorenzo (2000) assessed residents of urban communities' of Mandeville in the United States willingness to pay towards the conservation of urban forest and found more than 80% of respondents willing to pay for the protection and preservation of urban trees. Residents viewed urban forest as a very important function of the city and were willing to pay additional taxes for tree protection and preservation. Residents were willing to pay irrespective of their age and educational level. However, gender was a significant factor which influences residents WTP. Willingness to pay was also associated with residents' perception of which gender orientation benefits from urban forest trees.

Moreover, Ezebilo (2006) study on willingness to pay for biological diversity in Papua New Guinea and found that, income has no statistical significant effect on willingness to pay for biological diversity conservation in Kegsugl community, while income and educational level were reported to have statistical significant positive effect for Kundiawa community. Gender was reportedly independent of WTP and has no effect for both communities.

A review of Han *et al.* (2011) estimation of willingness to pay for environmental conservation in Kanas Nature Reserve, Xinjiang, China shows that, income, gender and educational level were independent of respondents WTP. However, attitude towards environmental conservation was statistically significant and influences WTP. This means that irrespective of respondents' gender, income and education, their WTP was highly dependent on their attitude to nature.

Additionally, Chuwuone (2008) studies on willingness to pay for systematic management of community forests for conservation of non-timber forest products in Nigeria's reveals that, socioeconomic factors such as wealth (income), occupation (livelihood activities) and female respondent were statistically significant and influences respondents willingness to pay towards forest conservation. Occupation was linked to respondents' wealth which reflects WTP. Female respondents who were perceived to obtain a lot of benefits from the forest were willing to pay to sustain those benefits

Lastly, Ansong (2014) studies on local communities' willingness to pay for sustainable forest management in Ghana reveal that, older respondents and income were major determinants of respondents' WTP. This was attributed to the fact that, older people have more income and experiences on conservation than younger respondents.

His study however, found gender and educational level independent of respondents' willingness to pay.

2.10 Mode of payment

Mode of payment plays a vital role towards building the confidence of resource providers to continue providing environmental goods and services. There is different payment method available for rewarding resources providers (FAO, 2007). These include; cash payments (direct debits or cash transfers), levies and kind payments (subsidies and technical assistance).

2.11 The shea tree (*Vitellaria paradoxa*)

2.11.1. History and ecological distribution of shea trees

Shea tree formerly *Butyrospernum paradoxa*, now called *Vitellaria* p*aradoxa* belongs to the family, *Sapotacea (*Masters, 2004). Historical evidence suggests that, shea cultivation started 4000 years in ancient Egypt. It was regarded as a high valued commodity tree in regional trade in the year 1352 by one Moroccan traveler, IBN Batuta and a European botanist; Mungo Park in 1799 (Ferris *et al*,. 2001).There are two subspecies of the shea plant, *Vitellaria paradoxa* and *Vitallaria nilotica* (Ferris *et al.*, 2001). The former does well in arid and semi-arid regions of West African countries whilst the later; *Vitellaria nilotica* is home to East African countries. The shea belt occurs around a band of 500-750 km wide stretching some 5000 km across 20 countries in West and East Africa (Ferris *et al.*, 2001). The shea belt is grouped into three zones following their potentials for shea nut production per year. These zones include; the high production zone, average zone and low production zone (Bup, 2014). The tree is absent from the forest, coastal areas and from highlands at altitudes above 1,600 m (Boffa *et al*.,
1999; Boukoungou *et al*., 2002). It has also been estimated by Maranz and Wiesman (2003) that, productive shea trees amounts to about 500 million which represents 2.5 million tons of kennel per annum.

2.11.2 Botanical characteristics of shea trees

Vitellaria, is a semi-arid tree of medium size, with a pyramidal crown. Shea trees grow to 10-20 m in height, but on rare occasions, they have been recorded to grow up to 25 m (Nair *et al*., 2013). The cylindrical trunk has a circumference of between 0.5-2.5m, usually relative to the height of the tree and measures on average, 3-4 m before splitting into numerous branches with thick, fissured bark (Nair, 2013). It has a greenish/yellowish color and grows in groups of approximately 30m during the flowering season, which is usually between the month of December and March (Moore, 2008). Its characteristics of thick, corky, and fissured barks enable it to withstand harsh environmental conditions such as bush fires, harmattan, wind, and drought (CRIG,
2002). In Ghana, it occurs in the wild over almost the entire Northern Ghana, covering 77, 670 square kilometers with some sparse shea trees covered in parts of Brong-Ahafo, Ashanti, and Volta regions (CRIG, 2002).

Globally, shea products are highly valued and demanded in large quantities by various confectionary, pharmaceutical, cosmetic and other industries for the manufacture of a variety of products (Ferris *et al*., 2001). For instance, the demand for shea butter in Europe, Japan, India, Canada and the United States has witnessed rising trend over the past few years (*Scholzl*., 2009).

The shea industry though, still in its infancy stage of development, contributes 30 million US dollar to the economy of Ghana (Bup *et al*., 2014). Aside economic benefits, various parts of the tree have been utilized for medicinal purposes, hand tools, cooking utensils, poles for house construction, and charcoal production (Bonkougou *et al*., 2002; Carette *et al.*, 2009; Dogbevi, 2007; Ferris *et al*., 2001; Hatskevich *et al*., 2011; Masters, 2004;)

Despite the positive contribution of shea trees in improving livelihoods of people both locally and globally, sustainable production and conservation of shea trees to sustain the industry remains a challenge. Stakeholders across the globe have focused on finding solutions to boost its production and conservation.

2.12 Nature of shea tree production, conservation and exploitation

Shea trees, (*Vitellaria paradoxa*), occur either in agro forestry and semidomesticated parklands across the band where they are grown (Boffa *et al.*, 1999). It has been reported that about 5 million shea trees remain undomesticated in the wild, occurring naturally in the savannah woodlands of arid and semi-arid areas of West and East African countries (Ferris *et al.*, 2001). Deliberate selection and management practices of shea trees have been ongoing for several centuries. These management practices have led to the transformation of most shea landscapes increasing shea tree population, gene flow between populations and increasing productivity of the tree (Boffa, 2015). These transformations have been influenced by conscious decisions and management practices of several millions farmers across the shea producing belt Boffa (2015). It is therefore essential that efforts geared towards shea resource improvements is built upon these existing shea tree parkland and management practices, indigenous knowledge and local participation.

To ensure effective conservation and production of shea trees, Boffa (2015) recommends that, there is the need to improve on existing farming systems to make it more sustainable and adapted to the needs and aspiration of the current generation instead of attempting to impose a brand new domesticated technique which may be alien to farmers. This is necessary because, most farmers over the last decades have attempted domesticating these trees by integrating them with agricultural crops resulting in improved and higher valued attributes including large fruits, sweet fruits, high fat content of the

kernel compared to other locations in a germplasm collection including origins in Mali and Burkina Faso (Maranz and Wiesman, 2003 cited in Boffa, 2015). However, the purported long gestation period of the tree remains among other reasons why shea tree plantation development remains low (Okiror *et al.*, 2012). This is equally a potential challenge confronting the study which may explain why shea conservation and production is very slow.

Despite these challenges to shea conservation, the trees have been exploited over several decades for numerous purposes. Shea trees offer an excellent organic matter suitable for many agricultural crops (Masters *et al., 2004)*. According to Ferris (2001) and Okiror *et al.,* (2012), shea trees are exploited by various local communities for their root, barks and leaves for medicinal purposes. Other products includes; the nuts which produce one of the finest butter and vegetable oils for the preparation of local dishes and the manufacture of confectionery products such as biscuits, chocolate and other cocoa butter substitutes (Ferris, 2001). Masters *et al.,* (2004), reveal that, the wood of shea tree is hard and resistant to termite attacks. This makes it suitable for the production of building and roofing poles. Masters *et al* (2004) indicate that, the hardness characteristic of the wood of shea trees makes it a preferred tree species for the production of charcoal and wood fuels for small households and cottage industries energy needs.

2.13 Definition of Governance

Governance is about establishing institutional structures or arrangements to resolve conflicts and facilitate human coordination (Paavola, 2007). It defines how we establish goals, define rules and norms for reaching those goals, and finally how we control and coordinate the outcomes/results arising from the use of those rules (Vatn, 2010).

In other literature, governance refers to the processes in which leaders are; chosen and voted into power, monitored and replaced; how the government enacts and implement

sound policies whilst adhering to constitutional provision of respecting citizens and state institutions that control the relationship existing among them (Kaufman, 2010).

In this study, governance is viewed from the perspective of how norms, rules and regulation coordinate shea tree production and conservation, access and withdrawal of benefits at the various local communities to ensure sustainable existence and provision of environmental benefits.

2.14 Types of Governance Structures

Literature reviewed so far suggests that, governance structures differ from one geographical setting to the other but there are similar key elements that run throughout among these structures. Vatn (2010) identified hierarchy, markets and community management as key governance arrangement that exist in the management of environmental resources such as shea trees. IUCN (2004) identified the following as types of governance arrangements; governance by the government, joint governance and private governance. Relating these two literatures, governance by government and governance by hierarchy usually involves the same command and control attributes with power of decision making vested in the central government. Resource distribution is often bureaucratic and runs from national to regional and district public entities. This governance type is the brain-child of many conservations parks and reserves in Ghana.

This system doesn't promote strong enforcement and compliance.

On the other hand, the market is a system of governance structure similar to joint governance that involves voluntary exchange among all participating agents (Individuals, companies, and conservation activist). The setting up of goals rests with all participating individual agents (government, individual land owners, companies, and conservations activists).The ultimate decision of allocating resources is often determined by the largest WTP for the environmental service (Vatn, 2010).

Community management governance arrangement is a system based on cooperation. Individual decision makers such as household heads, chiefs and individuals living in the community may formulate goals that govern both the individual and communal interest. Allocation of resources usually lies on a general rule of reciprocity (Vatn, 2010).A typical example of this form of governance is the Community-based Natural Resource Management (CBNRM) practiced among forest communities in Ghana (Forest Watch Ghana, 2006). This study seeks to establish the types of governance arrangement practiced in the management of shea trees and determine how it contributes to sustainable management of trees in the area.

2.15 Local institutional Arrangements/structures

Institutions are very essential for coordinating our every-day interrelationship. They have rules and norms that help defines how we share the same resources (forest, water and air) within local communities, district, regional and national level (Ostrom, 1990). According to (Ostrom, 1990), these rules could be local taboos, customary rites and norms among homogenous resource users who recognize the importance of natural resources to their socio-economic wellbeing and guided by the spirit of reciprocity are willing to give back to nature by protecting or conserving. In this study, local norms, taboos, rules and regulations with potential strengths of guaranteeing sustainable conservation of shea trees have been identified and assessed to determine their role in shea tree conservation and production.

On the other hand, institutions may refer to formal governance structures established by law and policy to coordinate roles and responsibility of public institutions at various levels (Greiber, 2009). This is often achieved through the establishment of an institutional set-up or arrangement to fulfill set goals and targets. This institutional arrangement may refer to a set-up of public institutions at various levels fulfilling essential

PES related functions (shea trees environmental related services) both at the district level working to ensure enforcement and compliance; regional level institutions working to remove administrative boundaries; national institutions working to introduce shea related PES policy directives.

Moreover, institutional arrangement may refer to relationships established among various stakeholders (buyers, sellers, and intermediary bodies) so as to reduce transaction cost (Tognetti *et al., 2003*). Pagiola and Platais (2007) recommends that, to develop an effective institutional arrangement to facilitate payment for environmental services such as shea trees, there is the need to control who has access to environmental services flowing from shea tree conservation and production. This will define rights to particular bundle of benefits as well as responsibilities for enjoying their provision. This will determine who has access to various benefits arising from shea trees conservation and production. It will also help determine whether those who pay for the costs of management practices of these trees would gain access to any of the benefits, and therefore have an incentive to conserve the resources (Ostrom, 1990). This will help eliminate the common property phenomenon that characterizes shea tree exploitation.

CHAPTER THREE

METHODOLOGY

3.0. Introduction

This chapter discusses the characteristics of the study area, research approach, the target population, sampling frame and size, data collection instruments and techniques and sampling techniques. It also presents the methods used in data analysis.

3.1 Study area

3.1.1Location and extent

The Bongo District is one of the nine Districts in the Upper East Region of Ghana (Figure 3.1).It shares boundaries with Burkina Faso to the North and East, KassenaNankana to the West and East Districts and Bolgatanga municipality to the South. It lies between longitudes 0.45^{o} W and latitude 10.50^{o} N to 11.09^{o} and has an area of 459.5 square kilometers. It lies within the Oncho-cerciasis-free zone. The District is made up of 36 communities and has 7 Area Councils (Bongo district, 2012).

3.1.2 Climate and vegetation

The climate of the district is similar to that experienced in other parts of the Upper East Region. Mean monthly temperature is about 21^{o}C. Very high temperatures of up to 40^{o}C occur between the months of March to May each year just before the onset of the single rainy season which occurs in June. Low temperatures of about 12^{o}C are usually experienced in December when harmattan winds from the Sahara dry up the vegetation. During these periods, the harmattan creates ideal conditions for bush fires which destroy grasses, shrubs and trees including shea trees. This phenomenon is further worsened by human activities such as charcoal burning and firewood production (Bongo district, 2012).

The amount of rainfall in the district is characterized by some 70 rain days in a year with rainfall ranging between 600mm and 1400mm. The rains fall heavily within short periods of time, flooding the fields, eroding soils into rivers and causing destruction to life and property. However, the fields dry up soon after the rainy season giving way to drought (Bongo district, 2012).

3.1.3 Demography

Human population densities are high in the district and due to long periods of intensive building and construction and other unfavorable land management practices, the soils are now exhausted. According to the Ghana statistical Service report, the population of Bongo District is 84,545 representing 8.1% of the region's total population (GSS, 2010). The number of females is 52.4%whilst males represent 47.6%. Ninety four percent (94%) of the population live in the rural areas. Majority of the people of the District falls within the youthful (42.7%) bracket depicting a broad population pyramid which declines upward with a small number of elderly persons (9.7%) occupying the tip of the pyramid.

3.1.4 Local economy and land use

Agriculture employs over seventy percent of the total population of the people. The Ghana statistical (GSS, 2010) report reveal that about 72.6% are engaged in agriculture and related sectors such as, forestry and fishery workers, 12.1% in service and sales, 15.5 percent in craft and related trade. The area is selected for this study, due to the fact that, the resources from shea trees (e.g. shea butter processing) employs close to 75% of women which includes pickers and the processors. It is one area that is a major source of income for most women and their families (Bongo District, 2012). Shea trees also act as a major source of carbon sink and helps maintain other ecological cycles.

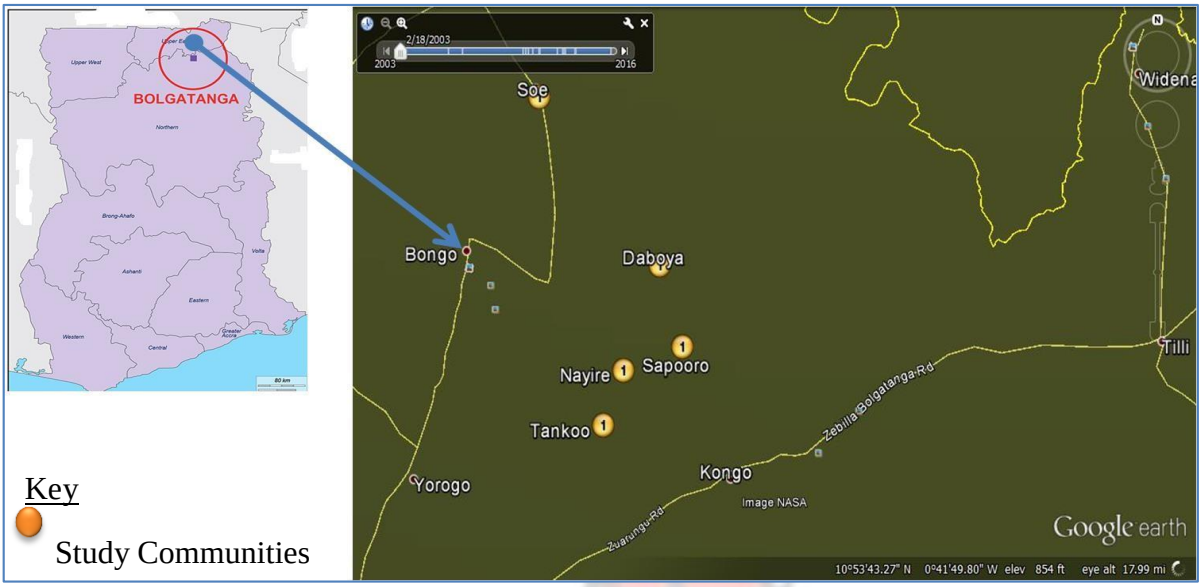

Figure 3.1: Map of Ghana showing the study District and communities (Tankoo, Nayire, Daboya, Sapooro and Soe).

Source: (Field Survey, 2015; Google earth).

3.3. Research Design

Quantitative research approach was used due to the fact that, it presents an excellent design of finalizing results and supporting or not supporting a hypothesis. This is achieved through the collection of numerical data and analyzed using mathematicalbased methods (Creswell, 1994).

3.4. Data Sources and Instruments

Primary quantitative data was collected, coded and analyzed for statistical inferences in this study using structured questionnaire. Survey questionnaire comprising close- ended questionnaire were used to generate primary quantitative data from the sampled population by eliciting stakeholder's bio-data, benefits of shea trees, willingness to pay, factors that influence WTP, ideal local institutional arrangements that would promote payment towards shea tree production/conservation and payment mode

(Appendix A).Secondary data from research institutions, journals, reports, conferences, websites, natural resources policies and other relevant materials were reviewed to support primary data collected for the study.

3.5. The population and sampling frame of the study

The population for this study focuses on all farmers, shea nut pickers and processors within the Bongo district. The sampling frame was drawn from list of various groups/cooperatives/association of shea processors, pickers and farmers in Tankoo, Nayire, Soe, Sapooro and Daboya communities.

3.6. Sampling and Data Collection

This study employed multistage sampling techniques (probability sampling). The first stage in this study involved the categorization of the various area councils of the districts where shea trees are grown into seven (7) clusters where shea trees are found. Having done this, three (3) clusters involving communities in which shea trees are found were selected using simple random sampling (lottery method). Five (5) communities were purposely selected within these clusters using availability of shea trees, existence of organized groups/association of farmers, shea butterprocessors and pickers as criteria for inclusion. Lastly 20 respondents of ages 25 years and above in each community group or associations were randomly selected using systematic random sampling. Using a list of farmers or shea processors/pickers from each community, one respondent was selected at every two interval starting from the first person on the list until the total number of 100 respondents for each community was reached to form a sample for the study.

For the elicitation methods, referendum method with double bounded dichotomous choice method is adopted for this study as the main elicitation method.

3.7 Data Collection Procedure

A familiarization visit was conducted at each selected communities to enable the researcher make a community entry to gain acceptance to these communities. Further, this activity was also undertaken to establish contacts with key opinion leaders, group leaders, and assembly members of the respective communities. Design of questionnaire and training of data collection assistants for the survey was done at this stage

The survey started with the administration of structured closed-ended questionnaire to 100 respondents. The questionnaire was translated from English into Gurene (local dialect) before being administered face-to-face to 20 respondents in each community. The first section of the questionnaire collected information related to the nature of shea trees (sparse or dense) in the various communities. This was done to determine whether the trees were actually declining as literature suggest. Information on respondents' attitudes towards shea tree conservation and production was also collected. The next section of the questionnaire collected information on respondents' knowledge of appropriate local institutional arrangements that could facilitate effective payments and governance of shea trees. Respondents' knowledge of strategies for preventing unsustainable conservation of shea trees was also assessed. Moreover, the benefits derived from shea tree resources were examined.

Further, a hypothetical scenario was presented to respondents' to collect information on their willingness to pay towards an environmental initiative to conserve/produce shea trees. The scenario is illustrated as follows;

"*Imagine there is an environmental initiative to conserve existing shea trees in the wild or establish shea plantations to provide market and non-market environmental services. The implementation of this initiative would ensure the sustainability of the tree.*

However, it would involve a lot of investment in the form of money and time from the community. The money would be contributed by the community through community levy and it could be either in the form of kind or cash".

Local residents were asked to state whether they would be willing to pay towards the initiative after reading this scenario to them. This scenario was preceded with double bounded dichotomous choice questions. Three bids were offered; Gh₵10.00, Gh₵15.00 and Gh₵20.00 for respondents to state the amounts they are willing to pay. This question was followed up with lower or higher bids depending on the respondent's response to the first question (Carson *et al.,* 2001).The last set of questions collected information on respondents' demographic and socio-economic characteristics such as age, gender, income, educational status, marital status and livelihood activity.

3.8. Data Analysis and model specification

Data gathered from the survey questionnaire were analyzed using statistical package for social sciences (SPSS version 20). Descriptive statistical tools such as; mean, frequency, and percentages were used to summarize variables of interest to the study. Linear regression was used to determine the relationship between the dependent variable (willing to pay) and the predictor variables (respondents' socio-economic characteristic).

3.9 Model specification

Willingness to pay in this study was analyzed using a model proposed by Carson and Hanemman (2005). The economic value of a non-market good like shea trees to an

individual can be measured by determining the magnitude of their WTP for the good. According to Carson and Hanemann (2005), WTP is defined as the amount that must be taken away from a respondents' income while keeping their utility constant to meet the cost of providing the non-market good (i.e., conserving or planting shea trees).

Most scholars employed the random utility model approach for dichotomous contingent valuation feedbacks to estimate the WTP (Hanemann 1984, Haab and McConnell 2002). Hanemann (1984) justified dichotomous contingent valuation questions by putting them in a framework that allows all parameters to be estimated and interpreted. Hanemann (1984) recommended deriving WTP from the indirect utility function. Thus, the indirect utility function of respondent 'j' can be formulated as follows:

$$Vij = v\ (Yj, Qj, M, P) \quad \ldots\ldots (1)$$

Where, V (.) is the indirect utility function, Yj, is the respondent's income, Qj is the current condition of shea trees in the area, M is the socioeconomic characteristics of respondent that might influence their WTP and P is a vector of individual characteristics affecting the trade-off that the individual is prepared to make between income and the non-market good (sustainable shea trees). For the status quo, where there is no effort to conserve or plant shea trees (i=0), the indirect utility function of the respondent is given by:

$$V0j = v\ (Yj, Q^0, M, P) \quad \ldots\ldots (2)$$

Let superscripts '0' denote the initial (status quo) conditions of no effort towards conservation/production of shea trees and superscripts'1' denote the new conditions (sustainable conservation/production of shea trees). $Q^0$is the current situation of shea tree and Q^1 is the new situations. If the respondent is willing to pay some money C ($C_j > 0$) for the sustainable conservation/production of shea trees, because of quality and quantity changes ($Q^1 > Q^0$), the indirect utility function of the respondent is given by:

$V_{ij} = v\,(Y_j\_C_j, Q_j, M, P)$……………………………………………………………(3)

In a general market equilibrium, there is always the need to consider the amount of income that the respondent will give up to make him/her indifferent between an initial condition (the current condition of no sustainable conservation/production of shea trees where income is at $C_j$and good at Q^0, and final situation (in this case the sustainable conservation/production of shea trees, where income is at Y_j -$C_j$and good is at Q^1).Economist calls this amount of income, the WTP (Haab and McConnell 2002). Thus, the final WTP equation for sustainable conservation/production of shea trees is given by a mathematical equation (4);

$V_{ij} = v(Y_j, Q^0, M, P) = v(Y_j\_C_j, Q^1, M, P)$………………………………………..(4)

Where v (.) is the indirect utility function, Y is the income of respondent, Q^0 is the level of goods in the current situation of no sustainable conservation/production of shea trees, Q^1 is the level of goods in the sustainable shea conservation/production program, *M* is the socioeconomic characteristics that might influence their WTP and P is a vector of individual characteristics affecting the trade-off that the respondent is prepared to make between income and the non-market good (sustainable conservation/production of shea trees). C is the compensation variation that is the WTP amount of the respondent. For detail derivation of mean willingness to pay model, see Carson and Haneman (2005).

From the indirect utility function, a multiple regression using a linear model was used to analyze socio-economic factors that influence respondents' willingness to pay. Respondents' WTP responses were regressed on age, gender, educational status, marital status, livelihood activity and income. There are six predictor variables that were selected to predict the dependent variable, WTP in this study. These variables have been included in this model for several reasons. First, they have been cited and discussed in earlier

literature. Second, so many authors have used them in their studies (Alhassan *et al*, 2014, Ansong, 2014, Baidoo and Amoatey, 2011., Ndetewio*et al*., 2014)). The selection of variables referred to in the literature is related to WTP, and these variables demonstrate the WTP of respondents. Coding was done using binary method. Thus, the model used for this study was adopted from (Mitchell *et al*., (1989)

$$Y= \alpha+ß_1X_1+ ß_2X_2+ ß_3X_3+ ß_4X_4+ ß_5X_5+ ß_6X_6+ ß7X7+\ldots ßX+ \mu \quad (1)$$

Where Y=WTP of respondents, X=explanatory variables, α=constant term, ß=coefficients. The estimated OLS model explaining variations in WTP across sampled respondents at Bongo district is specified as;

$$WTP= \alpha+ß_1A+ ß_2G+ ß_3MS+ ß_4EDU+ ß_5LA+ ß_6I + \mu \quad (2)$$

Where;

WTP= WTP for shea conservation/production, A=age, G=gender, MS=marital status, EDU=educational level, LA=livelihood Activity, I=income, ß=regression parameters and μ=error term.

Both dependent and independent variables were coded in Microsoft excel spreadsheet and entered into Statistical Package for Social Sciences (SPSS) for analysis and interpretation.

CHAPTER FOUR

RESULTS

4.1. Introduction

This chapter presents results on the socioeconomic background of respondents, willingness to pay towards sustainable production and conservation of shea trees, socioeconomic factors that influence respondents' willingness to pay and local institutional arrangements that facilitate payments towards sustainable shea conservation/production.

4.2. Socio Economic Characteristics of Respondents

Among respondents interviewed during the survey, 60% were females whilst 40% were males. The high numbers of females can be attributed to the fact that, females are noted for engaging in shea butter processing activities and nut picking in Ghana. Men normally play key roles in farming and related activities. This is true as it was observed in the five communities.

Observation from the survey indicates that that, 98% were married, whilst 1% was single and 1% divorced (Table 4.1). It is hoped that, married respondents would enjoy some financial support from their partners to boost their willingness to pay towards shea tree conservation.

It is observed from the survey that, majority of respondents' falls within the age range of 46-55 years and above 55 years representing 34% and 20% respectively. This observation from the survey indicates that, most of the respondents are probably old or transiting from their active to weak ages. Twenty seven percent (27%) were within 3645. The minority age bracket (25-34) representing 19% were mainly the youth in the communities (Table 4.1).

Observations from the survey indicate that, majority (71%) of respondents interviewed did not attain any formal education. However, 20% of them are within the basic school category. A few of them representing 4% and 5% attain secondary and tertiary education status respectively. Though, the numbers of respondents that have attained formal education are few, they could possibly create a positive impact by educating those without formal education on the importance of tree conservation. This can practically be possible since they belong to same group/association.

One's occupation or livelihood determines his ability to place value on certain goods and possibly pay for them. Majority of respondents interviewed during the study are engaged in farming (60%) It is important to note that, respondents who were identified as farmers were also engage in shea butter processing and nut picking. Nine percent (9%) are engaged in formal employment such as; teaching, nursing, engineering, and administrative related jobs whilst shea nut pickers and traders respectively represent 7% and 4% (Table 4.1). The fact that some respondents' livelihoods activities are directly related to shea trees, there is high tendency for them to pay towards conservation and production of the tree.

Income is important factor which determines respondents' WTP towards conservation of environmental goods. Thirty-eight percent of respondents (38%) interviewed, earned between 500-1000 Ghana cedis per annum followed by100-500, representing 33% of respondents. On average, 20% of respondents earned between 10002000cedis per annum. On the other hand, high income earners representing minority groups constitute 7% and 2% respectively (Table 4.1).

Table 4.1: Respondents' Socioeconomic Characteristics

Variables	Description	Frequency	Percentage

Gender	Male	40	40
	Female	60	60
		25-35	19
	Age	35-45	27
		45-55	34
	Above	55	20
Marital status	Single	1	1
	Married	98	98
Divorced and separated		1	1
Educational level	None	71	1
	Basic	20	20
	Secondary	4	4
	Tertiary	5	5
Livelihood activity	Farming	48	48
	Trading	2	2
	Formal employment	7	7
	Shea-butter processing	29	29
	Sheanut picking	14	14
Income	100-500	33	33
	500-1000	38	38
	1000-2000	20	20
	2000-3000	2	2
	Above 3000		7

Source: Field Survey, 2015.

4.3. Willingness to pay towards shea trees conservation/production

Results from the study (Table 4.2) indicate that, 97% of respondents in the five communities were willing to pay towards shea conservation and production whiles 3% of respondents' were not willing to pay. Respondents cited the following reason for willingness to pay; sustenance of shea related businesses, improvement of ecological

wellbeing of the savanna area, ensuring continuous existence of shea trees for future generations (Table 4.4).

On the other hand, 3% of the respondents' cited the following reasons for not willing to pay; some believed that shea trees cannot be conserve artificially. Hence, there is no need to pay for an initiative that will not work. Others also share a certain conviction that, the initiative will not be successful because of poor governance. Moreover, some respondents were not just interested in the initiative because, managers of the fund will spend the money.

The prices suggested for the Double Bounded Dichotomous choice questionnaire (DBDC) was as follows: GH¢20.00, GH¢15.00 and GH¢10.00 per annum. Soe community recorded the highest mean WTP of GH¢16.50 and Tankoo the lowest (GH¢11.00 (Figure 4.3).

Table 4.2 willingness to pay of communities

Community	Soe	Daboya	Tankoo	Nayire	Sapooro	Total
No. of respondents willing to pay	20	20	19	19	19	97
No. of respondents not willing to pay	0	0	1	1	1	3
Total	20	20	20	20	20	100

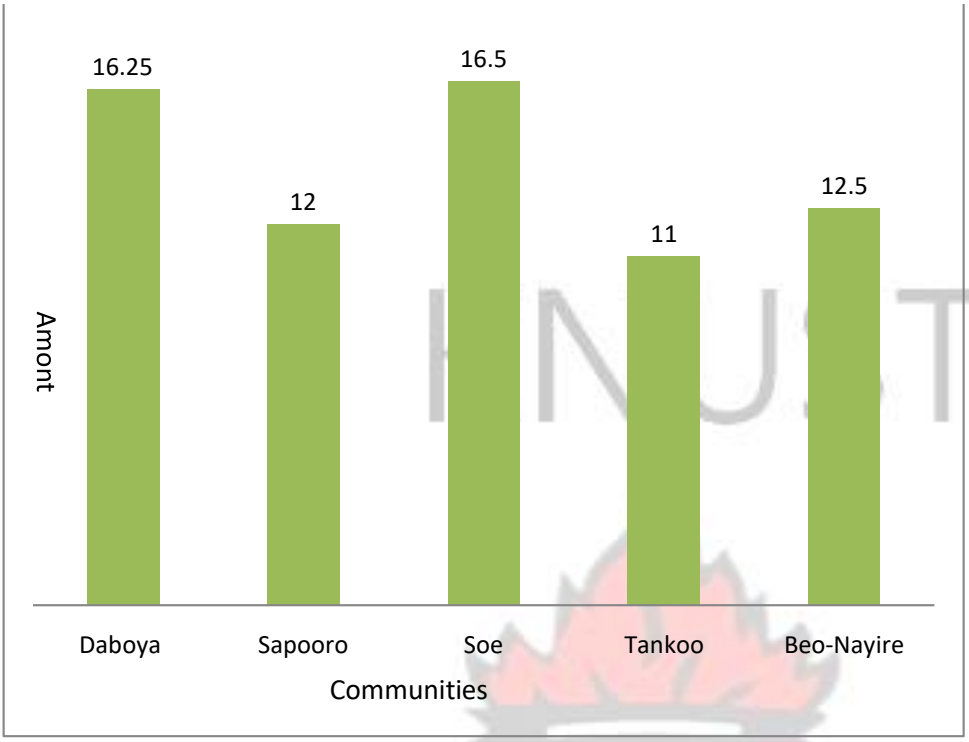

Figure 4.3: Mean willingness to pay towards shea conservation/production.
Source: Field survey, 2015.

4.4. Factors influencing willingness to pay towards shea tree conservation

A regression analysis of respondents' income, age, gender, livelihood activity and educational status using Ordinary Least Square model (OLS) was done for all respondents in the various communities to determine which factor influences their WTP towards shea trees conservation/production. The results showed a positive correlation between the independent and dependent variables, ($F(6, 93) = 8.009$, $p < 0.001$) was observed from the regression model (Table 4.3). About 34% of variability in the model was explained by four of the predictor variables (marital status, educational level, livelihood activities and income). The t-statistic for the regression coefficient of these predictor variables were statistically significant at 5%.

Table 4.3 Results from a linear regression analysis

Un-standardized Coefficients			Standardized coefficients			
	B	Std error	B	Beta	t-statistic	Sig. level
(Constant)	-1.735	5.398		-321	0.749	NS
Gender	-0.440	0.766	-0.051	0.574	0.567	NS
Age	-0.229	0.289	0-.073	-0.794	0.429	NS
Marital status	5.645	2.527	0.191	2.234	0.028	**S
Educational level	1.718	0.488	0.324	3.520	0.001	**S
Livelihood activity	0.490	0.158	0.270	3.110	0.002	**S
Income	0.850	0.361	0.225	2.353	0.021	**S

a. Dependent Variable: amount respondent is willing to pay
b. Predictor Variables: gender, age, marital status, educational level, livelihood activity and income.

Key: NS implies not significant

**S implies significant at 5%

Table 4.4 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the estimate
1	.584[a]	.341	.298	3.5283

Predictors: (Constant), income, livelihood activity, marital status, sex, age, educational level

ANOVAa

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	598.238	6	99.706	8.009	.000[b]
	Residual	1157.762	93	12.449		
	Total	1756.000	99			

a. Dependent Variable: amount respondent is willing to pay

b. Predictors: (Constant), income, livelihood activity, marital status, sex, age, educational level

4.5. Stakeholders and Institutions engaged in Shea Tree Production and Conservation Related Activities

Stakeholders are parties that have interest in a particular activity. Some of the primary stakeholders identified during the study indicated in Figure 4.4, include; farmers, shea butter processors and shea nut pickers. Farmers consciously select and conserve shea trees on farmlands during land preparation. Shea butter processors and nut pickers in collaborations with some organizations (LUSH LIMITED) are engage in shea tree conservation and tree plantation development. Institutions such as MoFA and forestry service division supports, regulates and controls the felling down of shea trees during land preparation and charcoal/firewood production. Shea butter buying companies (LUSH ltd) and NGOs (World Vision International, SNV, TECHNOSERVE) support farmers and shea butter processors to conserve and establish shea tree stands.

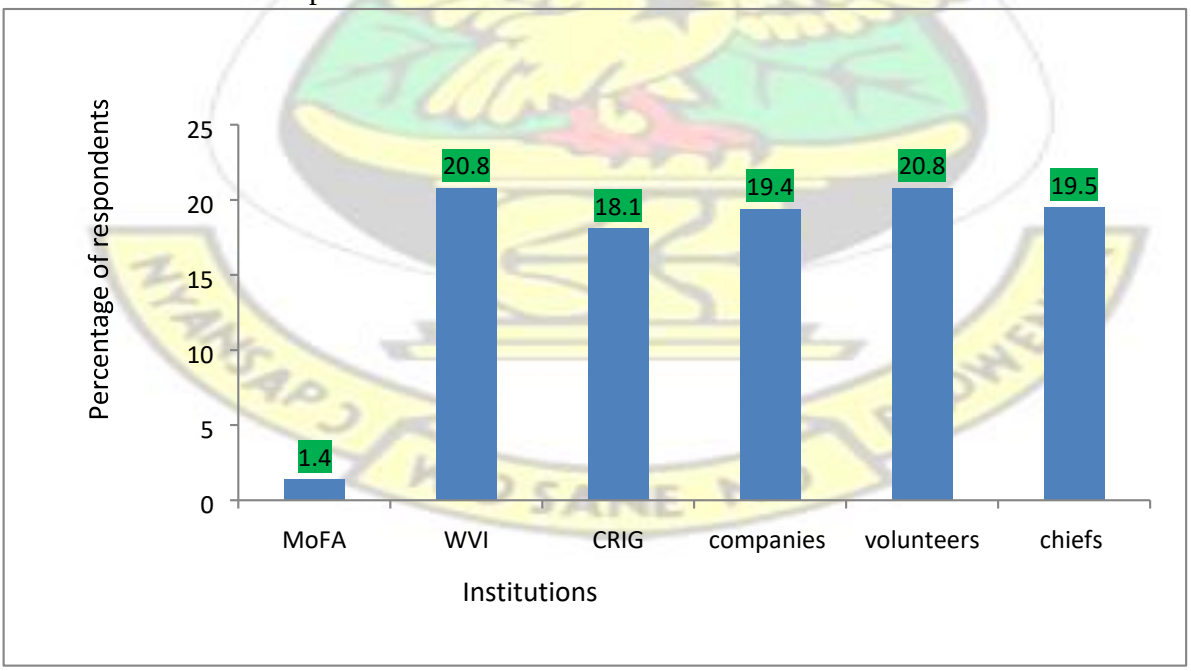

Figure 4.4: Institutions that Engage in Shea Tree Conservation.

Source: field survey, 2015.

4.6. Local Institutional Arrangement and Payment for Shea Tree Conservation/Production

Majority of shea trees in the study area are located in the wild/bush as reported by 96% of the respondent's whilst few are found in agro-parklands. Seventy nine percent (79%) of these respondents indicate that, these trees are owned by family heads, clan heads and the whole community and are managed by traditional authorities using taboos, rules and norms. Since they are managed by the whole community and families, no one is paid to render the service of either conserving or producing shea trees. Thirteen percent (13%) indicate that, apart from communal ownership, some shea trees are privately owned by private individuals and groups. A typical example is a shea plantation established by Bongo-Soe OJOBA shea butter processing group which is being supported by LUSH limited, a shea butter buying company based in the United Kingdom. Four percent (4%) indicates that, some of the shea trees found on protected lands in the bush are owned by government. Although the study identified key institutions and stakeholders, it found out that, there are no distinctions between shea producers (service providers) and users/beneficiaries. In addition, no institutional arrangement regulates access or payment towards sustainable shea tree production/conservation.

4.7 Mode of payment

There are different payment methods that can be used to compensate or reward people who would conserve shea trees. Findings from the survey indicates that, 22% preferred cash payments, whiles 32% proposed receiving payments in the form of subsidies to buy shea

seedlings and other related agro-products. Forty six percent (46%) opted for kind payments such technical assistance from research and public institutions such as university for development studies and cocoa research institute to enable them conserve or establish shea plantation. On the other hand, shea butter processors and nut pickers unanimously agreed to pay a levy for those conserving shea trees.

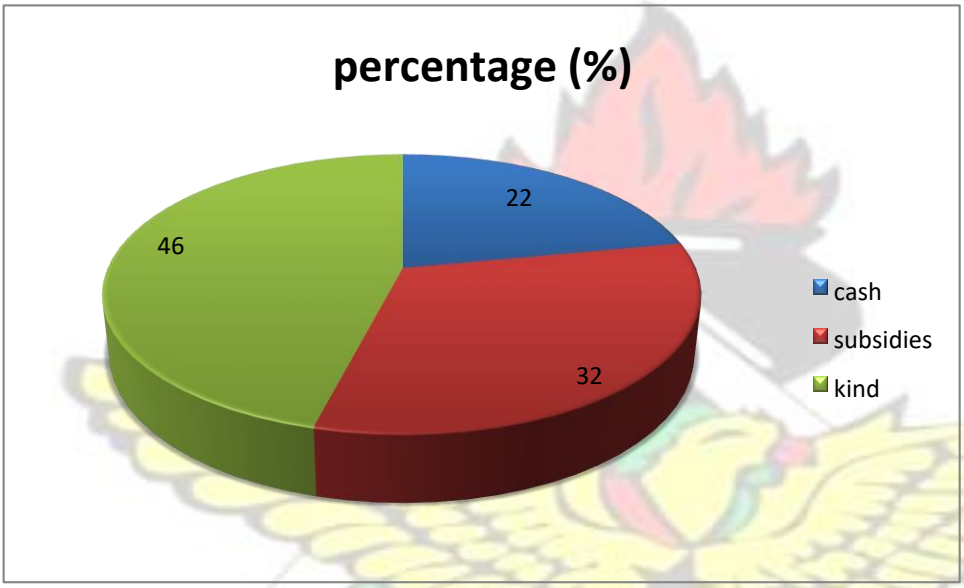

Figure 4.5: Payment Mode. Source: field survey, 2015.

CHAPTER FIVE

DISCUSSION

5.1. Socio-economic factors Influencing Willingness to Pay towards Shea Tree Conservation/Production

Almost all respondents interviewed for this study were married and from the survey results, marital status was statistically significant and influences respondents' willingness to pay

towards shea tree conservation and production. This implies that, they think of their progeny and the demand to create a better future for them. Moreover, married people often enjoy support from their spouses (Osewa *et al* 2012) which varies depending on the economic status of the couples. This could possibly be the major reason influencing their willingness to pay towards shea tree conservation and production as observed in the present study.. The findings of this study were consistent with the findings of Buyinza (2014) who reported that, there is a positive association between marital status and respondents' willingness to plant shea trees in Uganda. This could possibly explain why marital status influences willingness to pay towards shea tree conservation and production

Education is a variable that determines the ability of an individual to access and understand information (Chalfin, 2004). Education also enables people to be sensitive to environmental protection and conservation (Ezebilo, 2006). The study results show that, education was statistically significant and influences respondents' willingness to pay towards shea tree conservation and production. This finding was consistent with Ezebilo (2006) whose study results also witnessed a similar trend of education being significant towards respondents WTP for biological diversity conservation in Simbu province, Papua New Guinea. Though, majority of respondents interviewed places so much value on shea trees, those with higher education were more willing to pay higher towards shea tree conservation. This could be associated with their understanding that, conserving shea trees have high tendencies to provide other environmental services. Highly educated people were more likely to engage in other livelihood activities in the formal sector which could also earn them extra income. This study however, contradicts the findings of (Lorenzo, 2000 and Han *et al.,* 2011) whose studies revealed that respondents were willing to pay towards forest conservation irrespective their educational level.

The study also shows that, the main source of livelihood to people in the study area includes farming, shea butter processing and nut picking. Livelihood activity was significant at 5% level and influences respondents' willingness to pay. There were different livelihood activities engaged by respondents in the various groups/associations. Thus, the effect of livelihood activity on WTP could be that, those whose livelihoods were directly linked to shea trees were more willing to pay towards its conservation to sustain their livelihoods. This was captured in respondents' reasons for WTP towards shea tree conservation and production. Access to sound livelihood activities is linked to income levels (Ekka and Pundit, 2012). Those engaged in high income generating activities are able to demonstrate the value they place on an environmental service with higher WTP (Ekka and Pundit, 2012). This could possibly explain the variation in respondents WTP. The findings of the present study were consistent with Chuwuone (2008) whose findings also indicate that occupation influences respondents WTP to pay for systematic forest management in Nigeria.

Close to hundred percent (98%) of respondents sampled for this study were females. This can be attributed to the fact that, females dominate the shea industry as observed in the study. This is consistent with the findings of Carette *et al.*, (2009) who reveals that, the shea industry is female dominated in her assesssement of potentials and constraints of shea trees in Ghana. The findings from this survey reveal that, gender did not influence respondents' WTP. It could be that, most people places so much value on the tree irrespective of their gender orientation as explained by Han *et al.* (2011). Notwithstanding, it is important to note that, women hold a major stake regarding decision making in the industry and their views should be considered in any policy intervention.

Age is an important requirement for obtaining better output especially in the area of agriculture. Young and active individuals have high tendencies to be more productive

as compared to old and weak people (Osewa *et al.,* 2012*)*. However, age was not significant and did not influence respondents' willingness to pay towards shea tree conservation as observed in the study. The results agrees with the findings of Lorenzo (2000) who revealed that, age did not influence respondents' willingness to pay towards urban forest conservation in the United States. Majority of respondents for this study were within the age of 45-55 (34%) and above 55 years (20%). Thus, a total of 54% of respondents were dominated by old people who would probably lack the vigour to be highly productive with regards to labour. This may have implication for the initiative in the offing if it is going to be implemented in the next five to 10 years.

5.2 Willingness to Pay towards Shea Conservation and Production

Close to ninety seven percent (97%) of respondents interviewed for this study were willing to pay GH₵10-20.00 towards shea tree conservation and production. Bongo-Soe Ojoba shea butter processing cooperatives however recorded the highest mean willingness to pay of GH₵ 16.50 followed by respondents in Daboya community with GH₵16.25. This can be attributed to the availability of modern shea butter processing facilities and existence of a formalized cooperative which attracts a lot of nut pickers, processors and support from relevant organization for its activities than other communities. Moreover, it could also be attributed to the fact that, the establishment of shea tree plantation by Ojoba shea butter processing group with support from shea butter buying companies (e.g. LUSH LIMITED) seem to have increased their interest on conservation/production than other communities. This could possibly explain why they were more willing to pay than other communities. It could also be that, respondents' in these communities depend a lot on shea trees for their livelihood especially Daboya who do not have a modern shea butter processing facility but demonstrates high willingness to pay.

Though, the amount estimated is hypothetical, it translates to the actual commitment of respondents' to shea tree conservation. This implies that, the initiative would receive high endorsement or support if implemented in the area.

5.3 Mode of Payment

Payments for environmental services aim to offer incentives to managers of environmental resources to continue offering such services. Consultation with PES recipients is often recommended and could lead to the choice of cash, in-kind, or technical assistance—or combinations of these (Wunder, 2005). Findings from this study reveals that, twenty two percent were interested in cash payments whiles forty six percent were interested in technical assistance from public and research institutions such as; university for development studies and cocoa research institute. This decision was taken as a result of reports from various literatures that university for development studies and cocoa research institute has successfully reduce the gestation period of shea trees from 20 years to 5 years (Blaser *et al*., 2014). Other respondents (32%) wanted government to rather subsidies inputs such as fencing materials, seedlings and other related agro-products as a form of payment to enable them go into shea tree production and conservation.

5.4 Local Institutional Arrangements that Promote Payment for Sustainable Conservation and Production of Shea Trees.

The findings from the present study indicate that, majority of shea trees are communally owned by the entire community and utilized by members in the community. Right of access to shea trees found in the bush is controlled by chiefs in the various communities but due to breakdown of traditional rules and customs, the resources are opened to everyone making it a common pool property (Wunder, 2005). Private plantations owners however, are able to effectively enforce property rights governing their trees; however, they are few in the study area.

The study also identified key institutions and stakeholders that support shea conservation/production related activities but there was no institutional arrangement that can promote payment towards ensuring sustainable shea conservation/production. Apart from the private shea trees plantation established by Bongo-Soe Ojoba shea butter processors, there are no shea trees producers in the district. This explains why there is no PES scheme in the area. A PES scheme cannot be designed without the existence of a service provider (producer), a legal regulatory body, formal contracts and agreements and a financial mechanism (Pagiola and Platais, 2007).

The non-existence of coordinated institutional arrangements also contributes to the non-compliance of traditional rules and bye-laws to enforce property rights governing shea trees. Thus, to design a payment scheme to promote sustainable shea production/conservation, Pagiola and Platais (2007) suggested that, the institutional framework for a successful PES should include all stakeholders and institutions at national and local level, and mechanisms that support the implementation of the scheme. This should include public institutions that are responsible for environmental management, community-based organizations and NGOs involved in the management of natural resources, and public/private financial institutions that provide resources for the improvement of natural resources management. The institutional framework should be inclusive and representative, with broad engagement of local communities in the design and implementation of the plan. The legal framework for the implementation of a PES instrument should clarify land and resource tenure, provide specific rules and transaction mechanisms, and determine compliance and enforcement mechanisms. Pagiola and Platais (2007) further proposed that, the following aspects should be included in a PES design; the rights over the resources in terms of ownership and access to the resources, the payment of fees, and the use and sharing of benefits among the stakeholders. The present study

would encourage the design of an institutional framework that is composed of an inclusive shea tree board at the national, regional, district and community level to ensure equity, fairness, inclusiveness, transparency in its activities. The framework should also explicitly define ownership regimes to promote participation of all stakeholders. Policies and institutions should also be directly mainstreamed into national policies to create an environment that will attract both private and public voluntary payment schemes such as REDD+ and related schemes to help boost shea conservation. This will create a win-win situation for government of Ghana, global

carbon off-set markets and local farmers.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

The findings of this study reveals that, respondent place so much value on shea trees and this translated to ninety seven percent (97%) of respondents willing to pay between 10-20 Ghana cedis towards shea tree conservation and production

Respondents' willingness to pay was positively influence by socioeconomic factors such; level of education, livelihood activities income and marital status in order of increasing weight of their willingness to pay towards shea tree conservation and production.

There is currently no local institutional arrangement that facilitates payments toward the conservation/production of shea trees in the study area. Moreover, there are no distinctions between shea tree producers (service providers) and consumers (users).

A private initiative undertaken by Ojoba shea butter women group in collaboration with LUSH Company limited based in United Kingdom towards the establishment of shea

trees plantation signals a positive development for the emergence of private shea plantations in the future.

6.2. Recommendation

Education level, livelihood activity, and income were significant factors that influence respondents' willingness to pay towards shea tree conservation. Thus, it is recommended that, the implementation of a conservative/productive initiative should consider interventions that would help boost and sustain respondents', livelihood activities, and income. Efforts should also be undertaken to build capacities of respondents and their children regarding education.

There are no current payment schemes for the provision of environmental services from shea trees conservation/production in the area. This phenomenon has led to the uncoordinated nature of the shea industry. Government should create an enabling environment for public-private partnership for investment in shea tree conservation and plantation development by establishing legal and institutional arrangement framework that would support effective PES to boost shea tree production in the area. The creation of this environment has the potential to attract Carbon offset schemes such as REDD+ and other related schemes

Further, government could provide subsidies to encourage commercial shea seedlings production to make them easily available for individuals and organizations interested in establishing shea trees plantation. Similar interventions could also be extended to farmers and landowners to conserve existing trees found either on the farms or in the bush.

Ninety seven percent (97%) of respondents express their willingness to pay towards shea tree conservation/production. Hence, a pilot shea tree conservation program could be

implemented in the five (5) communities and the success story used to boost the confidence of other communities to embark on similar projects.

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APPENDIX

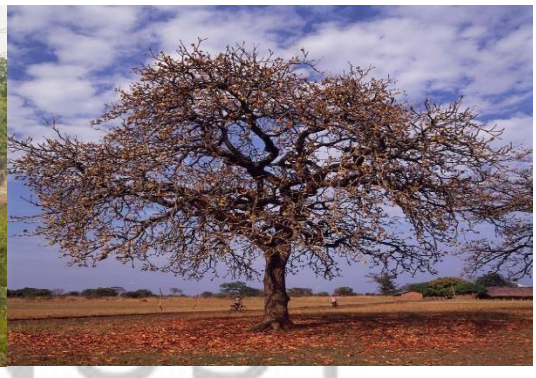
SURVEY QUESTIONNAIRE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

The researcher is a student of the above school pursuing MPHIL in natural resource and environmental governance. The purpose of collecting information for this study is to estimate willingness to pay towards shea tree conservation/production as well as identify institutional arrangements that promote sustainable shea production and conservation. I assure you that your responses to the questions during the in-person interview will be completely confidential.

Do you consent to give information for this study? Yes [ ] No [ ]

Name of cluster/community……Date ……



Picture of sustainable shea trees Picture of un-sustainable shea trees

Section A

Nature of shea production and conservation

A. 1. Do you have shea trees in this community? Yes [ ] No [ ]

A. 2. If yes, which of the pictures above depicts the status of shea trees in this community?

1. [ ] sustainable shea trees 2. [ ] un-sustainable shea trees.

A. 3. Which of the pictures above depicts the nature of shea trees that you prefer?

1. [ ] sustainable shea trees 2. [ ] un-sustainable shea trees

A. 4. If the choice is sustainable shea trees, why do you prefer those trees?

1. [ ] provides productive shea nuts 2. [ ] provides habitat for most mammals 3. [ ] provides winds breaks against storm 4. [ ] all the above

A. 5. What is the major method of shea production and conservation? (1) [ ] Natural regeneration and conservation (2) [ ] seedlings (3) [ ] vegetative production

A. 6. Which of the above methods in question (5) do you use in shea production and conservation? (1) [ ] Natural regeneration (2) [ ] seedlings (3) [ ] vegetative production

A. 7. Ten years ago, what was the nature of shea tree population? (1) [ ] Many (2) [ ] few

A. 8. Has the number of shea trees increased over the years last ten years? Yes [ ] No [ ]

A. 9. If no, what accounted for the decrease? (1) [ ] unsustainable exploitation (2) [ ] bush fires (3) [ ] charcoal/fuel production (4) [ ] poles [ ] other specify……

A.10. Do you and your family members plant shea trees? Yes [ ] No [ ]

A. 11. If no why don't you plant shea trees? (1) [ ] lack of seedlings (2) [ ] lack of land (3) [ ] lack of knowledge to manage shea trees (4) other specify----------

Section B

Local institutional arrangements

B. 12. Do you engage in any activities geared towards shea production and conservation? Yes [ ] No [ ]

B. 13. Do you know any institutions (NGO/government agencies) that engage in shea activities? Yes [ ] No [ ]

B. 14. If yes, is there any relationship between you/community and other stakeholders in the shea industry? Yes [ ] No [ ]

B. 15. If yes, state these stakeholders (1) …….. (2) ……..…… (3) ……

B.16. If no, why……

A. 17.Are local farmers involved in the implementation of some of these activities?

Yes [ ] No[ ]

B. 18. Are you aware of any organizations producing shea seedlings for interested farmers and organizations? Yes [ ] No [ ]

B.19. If no, what can be done to coordinate the activities of various stakeholders for improved development of the shea industry? (1) ……..……

(2) …… (3) …….

B. 20. Where are majority of shea trees found? (1) Farmlands (2) in the wild

B. 21.If in the wild, what ownership regime is practiced in the governance of these trees (1) communal (2) private (3) government

B.22. If communal, does this ownership regime facilitate the sustainable production and conservation of shea trees? Yes [ ] No [ ]

B.23. If no, state two reasons (1)…….. (2) ……

B. 24. If farmlands, what ownership regime is applied in the governance of these trees on farmlands? (a) [ ] communal (b) [ ] private (d) [ ] government

B. 25. If private ownership, can anybody exploit the resource without the consent of the owner? Yes [ ] No [ ]

B. 26. If no, why ……

B. 27. Does the private ownership promote sustainable conservation of shea trees in the farmlands?

B.28. is there an institutional arrangement that promotes shea trees production/conservation? Yes [ ] No [ ]

B. 29. Do you have norms and values that help conserve shea trees? Yes [ ] No [ ]

B. 30. If yes, what are these norms? (1) Taboos [ ] (2) totems [ ]

B. 31. Are these norms currently adhered to and does it help in the conservation of shea trees? Yes [ ] no [ ]

B. If no, what can be done to ensure that these norms and values are still practiced?
(1) …….. (2) …….

B. 32. Apart from these norms, are there other traditional rules that govern payment for shea exploitation? Yes [ ] no [ ]

B. 33. If yes, are those rules being adhered to towards the conservation of shea trees Yes [ ] No [ ]

B. 34. If no, give reasons for the failure of these rules (1) ……..
…… (2) ……

B. 35. Are there formal rules, bye-laws and policies that facilitate payments/compensations to shea trees producers/conservationist? Yes [ ] No [ ]

B. 36. If yes, is it observed in the community? Yes [ ] No [ ]

B. 37. If no, what should be done to ensure compliance of these rules? (1) Collaboration between community and state□ (2) formulating a shea policy□ (3) enforcement of assemblies by-laws (4) others specify…….

Section C

Total economic value of shea trees

C. 37. Does the shea tree offer any benefits to you? Yes [ ] No [ ]

If yes, tick the appropriate benefits that apply to you in the table.

Use value		**Non-use value**
Consumptive a. Butter/oil. Yes[ ] No[ ] b. Fuel wood/charcoal. Yes[ ] No[ ] c. Medicine. Yes[ ] No[ ] d. Poles. Yes[ ] No[ ] e. Craft material. Yes[ ] No[ ] f. food	Non-consumptive g. Cultural. Yes[ ] No[ ] h. Research. Yes[ ] No[ ] i. Education. Yes[ ] No[ ] j. Ecotourism. Yes[ ] No[ ]	Regulatory/Maintenance k. Windbreaks. Yes[ ] No[ ] l. Flooding. Yes[ ] No[ ] m. Soil fertility. Yes[ ] No[ ] n. Climate change. Yes[ ] No[ ]

Section D

Assessment of Willingness to Pay to sustain shea trees

Imagine there is an initiative to conserve existing shea trees in wild or establish shea plantations to provide market and non-market environmental services. The implementation of this initiative would ensure the sustainability of the tree. However, it would involve a lot of investment in the form of money and time from the community. The money would be contributed by the community through community levy and it could be either in the form of kind or cash.

D.38. Would you be willing to contribute towards this initiative to ensure the sustainability of these trees? Yes [ ] No [ ]

D. Why would you be willing to contribute towards this initiative? (1) to stop the continuous decline in shea trees (2) to boast shea nuts production (3) to ensure sustainability of the shea tree (4) other specify…….

D. 39. Would you be willing to pay towards conservation of these trees? Yes [ ] No [ ]

D. 40. If yes, how much are you willing to pay towards natural regeneration/conservation of these trees annually? 1) [ ] GH¢ 10.00 (2) [ ] GH¢15.00 (3) [ ] GH¢ 20.00

D. 41. If yes, are you willing to pay GH¢25.00. Yes [ ] No [ ]

D.42. If no, what is the minimum amount that you can pay? 1) GH¢5.00 (2) GH¢3.00 (3) GH¢2.00

D.43. How much are you willing to pay per one shea seedling towards the establishment of shea plantations? (1) GH¢ 10.00 (2) GH¢15.00 (4) GH¢ 20.00

D. 44. If yes, are you willing to pay GH¢25.00. Yes□ No□

D.45. If no, what is the minimum amount that you can pay? (1) [ ] GH¢5.00 (2) [ ] GH¢3.00 (3) [ ] GH¢2.00

D. 46. Why would you not be willing to contribute towards the conservation of the shea trees? (1) shea trees cannot be conserve artificially (2) The initiative would not successful (3) I am not interested in the initiative (4) they will spend my money.

D. 47. What payment method would you prefer? (1) Cash (2) in-kind (3) levy (4) other specify……..

Section E

Key strategies for preventing unsustainable exploitation of shea trees.

D. 48. Which of the following governance strategy is ideal for the management of shea tree? (1) [ ] private (2) [ ] government (3) [ ] co-management

D.49. What strategy can be employed to stop the unsustainable exploitation of shea trees especially those found in the wild (1) enacting a shea policy (2) setting-up a taskforce committee (3) privatization (4) collaboration/cooperation of shea stakeholders

Section F

Household data

A.50. gender (1) male [ ] (2) female [ ]

E. 51. Age (a) 15-25 (b) 25-35 (c) 35-45 (d) 45-55(e) 55 and above

E. 52. Marital status (a) single [ ] b) married [ ] (c) divorced and separated

E. 53. What is your level of education? (a) None [ ] (b) basic [ ] (c) secondary [ ] (d) tertiary [ ]

E. 54. What is the major source of income for your livelihood? (a) Farming [ ] (b) trading [ ] (c) formal employment [ ] (d) craftsman [ ] other specify…….

E. 55. What is your income level per annum? (a) 100-500 [ ] (b) 500-1000 [ ] (c) 10002000 [ ] (d) 2000 and above [ ] other specify……..