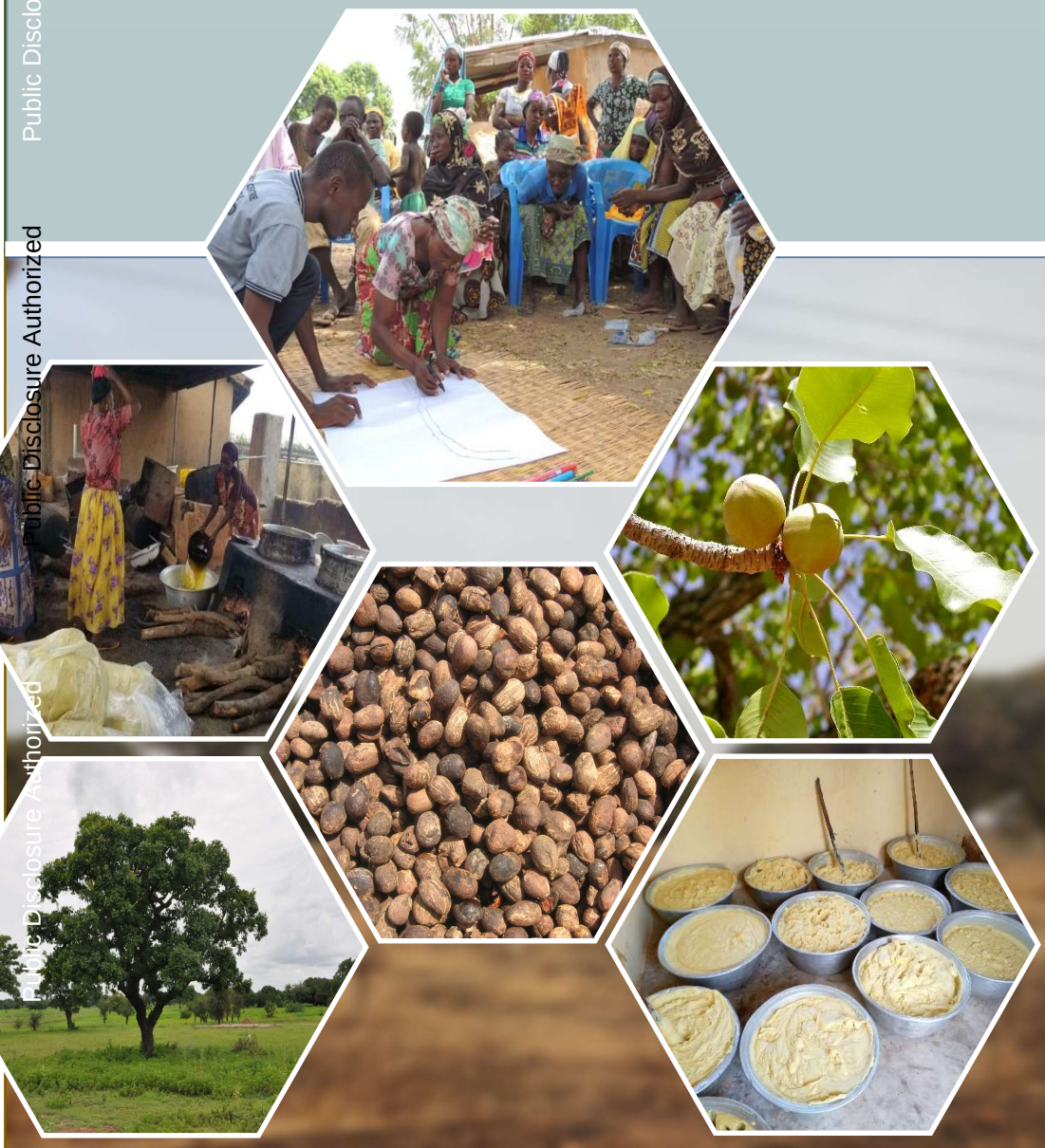
Analysis of Agroforestry-Based Value Chains and Food System in Northern Ghana

The Shea Value Chain

May 2023



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Ghana Green Growth PASA

Analysis of Agroforestry-Based Value Chains and Food System in Northern Ghana:

The Shea Butter Value Chain

May 2023

Environment, Natural Resources, and the Blue Economy Global Practice

Abstract

This series of two reports contains market and viability analyses to help relevant stakeholders identify the best opportunities for supporting sustainable and profitable tree crop production systems (in Northern Ghana) that have ready markets and contribute to diversification of farming systems and household livelihood strategies. The assessment focuses on cashew and shea, as two tree crops with high economic viability in the Northern Savannah Zone.

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The report was produced under the overall guidance of Pierre Laporte (Country Director, Ghana) and Sanjay Srivastava (Practice Manager, SAWE4).

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Table of Contents

List of Figures

List of Tables

List of Boxes

Glossary

Aggregators	Service providers in the supply chain who buy from producers, put together and sell to large-scale buyers.
Agroforestry	A set of systems and technologies where trees are deliberately used on the same land management units as agricultural crops and animals.
Agroforestry parklands	Land-use systems in which naturally occurring woody perennials are deliberately preserved in association with crops and/or animals in a spatially dispersed arrangement and where there is both ecological and economic interaction between the trees and other components of the system.
Carbon revenue /credit	Revenue or credit due to producers for undertaking deliberate activities to sequester or store carbon.
Carbon sequestration	The process of capturing and storing atmospheric carbon dioxide.
Climate resilience	The ability or capacity to bounce back from the impacts of climate change.
Cocoa Butter Equivalent	Cocoa butter equivalent is a fat composed of a combination of shea, illipe and palm oil. These oils are added together to produce a product that mimics the flavour and qualities of true cocoa butter but at a lower cost.
Conventional shea butter	Shea butter is produced from shea trees in farmers' fields where fertilizers and other chemical inputs have been used.
Fair for Life certified	Fair for Life is a certification programme for fair trade in agriculture, manufacturing, and trade.
Gender equality	The concept that women and men, girls and boys have equal conditions, treatment, and opportunities for realizing their full potential, human rights, and dignity, and for contributing to (and benefitting from) economic, social, cultural, and political development as well as equal access to resources.

Organic butter	Butter produced from organic shea trees that are found in uncultivated fields or in the wild.
Upgrading	The possibility of (developing country) producers to move up the value chain, either by shifting to more rewarding functional positions or by making products that have more value-added invested in them and that can provide better returns to producers.

List of Acronyms

AF	Agroforestry
AFS	Agroforestry System
CBE	Cocoa Butter Equivalent
CNFA	Cultivating New Frontiers in Agriculture.
COCOBOD	Ghana Cocoa Board
COCOSHEA	Cocoa, Coffee and Shea Association
CREMA	Community Resource Management Area
CRIG	Cocoa Research Institute of Ghana
DES	Decentralized Energy Systems
FDA	Food and Drugs Authority
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GEPA	Ghana Export Promotion Authority
GHG	Greenhouse Gases
GIZ	The Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH/German Development Corporation
GoG	Government of Ghana
GSLWMP	Ghana Sustainable Land and Water Management project
GTCP	Ghana Tree Crop Policy
GLSA	Global Shea Alliance
GSA	Ghana Standards Authority
MASLOC	Microfinance and Small Loans Centre
MOFA	Ministry of Food and Agriculture
MT	Metric Ton
NDC	Nationally Determined Contribution
OFIS	Olam Farmer Information System
PBC	Public Buying Company
PLS	Progressive Learning Scheme
ROWFAD	Rural Organization of Women Farmer and Agro Process /Development
SDG	Sustainable Development Goal
SAP	Structural Adjustment Programme
SET	Shea nut Equivalent Ton
ShVC	Shea Value Chain
SFC	Savannah Fruits Company
SNV	Stichting Nederlandse Vrijwilligers
SNG	Shea Network Ghana
SOP	Standards of Operation

TC	Tree Crops
TCDA	Tree Crops Development Authority
UDS	University for Development Studies
USAID	United States Agency for International Development
VC	Value Chain
VSLA	Village Savings and Loans Association

Executive Summary

Ghana has achieved significant economic growth over the past three decades. In 2019, the economic growth rate stood at 6.5 % and was largely driven by exports of commodities such as gold, crude oil, and cocoa (World Bank, 2020). Cocoa is the dominant source of agricultural earnings in Ghana. The agricultural sector remains a high priority for the government. In 2020, agriculture accounted for about 19.25 % of Ghana's gross domestic product (GDP).

Economic growth has, however, been uneven as spatial inequalities exist in Ghana. The Northern Savannah Zone of Ghana (Upper West, Upper East, Northeast, Northern, Savannah, Bono, and Bono East regions) has not experienced the same growth patterns as the rest of the country. The zone has higher rates of poverty and malnutrition, higher vulnerability to climate change and its variability, and higher rates of deforestation.

To address the challenges faced in the NSZ, there is an urgency to develop alternative livelihood strategies that build on the natural resource base of local communities and focus on sustainable land use. These strategies should promote land restoration to address food security needs, create employment and diversify income sources while limiting biodiversity loss. These approaches would consequently reduce the vulnerability of communities and the people to the menace of climate change. This study describes the governance of the value chain, examines constraints and challenges, the economic viability of shea production, and opportunities for better integration into national and international markets.

The following are the main findings of the study:

a) Shea trees in the AF parkland system provide many ecosystem services that help to improve agroecosystem biodiversity and productivity. Agroforestry-based value chains with shea have a huge potential to generate income for the land users.
b) There are multiple key actors consisting of collectors, aggregators (middlemen and middle women), processors and exporters in the value chain. No formal governance structure exists to coordinate the activities of the actors creating a vacuum that TCDA can fill.
c) The main production constraint is associated with the aging trees in the parkland system. Recent progress in vegetative propagation of the shea tree can reduce the fruiting period to 3-4 years and holds the potential for improved planting material for households. Collectors, mainly

women, must travel long distances to access shea trees growing in the wild. Processing is mostly undertaken by women who rely on rudimentary equipment as financial constraints impede their access to modern equipment.

d) Customary laws drive access and ownership of land resources. As land tenure and usufruct rights belong to men, women are left at a disadvantage. However, access to resources in the wild is not a problem as anyone can pick from the wild. The possibility of planting shea trees that can fruit in 3-4 years is a unique opportunity to increase the density of shea trees on-farm.
e) Shea nut collection can be increased substantially. Women face competition in the collection of shea nuts from farm fields since men have, in recent times, shown interest in shea picking. It is estimated that 60% of the shea nuts in the wild are not picked. There is an opportunity to increase quantities by exploring this niche. The challenge, however, is that the distance to these free for all community land is far and dangerous with high risks of snake bites.
f) Women dominate the upstream activities in the value chain, especially for collection and local processing. The creation of and support provided to women's' groups has enabled them to gain access to modern processing equipment and to meet certification requirements. As a result, there is a high level of market integration in local and international markets for these local collectors and processors.
g) Shea butter is highly integrated into local, regional, and international markets. In the high volume-low value market, shea pickers or collectors are quite integrated. Many women groups involved in shea butter production are highly integrated into international markets because they have been able to obtain certification which gives them access to those markets.
h) The shea value chain has the potential to fix 1.5 million tons of CO_2 equivalent ($tCO_{2\text{-}e}$) yearly, or a negative carbon footprint of 1.04$tCO_{2\text{-}e}$ per ton of shea kernels produced. Processing of shea can cause a significant change in carbon stocks and result in the loss of carbon sequestration and ecosystem services.
i) Water use and energy consumption is very high in shea butter processing. This necessitates the development of strategies to reduce water use and energy consumption.
j) Bush fires and charcoal burning are key drivers of the degradation of shea trees in the parkland system.

The following recommendations are proposed:

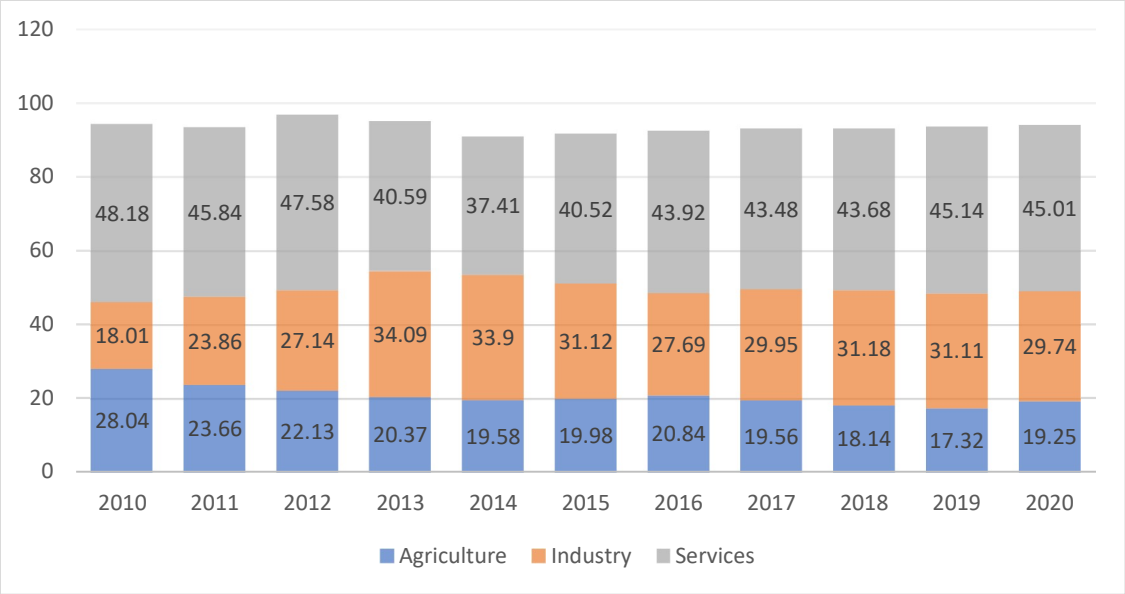
- TCDA must play an active role in coordinating and strengthening market linkages and communication amongst the diverse actors in the value chain.
- Research institutions and extension services should assess farmers' perception of new planting material distributed to pilot farmers and upscale the distribution of new planting materials that fruit within 3-4 years.
- Extension agencies and development organizations can provide training on the vegetative propagation of the new planting material and the use of other good agricultural practices such as FMNR to protect existing shea trees.
- Development agencies and civil society organizations intervening in the local communities should support the collection of shea nut in the wild by strengthening the use of tricycles and donkey-driven carts.
- Financial partners and appropriate government agencies need to strengthen VSLAs to provide financial support to women groups and collectors.
- TCDA in collaboration with other relevant stakeholders should develop strategies to reduce water use and energy consumption, e.g., the use of energy-saving devices such as solar-powered water pumps or biogas.
- Stakeholders involved with shea production at the local communities should continue to support producers' associations and women groups in shea butter processing through acquisition of mechanized equipment.
- Development partners engaged in certification processes should provide opportunities for women's groups to meet standards for premium certification to integrate regional and international markets.
- Non-Governmental organizations, private sector actors and development partners should continue to support market linkages from the producers to markets.

Chapter 1: Background

1.1 Context

1. Ghana has achieved significant economic growth over the past three decades. The country's economy and growth have been largely driven by exports of commodities such as gold, crude oil, and cocoa. Cocoa is the dominant source of agricultural earnings. The agricultural sector remains a high priority for the government. In 2020, agriculture accounted for about 19.25 % of Ghana's gross domestic product (GDP) (Figure 1). The current government has developed several initiatives such as the 'One district, one factory (1D1F)'; and 'Investing for Food and Jobs (IFJ)' programme, which includes the 'Planting for Food and Jobs (PFJ) and 'Planting for Export and Rural Development (PERD)', to name a few, to enhance the contribution of the agricultural sector and to address challenges associated with its sustainable development. In short, the food security of the people relies heavily on their agricultural activities.

Figure 1: Agriculture's contribution to GDP



Source : FAOSTAT : https : www.faostat.org.

2. Ghana's economic growth has, however, been uneven as spatial inequalities exist. The Northern Savannah Zone of Ghana (Upper West, Upper East, Northeast, Northern, Savannah, Bono, and Bono East regions) has not experienced the same growth patterns as the rest of the country. The zone exhibits several features. First, it is poorer than other parts of Ghana and lags

economically with higher rates of poverty and malnutrition. Second, the zone is highly vulnerable to climate change largely due to its agroecology. The soils are generally poor contributing to low productivity. Third, deforestation is higher in the region compared to the national average. The extent of degradation is quite pronounced in the Northern part of the country. The planetary crises of climate change, biodiversity loss and degradation of the natural resource base, and pollution are more acute in the Northern Savannah Zone (NSZ).

3. In the quest for economic diversification and building a resilient agricultural sector, the Government of Ghana (GoG) is paying more attention to a class of non-traditional tree crops such as shea nut, rubber, mango, oil palm, coconut, coffee, and cashew, which have emerged with interesting prospects. This is particularly important because there is growing evidence that climate change and its variability are affecting the major distribution areas of cocoa. Climate change projections suggest that by 2050, it will not be possible to grow cocoa in some of the cocoa-growing areas in Ghana because of recurrent flooding, and the occurrence of cocoa pests associated with rising temperatures (Läderach et al., 2013; World Bank, 2021; Ameyaw et al., 2018; Bunn et al., 2019). To highlight the importance of tree crops (TC), the Government of Ghana (GoG) developed a Ghana's Tree Crop Policy (GTCP), which aims 'to provide a comprehensive and holistic approach for the sustainable development of the tree crop sub-sector and proper targeting of support to the TC value-chains' (MOFA, 2012). The GoG also established the Tree Crops Development Authority (TCDA).

4. Agroforestry (AF), described as 'systems and technologies where trees are deliberately used on the same land management units as agricultural crops and animals' (HLPE, 2017), is a perfect candidate to address both income diversification and food security aspirations of land users. It involves the practice of incorporating trees in farmlands and holds the promise of addressing some current planetary challenges. Agroforestry systems can increase climate change resilience, have adaptation and mitigation potential, mitigate greenhouse gas emissions, protect, and conserve biodiversity, soil, and water along with other natural resources (Agroforestry Network, 2018; Mbow et, al, 2019; Verchot et al., 2007). AF can also, by linking trees and agriculture, address food needs not only for humans but also for animals in the form of fodder.

5. One of the oldest forms of agroforestry is the parkland system, which has been practised in Sub-Saharan Africa (SSA) for a long time. This system is common the Sudan and Sahel regions of West Africa. The parkland system refers to the practice of maintaining multipurpose trees in farmlands and fallows. Bonkoungou et al. (1994) define agroforestry parklands as "land-use

systems in which woody perennials are deliberately preserved in association with crops and/or animals in a spatially dispersed arrangement and where there is both ecological and economic interaction between the trees and other components of the system". In this system multi-purpose trees such as *Acacia senegal* (gum Arabic), *Adansonia digitata* (baobab), *Balanites aegyptiaca* (desert date), *Borassus aethiopum* (fan palm) *Faidherbia albida* (winter thorn), *Parkia biglobosa* (African locust bean), *Sclerocarya birrea* (marula), *Tamarindus indica* (tamarind), *Vitellaria paradoxa*, also known as *Butyrospermum paradoxum* (shea nut) and *Ziziphus mauritiana* (jujube), to name a few, are found dispersed in crop fields at varying densities.

6. AF is a central pillar in the livelihood strategies of the people in the Sudan and Sahel regions of West Africa, including the NSZ of Ghana. AF contributes to many of the SDGs, especially SDG 1.5, building the resilience of the poor through income diversification; SDG 2.4, ensuring sustainable food production systems; SDG 8.2, achieving higher levels of economic prosperity; and SDG 12.3, halving per capita global food waste. In the face of the urgency in building resilient systems to address climate change and biodiversity loss, there is an emerging consensus that AF can play a critical role (Agroforestry Network, 2018) in spurring economic growth.

7. Developing agroforestry-based value chains will be useful in connecting the poor rural population with the growing urban middle-class; in creating jobs and income generation opportunities; and would benefit women who are very likely to be involved in the processing sectors of these value chains. Agroforestry-based value chains also present opportunities to benefit from the ecosystem services that they generate at the landscape or global levels (Agroforestry Network, 2018). In addition, greening AF value chains can bring other dividends in the form of higher prices as in the case of organic products.

1.2 Objectives of the study.

8. The overall objective of the study is to generate evidence to support the development and implementation of a strategy for the promotion of TC value chains. This study focuses on shea.

9. To achieve the objective stated above, this study sets out to analyze an AF-based value chain based on shea butter (*Vitellaria paradoxa* or *Butyrospermum parkii*). The study also aims to identify opportunities for improving value creation, to explore the economic viability of shea production, and identify opportunities for upgrading.

1.3 Approach

1.3.1 The Study area

10. The broad area of this study is the NSZ, which comprises of the Upper West, Upper East, Northeast, Northern, Savannah, Bono, and Bono East regions. Figure 2 shows the geographical coverage of the study. As aforementioned, the NSZ of Ghana has not experienced the same growth patterns as the rest of the country. The zone exhibits higher poverty and malnutrition; high soil erosion and high variability to climate change; and higher land degradation and deforestation.

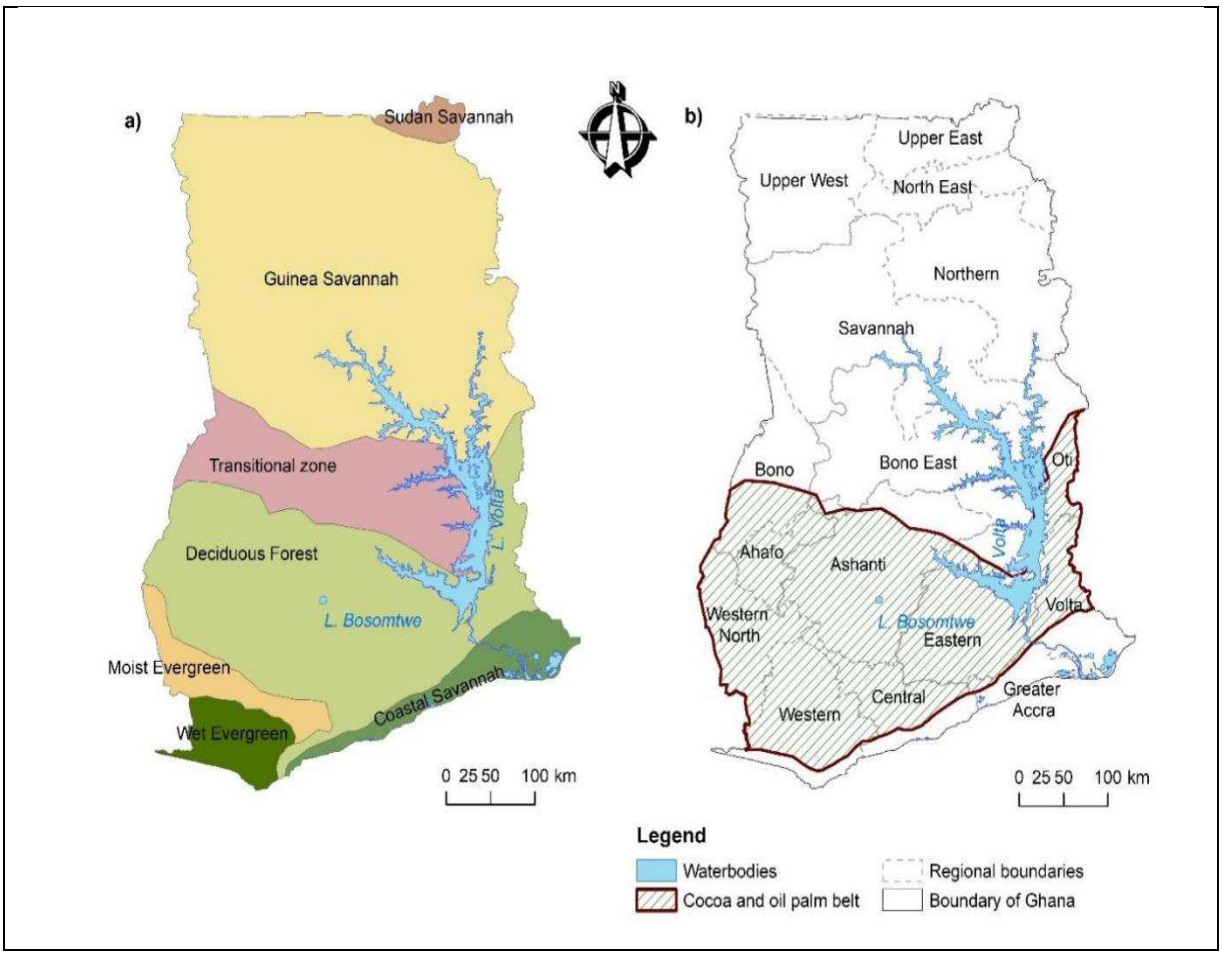
12. In view of the above, it is critical to ensure that natural resources and the environment are managed to sustain agricultural productivity. Research in the NSZ has shown that the adoption of AF can lead to high crop yields, increase the availability of fuelwood and poles, and improved food security for households (Abukari, 2019).

13. Under AFR100, Ghana has identified the NSZ as a priority for land restoration. Northern Ghana also depends on the oldest form of agroforestry known as the Agroforestry Parklands (described above). In this land-use type, trees are integrated with cropped fields. On one hand, agroforestry has demonstrated a 'high[1]' mitigation potential and a 'very high' adaptation potential (Mbow et al., 2019). High-value products from agroforestry parkland trees like shea provide opportunities for improved and diversified livelihoods, on the other hand. This is highlighted by the increasing global demand for shea butter. The practice of agroforestry enables land users to address food security concerns and at the same time obtain income from tree crop products.

14. The analysis in this study focuses on four components that include 1) mapping and analysis of the value chain; 2) identification of constraints and challenges; 3) economic viability of the value chain; and 4) identification of opportunities and potential for upgrading

[1] Mbow et al (2019) make a distinction between high and very high potentials.

Figure 2: The Northern Savannah Zone of Ghana



Source: Asubonteng, K.O. (2022).

1.3.2. Study approach

15. Several data collection methods were used in the implementation of this study. These include detailed desk reviews, key informant interviews, focus group discussions (FGD), and drawing upon secondary data sources. The interviews and discussions targeted input dealers, producers, producers' associations, retailers, wholesalers, aggregators, processors, and exporters. Discussions were also organized and held with the TCDA, the Directorate of Crop Services in the Ministry of Food and Agriculture (MoFA) and other relevant stakeholders.

16. The field surveys in the NSZ of Ghana covered seven shea pickers, 12 shea butter processors, three shea merchants, Tree Aid, and one Community Resource Management Area (CREMA)[2]. MOFA and were instrumental in identifying the study sites.

[2] The Community Resource Management Area (CREMA) is a geographically delineated area where one or more communities come together to manage resources in a sustainable

1.4 Structure of the Report

17. This report is organized into four chapters. Following this introductory chapter, Chapter 2 maps the shea value chain with specific attention to the governance, policies, and regulations of the value chain; economic viability and value creation; constraints and challenges; and opportunities and potential for upgrading. Chapter 3 takes on the cross-cutting themes including gender, the impact of fires and incentives' structures for the VC. Chapter 4 concludes, provides recommendations, and identifies areas for future work.

manner. It is, therefore, a community-based organization that is built on existing decision-making structures (Dzekoto & Bosu, 2018).

Chapter 2: The Shea-based agroforestry system

2.1 Shea production in Ghana

18. Table 1 shows that Ghana is among the largest producers of shea nuts behind Nigeria, Mali, and Burkina Faso. It is estimated that there are about 9.4 million trees in the country (CBI, 2019). The Northern, Upper East and Upper West Regions are the dominant producing regions in Ghana.

Table 1: Shea nut production in West Africa

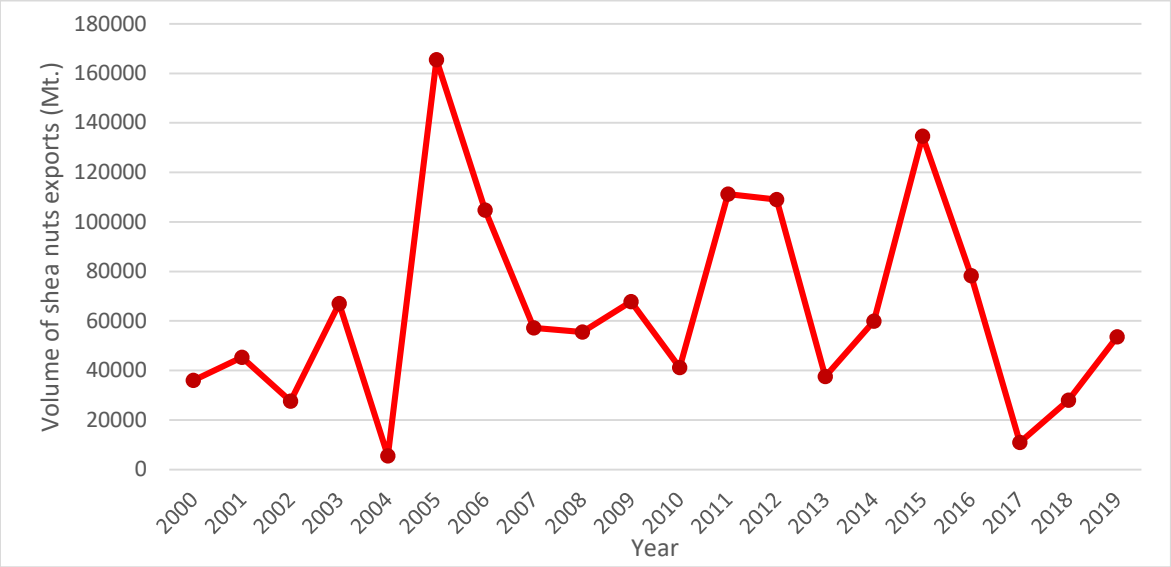
Years	Benin	Burkina Faso	Cote d'Ivoire	Ghana	Mali	Nigeria	Togo
	Production (in tons)						
2000	14,133	66,662	30,874	65,000	144,439	369,000	8,500
2001	14,150	65,545	30,564	62,024	143,736	370,000	8,000
2002	13,019	61,777	31,572	60,000	143,033	371,1000	8,242
2003	13,335	66,437	26,078	65,630	142,330	410,000	8,560
2004	12,219	65,852	26,194	62,253	142,523	414,000	8,864
2005	12,351	71,572	27,058	60,935	126,880	410,029	9,000
2006	12,491	69,062	27,951	53,254	53,407	414,948	9,300
2007	12,640	67,009	28,874	49,708	182,202	425,000	12,000
2008	12,797	64,971	29,100	40,932	141,113	384,435	10,500
2009	12,961	62,830	28,820	38,823	144,520	332,770	10,900
2010	13,131	65,000	32,631	36,687	131,903	325,610	11,250
2011	13,000	55,903	32,106	32,655	128,022	326,858	11,200
2012	14,000	47,000	32,050	33,310	118,148	362,183	12,000
2013	15,000	45,000	31,535	33,630	113,823	359,337	12,800
2014	14,838	50,000	31,892	34,300	48,960	360,009	12,510
2015	13,741	55,000	32,153	34,300	50,698	331,495	12,726
2016	14,526	70,000	32,320	34,300	173,800	350,280	13,074
2017	13,980	100,000	32,291	33,458	49,640	347,261	12,770
2018	13,930	120,000	31,401	34,019	144,932	343,012	13,254

2019	13,976	138,312	31,523	33,926	226,094	346,851	13,033
2020	14,027	140,000	31,644	33,801	167,967	345,708	13,019

Source : FAOSTAT ; https://www.faostat.org/.

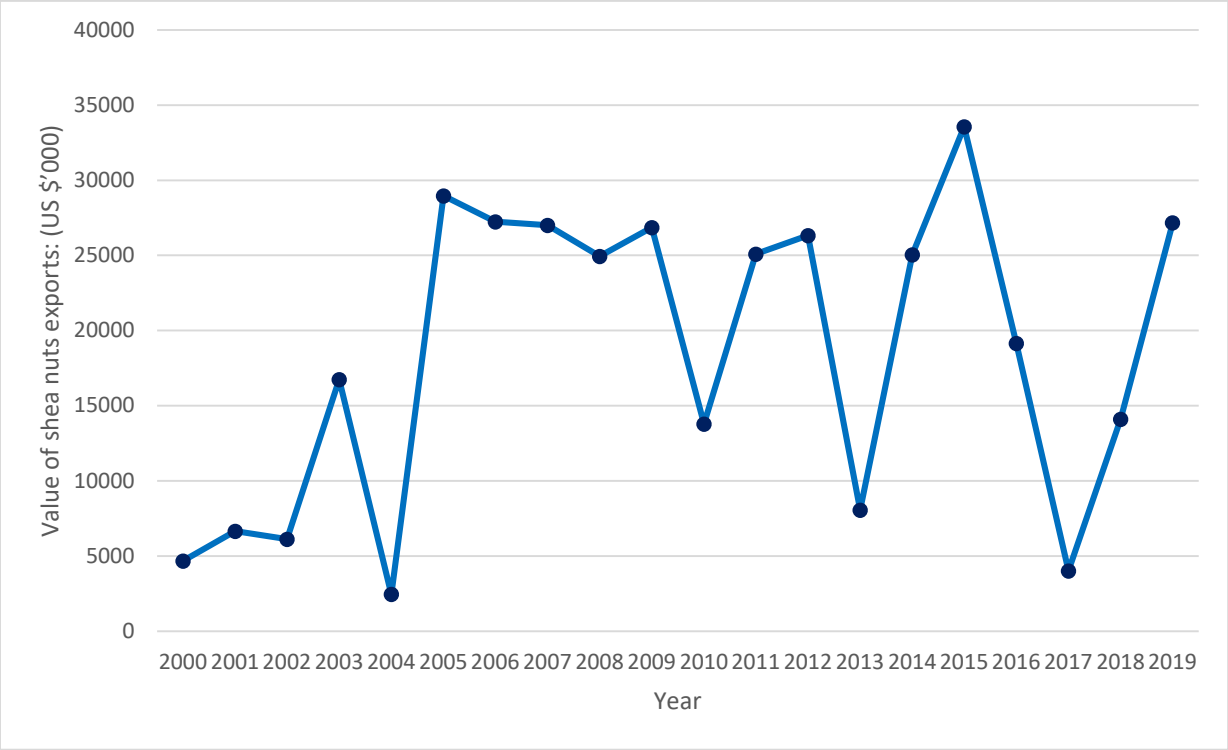
19. Shea nuts export reached 27,967 tons in 2018 with shea butter export valued at USD 66 million (CBI, 2019). Shea serves multiple uses including food, cosmetics, energy, and medicine. It is also a significant source of employment. SNV (2014) reports that in 2014, more than 900,000 women were involved in shea collection and processing. This calls for a particular emphasis on the gender dimension of the crop owing to the involvement of women in its collection and processing. In Chapter 3, the role of women in the VC is emphasized. Figures 3 and 4 depict shea nuts export volume and value, respectively for the period 2000 – 2019.

Figure 3: Volume of shea nut export (MT).



Source: Compiled by author from various editions of Agriculture in Ghana: Facts and Figures. MoFA, Ghana. https://mofa.gov.gh.

Figure 4: Value of shea kernel exports (in '000 USD).



Source: Compiled by author from various editions of Agriculture in Ghana: Facts and Figures. MoFA, Ghana. https://mofa.gov.gh.

20. Shea nuts are collected in farmed fields and from fallow lands in the agroforestry parkland system described earlier. Here strict land tenure arrangements influence who picks the fruits. The fruits are also collected from trees that are growing in the protected areas and in the wild. In the latter, ownership is free for all while in the former strict access regulations are implemented. It is reported that up to 60 % of the shea in the wild is not collected (NGS, 2000). The tree starts producing at about 15 years and peaks at 30 years. Historically, shea has been a naturally occurring tree, not propagated through planting. There has been progress in recent times to use vegetative propagation methods to reduce the time to fruiting. Recent research (Choungo Nguekeng et al, 2021) indicates that planted shea trees can start producing after three to five years. This development makes the tree even more for agroforestry systems.

21. The most important product from the shea nut tree is shea butter. It is used in the food industry as a substitute for margarine and cocoa butter and is also important in the cosmetic industry. Other products that are derived from shea include jam (from the pulp), wine (from the pulp), body lotion,

pomade and soaps (Gyedu-Akoto et al. (2017). The shea products are accepted by consumers, and the potential for commercial production is significant. There is also a residue that remains after the extraction, the shea nut cake, which is a very good fuel. It can also be used as an ingredient for livestock feed and as medicine to treat skin diseases. The cake is also used as manure and for fertilizer production. It is known that for every metric ton of processed shea nut, 450-600 kgs of shea nut cake can be produced (Abdul-Mumeen et al, 2013). There is, therefore, an opportunity to explore the use of this residue in composting.

2.1.1 Prospects of an integrated AFS with shea and others

22. The shea tree is one of the dominant species in the Northern Savannah Zone in Ghana and the Sudanian-Sahelian zones of Africa. It is prominently found in the AF parkland system. It represents up to 80 % of the woody vegetation in the parklands in Northern Ghana (Boffa, 2015). The tree is well integrated into the AFS.

23. There is sufficient evidence globally of the interaction of the shea tree with crops in an AF system. Ogwok et al. (2019) found in Uganda that maize and soybean responded differently depending on the rainy season and on the physiological variations of the species with age. The authors found, under different age groupings (mature and young), a higher reduction in maize yield compared to the reduction in soybean yield over two rainy seasons. It is suggested that when planting under the shea canopy, soybean should be the preferred crop instead of maize.

24. Zoumbodre et al. (2005) studied the association of maize with the shea tree in Burkina Faso. They found that maize yields were better under the 'tree's zone of influence'. Maiga (1987) found that crop yields were better when sorghum and millet were intercropped with shea tree in the Bazega province in Burkina Faso. Other studies (Kessler, 1992 in Burkina Faso; and Louppe and Ouattara, 1997 in Cote d'Ivoire) did not find increases in yield. In fact, Kessler found that sorghum grain yields under the shea tree were reduced by an average of 50% compared to sorghum in the open field. Bayala et al. (2002) found improved millet production in the short term under pruned tree crowns in Burkina Faso. Gnangle et al. (2013) investigated the productivity of cotton and sorghum in an AFS of shea trees in Northern Benin. They found, for sorghum, that 'average plant height and average biomass, dropped by 9.75 % and 29.31 %, respectively, when planted under the crown'. In the case of cotton, the crop 'under the crown was 6.58 % shorter compared to plants outside the crown'. It was also found that average bud production and average fresh biomass for cotton plants was 13.06 % and 36.06 % less, respectively,

when planted under the crown of shea trees. Gbemavo et al. (2010) also found in Benin that the shea tree shadiness had a negative impact on cotton yield. In Northern Cote d'Ivoire, Louppe and Ouattara found that cotton and peanut crop yields were lower around the first few metres under the tree. Better corn and peanut yields were observed at the canopy edge of the tree, especially on fertile soils. Seghieri (2019) provides further evidence on the prospects of an integrated agroforestry system with shea. Specifically, shea has impacts on light resources, on carbon and nutrients, and on water resources, to name a few.

25. Besides the study of the interaction or influence of the shea tree on agricultural production, additional research has been undertaken to gain insights on understanding whether there were any differences in fruit yields of the shea tree on cultivated land compared to those in fallow lands and on the effects of pruning of the shea trees on its fruit yields. Aleza et al. (2018), Kelly et al., 2007) and Kelly et al. (2019) cited in Choungo Nguekeng et al., (2021) have reported that better flowering conditions, fruiting and better yields were observed in cultivated fields where the shea tree is present. The shea trees found in cultivated fields were also larger than those in the forest - < 50 cm diameter (forests) compared to 80-130 cm diameter (cultivated fields). The trees in fallow lands, on average, measured 50-150 cm in diameter (Choungo Nguekeng et al., (2021). Ninety-four percent of trees in the AF parklands produced more fruits than the trees in natural stands (Lamien et al.,2004). Bayala et al. (2008) found that fruit yield did not differ significantly between unpruned and half-pruned shea trees.

26. Several factors highlight the prospects of integrating the shea tree and other trees such as P*arkia biglobosa* in the AFS. First, as the point of departure, farmer-managed natural regeneration (FMNR) involves a few practices that farmers have adopted over the years to optimize the relationship between the different tree species that they encounter in their AF parklands. Multipurpose trees serve several functions. Some trees provide non-timber forest products (NTFPs) that are used for household consumption, medicine, cosmetics and as a source of revenue. Other trees such as *Faidherbia albida* are known for their ability to improve the soil fertility status of the land. There are also tree species in the AF parklands that provide fodder for animals. Through FMNR, farmers protect and nurture trees and shrubs that they find growing naturally on their farms. Farmers select vigorous stems of the sprout and undertake pruning and other activities to ensure that these trees grow well. These practices have been documented by several researchers (Weston et al., 2015; Haglund et al., 2011).

27. Second, FMNR practices are also essential to optimize the productivity of both trees and crops, which can help address challenges related to shading and competition for light. Additionally, evidence from the Upper East of Ghana and elsewhere, as in Niger, show that FMNR has economic and psycho-social benefits. In the Upper East of Ghana, Weston et al. (2015) found that FMNR leads to health improvement, asset creation, increased consumption of wild resources and psycho-social benefits. In Niger, FMNR raised annual gross income by 17-21 million USD and contributed an additional 900,000 to 1,000,000 trees to the local environment (Haglund et al, 2011). Integration of tree species such as the shea tree in AF systems should be designed in a manner that recognizes FMNR and incorporates desirable options to maximize benefits.

28. Key messages:

- The shea tree and other trees have been highly integrated into AF parkland systems. Their multi-purpose functions allow them to provide a wide range of social, economic, and environmental benefits. Recent developments concerning planting material that can start fruiting within five years make the shea attractive for AF-based VC.
- The multiple benefits trees provide may not be enough for farmers to plant and protect trees on their farms if they don't have secure tenure to the land. Section 2.3.2 below re-visits the land tenure issue. The governance of the parklands and trees is a critical element in access to the resources and should receive very high attention as it has direct implications for the development of AF-based VCs.

2.2 Governance, policies, and regulation of the value chain

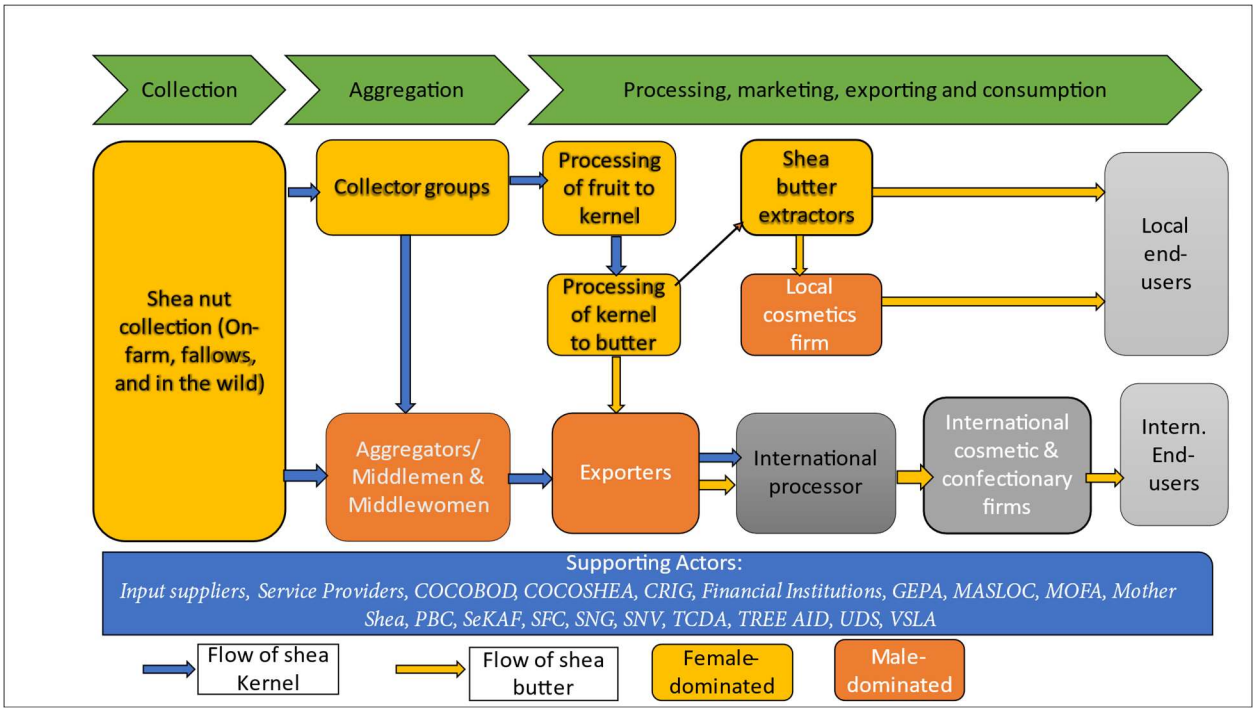
2.2.1 Mapping the Value Chain

29. Figure 5 is a schematic representation of the shea value chain in Northern Ghana. The colour-coding for activities within Northern Ghana highlights the gender roles in the VC. The blue arrow represents the flow of shea kernel, and the orange arrow represents the flow of shea butter. The main actors include the shea pickers/collectors, processors, merchants, and exporters.

2.2.2 Shea value-chain governance structure

30. The governance of the ShVC has evolved over the years. In the 1970s, the GoG decided to focus on promoting shea, in the face of declining cocoa prices, to diversify its sources of foreign revenue. In the late 1980s and early 1990s, the

Figure 5: The Shea Value Chain.



Source: Adapted from USAID/WINROCK (2018)

shea export policy was implemented as part of the structural adjustment programmes (SAP) in response to the low revenues from shea nut and butter. The policy intended to revamp the shea industry. As with other SAPs at the time, the policy emphasized privatization, trade liberalization and institutional reforms to limit government intervention in the industry. Between 1970 and 1990, the state along with COCOBOD and the Produce Buying Company (PBC) controlled the trade in shea nut. The state regulation was mainly through export control, which limited the extent to which government could allocate resources to the industry (Yayah, 2020; Chalfin, 1996).

31. At the beginning of the 2000s, the GoG was keen on pursuing efforts to benefit from the potential that the shea industry presented. For instance, the Shea Development Strategy (SHEDS) for the period 2015 to 2030 was formulated by the GoG through the Ghana Cocoa Board (COCOBOD). The strategy aimed at giving a clear direction for the development of the shea industry with the specific objective to revamp the industry following the neglect during the structural adjustment period. COCOBOD created a shea department as part of the COCOBOD (Yayah, 2020).

32. With the creation of TCDA (Box 1), the governance of shea, as in the case of the other tree crops except cocoa (cashew, coconut, mango, oil palm and rubber) fell under the responsibility of the Authority. It is important that critical issues of asymmetric power relations that disfavour local producers to the benefit of oligopolistic processing firms and cosmetic companies be effectively addressed (Laube et al., 2015). There are too many middlemen in the VC, who may not operate as large-scale enterprises but serve as agents for the big companies. The pricing scheme also needs to be examined. Are the premiums fair and do they reflect the market value of the products? Detailed and rigorous studies need to be undertaken to better understand value addition in the VC.

Box 1: The Tree Crops Development Authority (TCDA)

The Tree Crops Development Authority was established by the GoG on December 28th, 2019, by an Act of Parliament (TCDA Act 1010, 2019). This corporate body was tasked to regulate and develop in a sustainable environment the production, processing, and trading of six TCs (cashew, coconut, mango, oil palm, rubber, and shea) in Ghana. TCDA:

- *focuses on research support (undertake, assist, and encourage scientific, technological, and economic research on TCs);*
- *provides production and value chain support (promote and optimize land utilization in the selected TCs in Ghana);*
- *builds capacity (coordinating and facilitating with relevant institutions to strengthen the capacity of farmers in best agricultural practices); and*
- *licenses and regulates activities of the VCs.*

The Authority is governed by a Board of Directors comprising 29 members, 24 of whom are selected from the private sector, four representing actors of each of the six TCs. The Ministry of Food and Agriculture (MOFA) has the overall responsibility of the Authority. In October 2020, the GoG appointed the Management of the Authority. The necessary resources and mechanisms to make the Authority fully operational have been put in place. It is expected that the full operationalization of the Authority will help the country to earn, beginning from 2028, about $US16 billion annually from the six TCs (TCDA, 2020).

2.2.3 Shea Value Chain actors

33. The first actors are the pickers/ collectors who pick the shea nut from the ground during the harvest season. In Northern Ghana, this is typically from June to September, with July and August being the peak months. The collectors pick the nuts from their farms, from fallow lands and from community lands. The nuts picked from the farms and the fallow lands (depending on the duration of the fallow) are referred to as conventional nuts, whereas the nuts picked from the wild are referred to as organic. It is estimated that only 40 % of the shea nuts in the wild are picked. Thus, there

is a potential to increase nut picking from the wild. A major challenge is that the distance to these fields is quite far, making it difficult for rural women to transport the shea nut to their households or market centres. Collectors pick only fresh ripe nuts on the ground and the dry nuts are usually abandoned in the field. After picking, the collectors in most cases clean, shell, parboil, open dry, crack the shells, separate the nuts, dry the nuts, and bag nuts in jute bags. The process is tedious and labour-intensive.

34. The next actors in the ShVC are the processors, who most often, are responsible for the transformation of the shea nut into butter. In Northern Ghana, processing shea nut into butter has been an old age tradition often dominated by women, which is undertaken for household consumption and for sale in local markets. These rural women most often use manual extraction methods (Figure 6) that are not quite efficient. They pack their shea butter in bowls and calabashes.

Figure 6: Rudimentary production of shea butter.

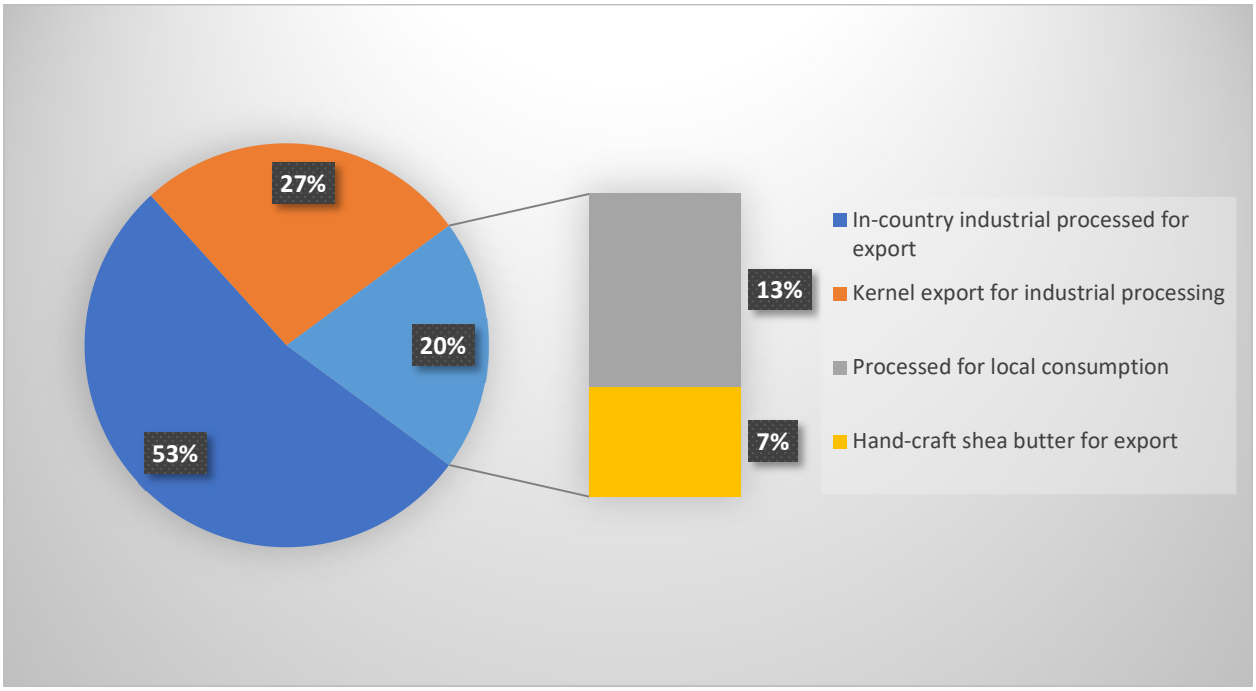
Photo: Courtesy Mujeeb Adams

35. In recent years, cooperatives, and women groups have been formed to undertake processing of shea nut to butter. These groups use mechanical extraction methods for their operations. They source their shea nuts from local markets while some of them have recruited thousands of registered collectors who supply them with organic nuts. The shea butter is sold mainly in district and national markets and sold to exporters.

36. Following the processors in the value chain are the aggregators /traders. This group of actors oversees the marketing of shea nut and shea butter. They sell to large firms, wholesalers, and retailers. They also sell to exporters. Some of these merchants have standing arrangements with large firms to supply shea nuts and shea butter. In this regard, one of the key actors is the Savannah Fruits Company. This segment is dominated by men. These aggregators pack the butter in 25kg carton boxes.

37. Finally, we have exporters who deal with the export of shea kernel and butter. It is estimated that in 2017 alone, there was about 50,000 shea nut equivalent tons (SETs) of in-country industrially processed butter for export, about 25,000SET kernel exported for industrial processing, and about 7,000SET of hand-crafted shea butter exported (Figure 7).

Figure 7: Shea crop end markets.



Source: Adopted from USAID/WINROCK/TECHNOSERVE, 2018.

2.3 Constraints and challenges in the Shea Value Chain

38. Actors in the ShVC face several constraints and challenges. The degradation of the parkland system has put considerable pressure on shea nut resources. The aging trees, bush fires and charcoal burning are constraints to increasing shea nut production. Aging shea trees population, lack of

access to shea trees, and limited integration into local and export markets are some of the challenges that actors in the ShVC face.

2.3.1 Sources of shea nut seedlings and farmers' perception of seedling quality

39. The shea tree seeds are recalcitrant and planting by seed takes a long time to fruit because of its slow growth. The potential for the shea tree to play its role in the AFS is hindered by this constraint. Considerable research has, however, been undertaken in Burkina Faso and many other West African countries, to enhance the vegetative propagation of the tree. Grafting, air layering and micropropagation methods have been used to shorten the time to fruiting. Overall, these methods have proved to be successful, and scaling-up of these methods is on-going (Hale et al, 2021, Seghieri, 2019).

40. In Ghana, CRIG has the mandate to develop techniques to enhance tree growing. Recent work by Yeboah et al. (2020) indicates that an acceptable approach used for domesticating endangered tree species is by vegetative propagation methods which include rooting, air-layering, and grafting (Yeboah et al., 2009; 2011; Akakpo et al., 2014). These methods allow to produce individual seedlings of the same genetic constitution and facilitate the multiplication of desirable genotypes in the reproductive phase (Hartmann et al., 2011; Pereira et al., 2016). This can be achieved by 'taking shoots from ontogenetically mature crowns of large trees with the resultant effect of a significant shortening of the juvenile phase' (Hackett, 1985; Hartmann et al., 2011). Using these techniques, the fruiting of the shea was observed after 3-4 years when young-rooted cuttings and grafted seedlings developed from some desirable trees were transplanted in the field (Yeboah et al., 2009).

41. Based on the above research, CRIG produced seedlings and provided them to TCDA. In 2020, 48,000 seedlings were distributed to farmers. In the field study for this report, very few farmers were aware of this new development. ROWFAD, a farmer organization, was aware and started a nursery but ran into some difficulties related to the availability of water during the dry season._This observation reinforces the need for better management and dissemination of information.

42. In sum, there is a need to conduct a detailed assessment with the farmers who received the seedlings. Recent progress in vegetative propagation has led to the development of planting materials that can start fruiting within 3-5 years. The material is at the demonstration stage now. The possibility to plant shea trees that can start fruiting within a short time will be a game-changer and will increase the potential of shea as source of carbon revenue too. This will be highly conditioned on addressing land security and tree tenure rights issues (for men and women) along with taboos about tree

planting. However, there is a need, maybe through carbon credits, to incentivize producers. This action will align very well with the Ghana Shea Landscape Emission Reductions project.

2.3.2 Institutional arrangements (formal and informal) governing ownership and access.

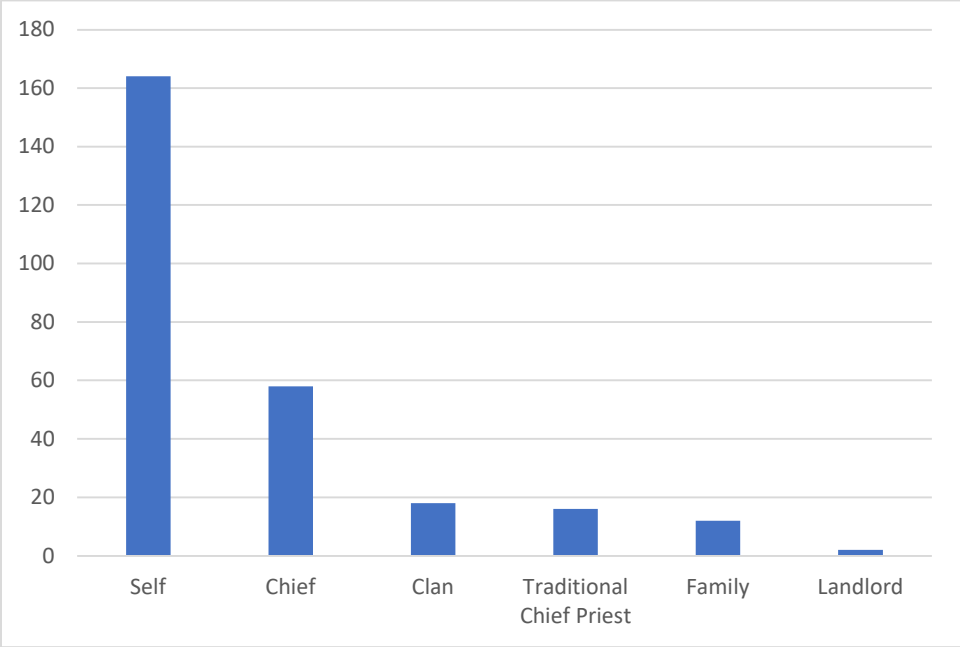
43. Agroforestry involves the integration and management of trees in crop fields, which includes the planting of desired trees, management, and use of existing (naturally occurring) trees in the fields. The institutional arrangement for planting and managing trees is, therefore, a very important consideration for agroforestry-based value chains. In the present context, two key questions concern who has ownership of the shea trees and what rules govern access and use in the shea AF parklands.

44. Tree tenure rights and governance draw from both customary and statutory laws. Most of the shea AF parklands, like most land in Ghana, are under customary laws. Under this regime, the traditional authority, represented by the chief or family head manages the land. This regime is most often characterized by its unwritten nature (Alhassan, 2006). In Northern Ghana, the skin and land priests hold the customary rights to land (Yaro, 2010). Hence, the chieftaincy authority is the allodial title holder executed by the paramount chief or district chief. At the community level, customary land and customary freehold is vested on the usufruct farmer. The farmer who is not an indigene can be considered as a tenant (locally known as *abunu, abusa*).

45. Three main factors define the arrangements governing ownership, access, and use of shea trees in the parkland system. First, the mode of acquisition is important. There are four different modes of acquisition. These are inheritance, gifts, renting, and purchase. Members of the clan family can inherit land from the clan lineage over time. Second, whether the land user is an indigene/native is important, therefore, non-indigenes' right to tree tenure may be limited. Third, the location of the shea tree is an important factor regarding ownership, access, and use of tree products.

46. In Northern Ghana, most of the ownership of the land is through inheritance. In a recent study, Shu-aib Jakpa et al. (2018) found that about 82 % of land was inherited meaning the land users had the rights to the land and to trees therein. This is followed by gifts that represented 16%. Figure 8 below captures the picture of authority over the land. Most of the respondents (61%) indicated that they had authority over the land, followed by the Chief (21%) and the clan (7%). It should be noted that, formally, the chief is the custodian of all customary land, as mentioned earlier.

Figure 8:Authority over land in Northern Ghana.



Source : Shu-iab Jakpa et al. (2018).

47. Access and use of shea trees vary depending on whether the tree is on-farm, in fallow lands, or in the wild. Up to now, the shea tree is naturally occurring. In farmlands, the usufruct farmer, represented by the head of the household (usually the male) has the right to manage the shea tree as he so wishes. Common management practices include creating fire belts, preventing indiscriminate felling, managing young trees for effective regeneration, weeding around the trees, pruning tree branches, and planting of shea seedlings/sprouting on the farm (Shu-aib Japka et al., 2018).

48. Members of the household (his or her family) have the right to pick shea nuts from any tree on the farm. Thus, women can pick the nuts on their spouses' farms. In recent years, there is an increasing trend of men being engaged in picking the shea nuts on their farms (See Figure 9 in section 2.3.3 below) while the women pick on fallow lands, which might have belonged to their households. While these on-farm trees are found on communal lands, it is uncommon for land users to pick from shea trees that are not on their farms. Thus, shea trees on fallow lands are available to owners of the fallow land and their families. In other communal lands that have not been previously cultivated, known as the wild, access and use is open to the whole community. Most of these communal lands are located far from the villages/communities. Since these lands have not been cultivated, they are the source of shea nuts for organic shea butter. There are strict rules on the

management of trees in protected areas. Access and use of shea trees in these areas are highly regulated and are subject to authorization by the Wildlife Division.

49. In summary, ownership, access, and use of shea trees in Northern Ghana are governed mostly by traditional customary law. The traditional chief is the custodian of the land for the community. Inheritance is the most frequent mode of land acquisition whereby clan/family land is passed down from generation to generation with all the rights to manage and use the shea tree.

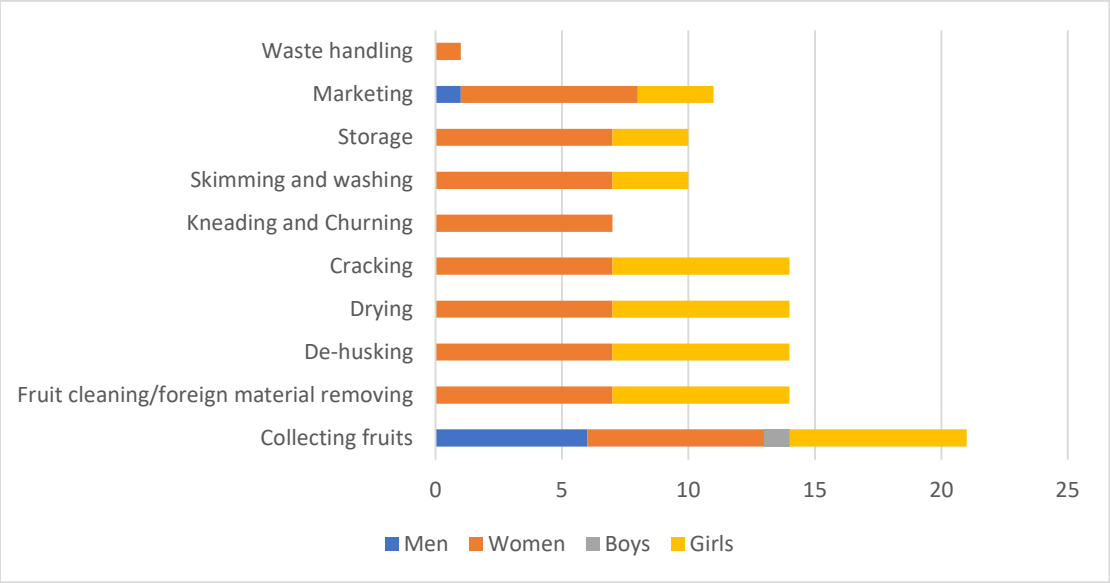
50. Evidence shows that land users recognize the significant role that shea trees play in the parkland system (Faye et al, 2010; Boffa, 1999, 2015; Lovett and Philips, 2018) - even though the trees are felled for charcoal- and have adopted strategies to protect these trees. Farmers select species to be protected and nurture them including the selection of preferred individual trees and crown pruning (Boffa, 2015; Weston et al., 2015; Haglund et al., 2011). As most of these shea trees are ageing, management practices that aim to rejuvenate the shea parkland system should be encouraged. As mentioned elsewhere in this report, recent developments show that there is a potential for shea seedlings fruiting within 3-5 years. Shea seedlings that meet this criterion have a promise for the shea AF parkland. However, there is a need to create awareness about this, especially in the context where taboos and cultural norms are not favourable to planting trees.

2.3.3 Addressing specific constraints for increasing women's participation and value creation in the ShVC.

51. Women are key participants in the ShVC and are the main actors in upstream activities of shea nuts collection and processing the shea nuts into butter. Figure 9 shows the high participation of women in shea value chain activities with increasing involvement in local trade and exports of shea butter. Owing to shea's potential to improve revenue for marginalized groups such as women, there is a growing interest to improve the participation of women.

52. There are, however, specific constraints for improving the effective participation of women and value creation in the ShVC. Some of the constraints to women's participation are:
    - **Inadequate access to financial products and services**: Women lack the finances to invest in their businesses and upgrade their activities. This constitutes an important constraint for women's participation. There is a need for service technologies to enable them to upgrade their chain activities.

Figure 9: Participation of household members in shea activities.



Source: Consultation survey of household pickers in Northern Ghana, 2021.

- **Lack of training and inadequate capacity**. It is important to assist women to get training in several areas including how to improve the quality of their shea. Assisting women to develop entrepreneurial skills and leadership will increase their participation.
- **Use of rudimentary equipment.** Women currently use rudimentary equipment in the processing of shea butter. It poses a serious challenge in their participation and in creating value. Addressing this constraint will facilitate improvement in shea production efficiency and product quality. The Samira Empowerment for Humanitarian Project, for instance, as mentioned above, is establishing butter processing factories for these women groups. Other initiatives under the GSLWMP, the Ghana Landscape Restoration and Small-scale Mining Project are also supporting the establishment of butter processing facilities.
- **Unfavourable customary rights and tenure arrangements for trees**. Men possess the decision-making on trees and, with the growing demand for shea, men are getting more involved and consequently limiting the quantities that women can collect freely.
- **Changing landscapes to collect nuts.** Women now travel longer distances and the competition for their time, given their household chores and responsibilities, is a major constraint for women's participation in the ShVC. Helping women improve their mobility by facilitating their acquisition of donkey carts and three-wheeler cargo motorcycles will play an important role in addressing this constraint. This compounds safety concerns about snake bites and unfavourable weather conditions that these women ordinarily face.

53. There have been several recent developments that aim to address some of the constraints women encounter in the ShVC, particularly related to value creation. Some of these developments include:
    - The Global Shea Alliance (GLSA) works with women groups to strengthen and increase their participation in the shea supply chain. GSA provides business training to women collectors. It also develops warehouses for these women groups.
    - Livelihoods Fund (Box 2) has launched a sustainable shea sourcing project in Northern Ghana called the 'Women in Shea Initiative (WISH)' that targets support to 13,000 women farmers (from more than 150 communities) in building a responsible shea supply chain in East Gonja District, in Northern Ghana. The project aims to provide sustainable income, diversified agricultural production, and preservation of the shea natural ecosystem.
    - The Samira Empowerment for Humanitarian Project is undertaking a Shea Empowerment Initiative (SEI) in Northern Ghana (Upper West, North-East, Northern and Upper East) that would train 1600 women involved in the shea butter industry to capacitate them on how to properly pick and process shea nut into high quality shea butter. The project is also establishing four factories for shea butter processing to be based in Northern Ghana.

Box 2 – The Livelihoods Fund for Family Farming (L3F)

The Livelihood Fund for Family Farming (L3F) (https://livelihoods.eu/l3f/) has launched a 10 year-programme. This program brings together major players in the ShVC. The actors include Mars Incorporated (https://mars.com/) -Mars produces some of the world's most famous brands of confectionary; AAK (https://www.aak.com/about-us /) -AAK is the leading producer of plant-based oils and fats and is a major supplier of shea to Mars; USAID (http://www.usaid.gov); CARE (https://www.care.org/) which is a global humanitarian organization assisting shea women collectors in Ghana to develop strategies to improve their social and economic development; and a local NGO known as Presbyterian Agricultural Services (PAS).

L3F has initiated a project called WISH which supports women pickers and collectors to have access to shea trees in the wild. The WISH Initiative aims to provide shea women with new transport means to reduce the burden of transporting shea nuts from long distances.

- With support from the United Nations Development Programme (UNDP) through the Global Environment Facility Small Grants Programme (GEF-SGP), Ripples Ghana is implementing a project that has enabled it to receive Ecocert for Fair-Trade Certification, which allows shea products to be sold in international markets. Two hundred and forty-four (244) shea producers and 3000 shea pickers, mostly women, in 14 communities in the Kumbungu district are beneficiaries of this project.
- USAID in partnership with GLSA and Evolution of smooth, a U.S. cosmetic brand, has developed facilities that will increase the income of about 1,000 shea pickers and processors.
- Mother Shea Limited provides support through training and assists the women to build their businesses. It is currently assisting 3000 women who collect organic shea and another 3000 women who collect the conventional shea to enable them to obtain good prices for their products.
- The Ghana Sustainable Land and Water Management project (GSLWMP) is also providing support to shea processing facilities.
- ROWFAD also works with 1,750 women from 51 cooperatives. There are many other initiatives by key partners that are targeting women actors in the ShVC, which for space limitation cannot be enumerated here.

54. As noted by Choungo Nguekeng et al. (2021), significant progress has been made in the vegetative propagation of materials that can start fruiting within 3-5 years. But an important hurdle to address concerns taboos (Boffa, 2015) about tree planting and the recalcitrant nature of the seed. Regenerating the shea parkland with these new materials will

increase tree density on farms and open more opportunities for women even though there is an emerging competition from men with the increasing global demand for shea nuts and the tendency for men to collect nuts which are in the farms.

2.4 Economic viability and value creation in the ShVC

2.4.1 Economic viability of shea butter production.

55. Rural women in Northern Ghana pursue diverse livelihood activities. They participate in the shea industry as pickers of shea nuts from their farms, fallow lands and the wild. When they do not sell the shea nuts to processors, they engage in shea butter production.

56. There is mixed evidence about the levels of margins that rural women can get from shea nut collection versus shea butter processing. Lovett and Abdulai (2018) found that a ton of shea butter generates only about US$61, which corresponds to a profit margin of 4%. This contrasts with a profit margin of 44 % for the collection of shea kernel. Gallat and Collinson (2000) also found very marginal profitability of shea butter production in Northern Ghana. The results of an USAID, ISSER, ICED, and Feed the Future Innovation Lab (2021) study indicate that there is no substantial benefit for rural women shea nut pickers, making a strong argument for more value addition. Hammond et al. (2019) found that collectors of shea kernel made US$57 as income/year compared to $US40 for rural women who produced shea butter. For an 80kg bag of shea nuts, Alhassan (2020), estimated a profit margin of about GHS10.8, equivalent to 135GHS/ton of shea butter. Kodua et al. (2018) found a gross margin of GHS163.24 for shea butter production in Northern Ghana.

57. Rural women in Northern Ghana also engage in other revenue options apart from shea nut collection or shea butter processing. Table 2 summarizes the benefit-cost ratios of several revenue options, including shea butter extraction for rural women in Northern Ghana based on yearly estimation.

58. The top-five (benefit-cost ratios in parentheses) rural enterprises are dawadawa processing + groundnut production (1.7); dawadawa processing + groundnut production + charcoal burning (1.6); dawadawa processing +*shea butter extraction* +charcoal burning (1.5); dawadawa processing + *shea butter extraction* (1.5); and dawadawa processing + charcoal burning (1.5). Dadawa is made from the fermented dried seeds of the African locust bean *Parkia biglobosa* that have been pressed into balls to prepare condiments that are very rich in protein. It is important

to note the presence of shea butter extraction among the top-five rural enterprises that rural women can undertake. As shown below, groundnut yields were quite good at the canopy edge of the shea butter tree in the AF parkland system. In addition, dawadawa is a product from *Parkia biglobosa*, which is one of the prominent tree species in the AF parkland system. These results make a strong case for the diversification of enterprises at the local level.

59. However, caution should be exercised concerning the results presented above, because the data of the rural enterprises date from 2011. Some rural activities that can be associated with AF parklands such as honey production have not been examined. In addition, the valuation of rural enterprises has not incorporated potential income from the residue that remains after the extraction of shea butter, and shea nut cake.

Table 2: Benefit-cost ratios for rural women enterprises in Northern Ghana.

Enterprise	Actualized Cost (GhC)	Actualized Benefits (GhC)	Benefit-Cost ratio
Pito Brewing only	1,255	1,633	1.3
Dawadawa processing only	902	1,303	1.4
Shea butter extraction only	592	675	1.1
Charcoal burning only	211.7	211.7	1.0
Groundnut production only	292	292	1.0
Pito brewing and Charcoal burning	1,263	1,670	1.3
Pito brewing and shea butter extraction	1,434	1,960	1.4
Pito brewing and groundnut production	1,333	1,759	1.3
Shea butter extraction and groundnut production	432	463	1.1
Shea butter extraction and charcoal burning	422	470	1.1
Dawadawa processing and charcoal burning	**749**	**1,162**	**1.5**
Dawadawa processing and groundnut production	855	1,455	**1.7**
Dawadawa processing and shea butter extraction	1,060	1,645	**1.5**
Groundnut production and charcoal burning	259	281	1.1
Groundnut production and soap making	340	340	1.0
Pito brewing, dawadawa processing and charcoal burning	1526	1,809	1.2
Pito brewing, groundnut production & charcoal burning	1208	1,440	1.2
Pito brewing, shea butter extraction & charcoal burning	1,316	1,836	1.4
Dawadawa processing, shea butter extraction & charcoal burning	571	583	**1.5**

Dawadawa processing, groundnut production & charcoal burning	866	1,393	**1.6**

Source: Abankwah and Abebe (2011).

60. To sum up, the overall evidence points to positive gross margins for shea butter production. However, significant value addition should be pursued to make these margins even more attractive. Several other livelihood options are available for women in rural communities. Shea butter extraction combines quite favourably with the leading rural enterprises that women might consider. Further investigation is needed to update the data presented above and to identify potential challenges that the rural women might face, including upgrading women's skills in shea butter production to meet international quality standards (Sanou et al., 2019) and how tree rights might affect these potential rural enterprises.

2.4.2 Level of market integration.

61. Local trade of shea nuts and associated products is quite vibrant in Northern Ghana. As indicated in the ShVC diagram (Figure 5 above), shea nut pickers, who are mostly women, either sell the raw nuts at local or district markets or extract shea butter from the nuts. Laube et al. (2018) found that 81% of respondents in four communities in Northern Ghana indicated the sale of shea nuts as their priority, while 13% reported that the sales of shea nuts was their second priority. Also, the authors found that about 19% of the respondents considered processing butter as their primary priority while over 45% identified shea butter production as their second priority. The field survey undertaken for this study found that more than 75% of shea processors bought their shea nuts from the district markets. All the shea pickers reported selling their raw nuts to large firms or their agents. The main message here is that trade in shea nuts, at least at the local level, is vibrant.

62. Considering the local market, which may be the community or district market, rural women are highly engaged in selling their raw nuts and/or processed products thereof. There has been extensive debate on the transformative and poverty alleviation potential of shea nuts picking by rural women in North Ghana (Laube, 2015; Laube et al. (2017). As shown above, gross margins for both shea nuts and shea butter production for rural women are generally positive. Thus, as also observed by Laube (2015), shea nuts sales are a welcome source of income and can help alleviate rural poverty.

63. The level of integration of shea nuts in international and global markets remains the key issue. This is the case because access to these markets provides opportunities to benefit from competitive global shea prices.

Over the past two decades, there has been an increasing global demand for shea, especially in the cosmetics, medicinal and food industries. More than 90% of exported shea nuts is used in the food industry. Shea butter is extracted into a vegetable fat fraction (stearin) and used for the formulation of Cocoa Butter Equivalent (CBE) and margarine. As aforementioned, the cosmetic and pharmaceutical industries take a share of the market, considered as low volume but high value.

2.4.3 Enhancing market integration.

64. Several actions can be taken to enhance market integration by rural women collectors and producers of shea products. These include:

Adding value through skills development and entrepreneurship. There are many activities that have been undertaken to strengthen and support shea nut collectors and develop their skills. Little attention has been put into facilitating access to simple and practical technologies that will simplify the tasks of these producers. Improved access to relevant technologies will enhance market integration.

Improving the quality of shea products. Post-harvest processing can go a long way to improve the quality of shea nuts and shea butter and lead to better market integration. Parboiling the nuts immediately after harvest, for instance, prevents the seeds from germinating. Germinated seeds are not recommended for shea butter production as their use results in poor quality butter. Sun-drying in contrast to smoke-drying leads to a better quality of the shea butter. High-quality butter is preferred for home consumption and allows for longer storage, which may benefit from higher prices during off-season periods. It has been shown (Masters et al., 2004) that by improving processing practices, shea butter of commercially acceptable grades with free fatty acids (FFA) of less than 0.5% can be produced. The survey conducted for this study indicates that premium prices for good quality shea can be an incentive for collectors to improve quality. Shea nut processors and wholesalers are willing to pay higher price premiums. When collectors receive higher returns, they can, in turn, invest more in inputs and equipment such as solar dryers (Masters et al., 2004). Decentralized off-grid energy systems may be able to provide these kinds of facilities for rural women.

Increasing quantity produced. Most shea collectors depend very much on shea trees on privately-owned farms and in fallow lands. Most of these trees are ageing and until planted shea butter trees start fruiting, increasing the quantity of shea nuts will rely on increasing the picking from the wild. Evidence suggests that close to 60% of shea nuts in the

wild are not collected (NGS, 2020). However, the distances to these community areas are quite far. Any strategies that enable these collectors to reach these locations would be quite useful. Some shea collectors are already getting support from NGOs through the acquisition of tricycles and donkey-driven carts, which helps facilitate this process.

Improving access to finance. Inadequacy of financial resources is a major impediment to smallholders in general, and to women. The survey for this study indicated that financial constraints constituted a major stumbling block for rural women. Some of the reasons included inadequate record-keeping, lack of collateral, and high interest rates. Most producers belong to Village Savings and Loans Associations (VSLAs), which have enabled them to mobilize some resources though considered insufficient. Financial institutions should be encouraged to support these producers and their village associations. Bilateral donors and multinational partners can play an effective role in facilitating access to finance.

Pursuing certifications schemes. International certification has emerged as an important criterion to access global markets. Certification with traceability assures international buyers of the quality of the shea products. In Northern Ghana, many organizations are helping women shea butter producers to benefit from international certification. Ripples Ghana has received Ecocert for Fair-Trade Certification, which allows it to have access to international markets. The organization currently trains and assists 244 shea producers and 3,000 shea pickers in 14 communities in the Kumbungu District to manage and develop their own businesses. Increased involvement of these rural women collectors and processors in certification schemes and the development of fair trade will enhance their integration into local and international markets.

2.4.4 Exploring opportunities for marketing shea butter locally and for export.

65. In 2020, the global shea industry generated about 655.2 million USD. It is anticipated that by 2025, the industry could generate up to 2.9 billion USD (www.cbi.eu). This growth is driven by, amongst others, the increasing demand for shea butter in the cosmetics and food industries, due to the rising demand for plant-based ingredients in the cosmetic industry. The export value of shea butter from Ghana in 2020 was about 66 million USD (Ghana National Chamber of Commerce and Industry, 2021). Indeed, total exports of shea nuts have increased seven-fold from 50,000 tons over the past twenty years.

66. Ferris et al. (2001) observed that the shea market can be grouped into 3 categories (i) high volume, low value (ii) high volume, intermediate value, and (iii) low volume high-value markets. The high volume, low-value market is made up of rural women in Northern Ghana who produce individually high volumes but low value locally processed butter. This is the village crafted market for shea butter. These women use manual and traditional methods to produce shea butter with very low extraction rates. They sell at local markets and are not organized in any formal structures. Awuviri (2017) observed that the supply for shea butter by these women producers exceeds the demand in these rural areas/communities such that they must go from one community or district market to the other to sell their shea butter. The large number of shea butter suppliers in this low-value market is largely due to new entrants who have been attracted to the shea industry in recent years (Awuviri, 2017).

67. The second shea butter market is the high volume, intermediate value export to the food processing market. This market consists of local shea processors, cooperatives and/or organized groups of women who pick nuts from the wild and/or buy them at local markets and transform them into shea butter and cosmetics. Although the operations in this market category are also manual, processors sometimes use semi-mechanized systems which they own or which they access commercially for a fee. The market demand for this category is quite good and the potential is enormous (www.cbi.eu/market information). Some buyers, mainly large firms, prefinance the operations of these cooperatives and processors. The Savannah Fruits Company (SFC), for example, currently works with about 140 cooperatives with a combined membership of over 20,000 women. The products include conventional shea butter, organic shea butter (50% of SFC's production), and fair for life certified butter. SFC places orders with specific processors and buys 100% of their production. The survey undertaken for this report showed that some of the processors are keen on diversifying their clientele.

68. The third category, which is characterized as low volume high value export, is undertaken by exporters and large firms who connect with international processors to supply international cosmetics and confectionery firms. It should be noted that there is a market for cosmetics that are handled by actors in the second category.

69. There have been attempts to improve the shea butter production standards and to expand the market for shea butter. As mentioned before, the supply for locally made shea clearly outstrips the demand within local communities. However, the potential at the national level is

good if these women can be linked to urban markets and if observed market failures in the production and marketing of shea nut products (e.g., inadequate competition, and asymmetric information about market conditions) can be addressed (Awo and Anaman, 2015).

70. At the international level, export demand for shea butter has been boosted in recent years by, amongst others, the increasing demand for Cocoa Butter Equivalent (CBE) (Boffa, 2015). Available empirical evidence indicates that the level of education and extent of entrepreneurial skills are two key determinants for women shea producers to access these markets (Al-hassan, 2012; Arthur et al., 2018; Tanko, 2017). Hence, strengthening their skills and designing policies that enhance their access to modern methods of processing will be critical for their participation in international markets. Improving the quality of the butter is also important for international market access (Tanko, 2017). In addition, organizing these women groups into cooperatives (and strengthening them through skills development and capacity building, for instance) will give them some market power and facilitate their access to modern processing techniques.

71. Remarkable progress has been made concerning the organic certification of shea butter in Ghana. As aforementioned, private companies have helped women groups acquire organic certification, which enables them to enter international markets with good quality shea butter. It should be noted that, while obtaining organic certification is a good achievement, continuous effort is needed for network upgrading that involves facilitating and strengthening horizontal and vertical linkages for these shea butter producers.

72. Many opportunities are emerging for shea butter producers due to the increasing global demand for shea butter products. There has been substantial progress in organizing women shea butter producers into cooperatives and associations. NGOs like Ripples Ghana OR and other actors such as SFC are training these women to produce the best quality product for both domestic and export markets. Female shea butter producers now have access to international markets through the Ecocert for Fair-Trade certification that Ripples Ghana OR received. An increase in market power is expected through the cooperatives and associations that have been created because they have strengthened the vertical and horizontal linkages of these women shea butter producers to local markets. The Global Shea Alliance is also undertaking similar actions.

2.4.5 Potential complementary activities for integration

73. The pollination activities by bees in the AF parklands make beekeeping a top candidate for consideration as a complementary activity for shea. Apiculture is already an activity that is common in the NSZ of Ghana and is practised by shea collectors. It provides producers with an opportunity for additional income generation.

74. There are other possibilities for integration. These include:

- Use of complementary crops – the production of complementary crops such as legumes, vegetables and sesame can be good options. Particularly, the principle is to consider crops with a short life cycle, low requirements for water, shade-tolerant, and those that can improve soil fertility (Monteiro et al, 2017).
- Exploiting non-timber forest products (NTFPs) of other AF parkland trees -AF parkland trees like *Parkia biglobosa* produce NTFPs that can be valuable. The fermented dried seeds of the African locust bean *Parkia biglobosa* can be pressed to balls to prepare condiments that are very rich in protein called Dawada. They can be used as a natural sauce to prepare stews, soups, and barbecues (Abankwah and Abebe, 2011). As shown in Table 2 above, this is a highly profitable activity.
- Assisted natural regeneration can help in increasing the density of trees through planting, enrichment planting, or natural regeneration can be a strategy to improve production in the future.

2.5 Opportunities and potential for upgrading.

2.5.1 Betting on organic butter production

75. Organic butter production is common in the CREMA's and from shea butter produced from nuts picked in the wild and in protected areas. Further support to women's groups to enable them produce certified organic butter will create opportunities for further penetration in regional and international markets where these products enjoy high prices.

2.5.2 Opportunity for carbon revenue

76. AF systems can increase climate change resilience and mitigation potential, protect and conserve biodiversity, soil, and water along with other natural resources. AF has the capacity to mitigate GHGs emissions as it can store more carbon than fields with annual crops. AF's potential for carbon revenue draws principally from the ecosystem services it can supply as well as its ability to provide food.

77. Improving the ShVC to realize its full monetary value and harnessing the market value of shea tree products will protect these trees from being felled for charcoal production, which is one of the key drivers of deforestation and degradation of the shea parkland. Activities that enhance income and benefits from shea will encourage active management, maintenance, and enrichment of the parkland (Boffa, 2015).

78. A study (Waldén et al., 2020) has shown that the possibility of receiving carbon revenue increases the profitability of agroforestry by 0.5% to 70% depending on the carbon price and carbon sequestration rate used; varying from lowest carbon price/lowest carbon sequestration rate to highest carbon price/highest sequestration rate. It was also found that, on average, carbon revenue increased the profitability of AF by 150% compared to monocultures. Some evidence of the carbon stocks associated with the shea parkland system include:

- A shea tree can sequester carbon ranging from 1180±209kg C ha^{-1} to 2089±522kg C ha^{-1} (Dimobe et al., 2018).
- In the shea parklands, Takimoto et al. (2008) found C stock (biomass C + soil C in the layer 0–100 cm) at 50 t ha^{-1} of which the percentage of soil C stock alone corresponds to 55%.
- Where the tree density is about 30 ha^{-1}, Including root and soil C, a maximum of 7.5 t of C ha^{-1} (Peltier et al., 2007) and at 50-100 trees ha^{-1} (Dayamba et al., 2016) C stock did not differ from the community-managed forests (56–67 Mg ha-1, 1 Mg = 1.10 t), and that more C was sequestered in parklands than in four- to six-year-old fallow lands (5–9 g kg^{-1} of soil).
- Aboveground sequestered C was higher in parklands than in fallows and protected areas (0.07–0.11, 0.05–0.07 and 0.06 Mg ha^{-1} yr^{-1}, respectively) (Sanogo et al., 2016).
- The shea value chain fixes 1.5 million tons of CO_2 equivalent ($tCO_{2\text{-}e}$) yearly, or a negative carbon footprint of 1.04$tCO_{2\text{-}e}$ per ton of shea kernels produced (Bockel et al., 2020).

79. Notwithstanding, there is empirical evidence about the carbon footprint of the shea. Jasaw et al. (2017) found in four villages in Northern Ghana that the processing of shea can cause a significant change in carbon stocks and result in the loss of carbon sequestration ecosystem services. Regarding GHG emissions, rural shea butter processors emit 3.14–3.31 kg CO_2 eq/kg shea butter, while urban processors emit slightly less (2.29–2.54 kg CO_2 eq/kg shea butter). Other research has quantified the carbon footprint of post-harvest activities (Glew and Lovett, 2014; Noumi et al., 2013).

80. In sum, shea has immense potential for carbon revenue. Carbon stocks for the shea tree and shea parklands are quite significant. Shea AF parklands provide ecosystem services and command high adaptation and mitigation potential. The move towards enrichment planting with material that can fruit within 3-5 years will go a long way to strengthen the system and contribute to a resilient ShVC. Producers engaged in enrichment planting should be incentivized with carbon credits as proposed within the context of the Ghana Shea Emissions Reduction project.

Chapter 3: Cross-Cutting Issues

3.1 Gender Considerations in the Value Chain

81. In section 2.3.3 above, constraints that women face in the ShVC were summarized. In the following subsection, we examine the nature of gender differences in the shea agroforestry-based value chain. Three specific issues of interest are: (i) identifying where gender differences are concentrated in the ShVC; (ii) determining the factors explaining these differences; and (iii) identifying the prospects for generating gender-equitable and sustainable outcomes.

3.1.1 Concentration of gender differences

82. As indicated earlier, the ShVC consists of collectors, processors, merchants, and exporters. Overall, the ShVC has been dominated by women as they have been at the core of the shea industry. However, in recent times, this has been changing with the global demand for shea increasing and consequently attracting men into the supply chain.

83. Gender differences are high and concentrated at the collection and processing nodes of the VC. Women are the main collectors (Maranz et al. 2004; Teklehaimanot, 2004) and the main producers of shea butter. They collect the nuts from bush lands (in the wild), on fallow lands, and in cultivated fields. As the picking of the fruits coincides with the period for farming activities, these women must leave early to pick the nuts. In recent years, the distances have increased, adding more pressure on women's time. They are also the main actors in preparing the kernels for markets, which they sell to local users, middlemen, and export buyers (Kent, 2017). Men assist the women in transporting the nuts from the fields and in extracting nut kernels (Kent, 2017) and are involved in aggregation, bagging, packing, loading, off-loading, and acting as export agents (ILO, 2021). Women dominate the processing of shea nuts into butter, which is sold to consumers at local markets and/or to shea butter traders and exporters.

84. The downstream channels (merchanting and export) show a lower concentration of women. However, recent activities by the Global Shea Alliance targeted at women's groups, retailers, and non-governmental organizations (NGOs) are improving women's involvement in the export of shea products. It is important to note that even though women dominate the collection of nuts, processing the nuts into butter and the

local trade of the butter, men own the rights of primary decision-making and tree cutting. In addition, recent evidence (Kent, 2017) indicates that males are highly involved in the spending decisions from the proceeds of shea sales.

85. The observed nature of gender differences is explained by several factors. Firstly, cultural, and social norms that designate the collection and processing of shea as a woman's activity have played a critical role in limiting the participation of men at these stages of production. In some communities, it is taboo for men to be involved in the collection and processing of shea.

86. Secondly, men do not have the knowledge and skills needed for shea processing, some of which have been acquired and learnt over the years by women. In fact, there is a move towards using geographic indicators to identify shea products that are coming from locations where there is substantial knowledge in the practice of shea butter making thereby recognizing women's heritage technique in butter-making (Becker, 2021). As observed by Seghieri (2019), intra-household knowledge sharing and collaboration between men and women is significant for achieving resilient resource management.

87. Thirdly, technological, and financial constraints define in a way, the stages in which men and women operate. Women are quite unlikely to participate in downstream activities that require large investments in technology and financial resources. Introducing technologies and services that are friendly to women can assist them in upgrading their chain activities (KIT, Agri-ProFocus and IIRR, 2012).

88. Finally, the tenure and rights to trees are the preserve of men as defined by customary laws. With exceptions of shea collected in the wild or bushes, the rights belong to the male for shea picked in cultivated fields.

3.1.2. Prospects for generating gender-equitable and sustainable outcomes.

89. There are prospects for generating gender-equitable and sustainable outcomes. Appropriate action including sensitization to address gender discriminatory practices and attitudes; the buy-in of the community's traditional and opinion leaders will be needed in addressing land tenure and rights to trees (necessary for women to secure the future supply of nuts) and exploring how cultural barriers can be resolved; building the capacity of both men and women; and providing financial assistance to women to enable them to invest in downstream activities.

90. Professionalization of the chain and converting these informal activities to real businesses can facilitate gender-equitable outcomes (KIT, Agri-ProFocus and IIRR, 2012). Capacity-building activities, entrepreneurial skills development, and strengthening the organizational capacities of these women groups can go a long way to catalyze the formalization of female activities in the chain. This can be facilitated by providing resources to enable them to purchase donkey carts and three-wheel cargo motorcycles. In the case of Northern Ghana, this is already happening through the activities of the Global Shea Alliance. Tree Aid has also established enterprise development revolving funds with priority given to women groups (Nfor, E.T.P, in KIT, Agri-ProFocus and IIRR (2012). Providing women with processing facilities (equipment and machines) holds a promise in assisting them to achieve sustainable outcomes.

91. In all, due to the traditional roles attributed to women by culture and social norms, there is a higher concentration of women in the upstream activities of collection (picking) and processing of the nuts to shea butter (See Figure 9 above). Men are increasingly getting involved in transporting the nuts, aggregation, bagging, packing, loading, and off-loading and playing roles of export agents. Men will in due course play a greater role in the picking of nuts (collecting) from the wild at distant locations. Support to women's groups to improve processing of shea and to facilitate their access to shea nut should be given high priority. On the later, intra-household consultations and involvement of traditional leaders is critical.

3.2 Impact of Wildfires

92. Wildfires or bush fires are a common feature in AF parklands. Two types of fires have been observed in the Sahelian region: early fires and late fires. The early fires occur early in the dry season whereas the late fires occur late in the dry season. Due to the resprouting capacity of parkland trees like the shea, these fires may not hinder regeneration (Sawadogo et al., 2002). The late fires, on the other hand, can destroy regeneration (Lohbeck et al., 2020). Fires constitute one of three major human impacts on the parkland ecosystem, including agriculture and grazing (Lohbeck et al., 2020). These factors are directly related to FMNR practices. Fires may be needed to reduce the abundant woody biomass following a fallow period and to clear the land (Kandel et al., 2021).

93. A study in Northern Ghana (Lohbeck et al., 2020) showed signs of fire use in 54% of the plots studied. The study indicated that fire had positive

effects on the regeneration of the Shea tree. Fire may cause dieback so that the shea tree can resprout without leading to mortality (Lohbeck et al.,2019). Studying bush fires in the Wa Municipality, Dapilah et al. (2019) found that the use of fire is common, especially in the dry season. The respondents indicated that bush burning facilitates 'wildlife/game hunting and enhances the regrowth of grass for animals and cattle'. Pastoralists are known to use fire to regenerate the grasslands (Krätli, 2015). It was also indicated that bushfires had negative effects on shea tree population as it took a long time for the tree to recover from the fires. Some respondents expressed the view that bushfires enhance the flowering and fruiting of the shea tree. The respondents argued that, when shea trees are burnt by fires, the following season, they fruit well producing big and sweeter fruits the following season. As a result, they consciously allow the shea trees to be burnt by fires' (Dapilah et al, ,2019). However, Boffa (1999) reports that frequent burning delays fruit production, especially in young shea trees and an immediate increase in soil nutrient availability after the fire.

94. Over the years, farmers have become aware of and have adopted practical approaches to prevent fires. Farmers have learnt to weed around trees to protect them from fires (Kandel et al., 2021). Shu-aib Jakpa (2018) found that farmers in Northern Ghana create fire-belts around farms and trees and weed around shea trees to protect them from bush fires. Husseini et al. (2020) have identified indigenous practices to control forest fires. These include pre-fire suppression methods (boundary cleaning and early burning) and post-fire and reactive mechanisms (fire rides and break creation, fire beating and firefighting with water knapsacks). Respondents of the survey for this study listed some of the above methods including tree planting, boundary cleaning, and fire breaks. These respondents also indicated that they are beneficiaries of training on a regular basis on bush fires. Some of the training has been offered by organizations such as GIZ.

95. Summing up, several key messages have emerged concerning the impact of bush fires in the NSZ on the AF parklands:

- Bush fires are common in the AF parklands in Northern Ghana. Some occur naturally from lightning strikes and others are set deliberately to achieve certain objectives (wildlife/game hunting, enhancing the regrowth of grass for animals and cattle, weeding and removal of unwanted trees, and soil fertility enhancement).
- Although bush fires have ecological benefits, they can damage the health of the AF parkland system. In fact, there is evidence suggesting that fires are largely responsible for the degradation and deforestation

occurring in the system (Agyeman et al, 2012; Boffa, 1999; Kyere-Boateng and Marek, 2021).

- There is a need to explore mechanisms to address the use of bush fire as a management tool. Given the presence of different actors (farmers, pastoralists) and stakeholders in the landscape, a community-based approach needs to be adopted and implemented. This could involve developing a fire management strategy and strengthening communication messages on bush fires.
- Proper fire management can have desirable environmental, economic, and social impacts. As shown by some authors, the effects of bush fires must be put in their proper context. It is, therefore, important to put in place fire management options that satisfy various stakeholders in the landscape and review the simplistic notion that fire prevents natural regeneration (Weston et al., 2015) and not to confuse the causes and effects of bush fires (Lovett and Phillips, 2018). It might be beneficial to promote early fires, especially when the necessary capacities have been strengthened.
- Arresting the negative impact of bush fires is a necessary step in improving the productivity of shea in the parkland.
- Continuous building of the capacity of all actors needs to be pursued. The approaches of the CREMAs provide useful lessons that can be replicated.

3.3 Revisiting the incentives' structure and rethinking carbon credits.

96. Payment of premiums for the collection of organic shea is a standard practice. Women collectors receive premiums ranging between 20 and 30 GHS/bag on average. Organic butter might receive close to 50% more than conventional butter. It is not clear how these premiums are calculated and whether they can be considered as a premium or as a strategy to address the low prices collectors are receiving.

97. It has been shown that shea sequesters a considerable amount of carbon. Is there a way to integrate premium payments with carbon credits for shea collectors, who are soon to be shea producers given the new shea planting materials that are being disseminated? It is time to explore mechanisms and strategies to make carbon credit effective. What possibilities are there to associate this concept with the Carbon Fund managed by the World Bank under the Forest Carbon Partnership Facility (FCPF) and Emissions Reduction Program. In any case, there is a need for action to incentivize shea producers by securing premium certifications.

Chapter 4: Conclusions, recommendations, and further research needs

4.1 Conclusions

98. The key messages and findings that have emerged from this study can be summarized as follows:

1) Shea trees in the AF parkland system provide many ecosystem services that help to improve agroecosystem biodiversity and productivity. Agroforestry-based value chains with shea have a huge potential to generate income for the land users.
2) There are multiple key actors consisting of collectors, aggregators (middlemen and middle women) processors and exporters in the value chain. No formal governance structure exists to coordinate the activities of the actors creating a vacuum that TCDA can fill.
3) The main production constraint is associated with the aging trees in the parkland system and losses of trees to charcoal production. Recent progress in vegetative propagation of the shea tree can reduce the fruiting period to 3-4 years and holds the potential for improved planting material for households. Collectors, mainly women, must travel long distances to access shea trees growing in the wild. Processing is mostly undertaken by women who rely on rudimentary equipment as financial constraints impede their access to modern equipment.
4) Customary laws drive access and ownership of land resources. As land tenure and usufruct rights belong to men, women are left at a disadvantage. However, access to resources in the wild is not a problem as anyone can pick from the wild. The possibility of planting shea trees that can fruit in 3-4 years is a unique opportunity to increase the density of shea trees on-farm.
5) Shea nut collection can be increased substantially. Women face competition in the collection of shea nuts from farm fields since men have, in recent times, shown interest in shea picking. It is estimated that 60% of the shea nuts in the wild are not picked. There is an opportunity to increase quantities by exploring this niche. The challenge, however, is that this distance to these free for all community land is far and dangerous with high risks of snake bites.
6) Women dominate the upstream activities in the value chain, especially for collection and local processing. The creation of and support provided to women's' groups has enabled them to gain access to modern processing equipment and to meet certification requirements. As a

result, there is a high level of market integration in local and international markets for these local collectors and processors.

7) Shea butter is highly integrated into local, regional, and international markets. In the high volume-low value market, shea pickers or collectors are quite integrated. Many women groups involved in shea butter production are highly integrated into international markets because they have been able to obtain certification which gives them access to those markets.
8) The shea value chain has the potential to fix 1.5 million tons of CO_2 equivalent ($tCO_{2\text{-}e}$) yearly, or a negative carbon footprint of 1.04$tCO_{2\text{-}e}$ per ton of shea kernels produced. Processing of shea can cause a significant change in carbon stocks and result in the loss of carbon sequestration ecosystem services.
9) Water use and energy consumption is very high in shea butter processing. This necessitates the development of strategies to reduce water use and energy consumption.
10) Bush fires and charcoal burning are key drivers of the degradation of shea trees in the parkland system.

4.2 Recommendations

The following recommendations are proposed:

- TCDA must play an active role in coordinating and strengthening market linkages and communication amongst the diverse actors in the value chain.
- Research institutions and extension services should assess farmers' perception of new planting material distributed to pilot farmers and upscale the distribution of new planting materials that fruit within 3-4 years.
- Extension agencies and development organizations can provide training on the vegetative propagation of the new planting material and the use of other good agricultural practices such as FMNR to protect existing shea trees.
- Development agencies and civil society organizations intervening in the local communities should support the collection of shea nut in the wild by strengthening the use of tricycles and donkey-driven carts.
- Financial partners and appropriate government agencies need to strengthen VSLAs to provide financial support to women groups and collectors.

- TCDA in collaboration with other relevant stakeholders should develop strategies to reduce water use and energy consumption, e.g., the use of energy-saving devices such as solar-powered water pumps or biogas.
- Stakeholders involved with shea production at the local communities should continue to support producers' associations and women working groups in shea butter processing through acquisition of mechanized equipment.
- Development partners engaged in certification processes should provide opportunities for many women's groups to meet standards for premium certification to integrate regional and international markets.
- Non-Governmental organizations, private sector actors and development partners should continue to support market linkages from the producers to markets.

Table 3 provides further insights for actions that can be taken for each key sector.

Table 3: Key recommendations by sector

General	
Theme	***Key recommendations***
Agroforestry ***(Supporting integrated agroforestry systems)***	• Promote and support agroforestry practices along with training on GAPs. • Upscale the availability of improved planting material for shea and the establishment of local nurseries and consider their certification. • Collaborate with relevant partners and stakeholders to control bush fires and stop the cutting of trees for charcoal and explore the potential of promoting agroforestry woodlots for fuelwood
Governance ***(Improving the organization and governance of the ShVC)***	• Assess and strengthen TCDA's capacity to provide guidance, advisory services, and support to VCs actors. • Improve coordination of the VCs including addressing information asymmetries and strengthening horizontal and vertical coordination to improve the relationships among actors in the VCs. • Ensuring adequate and effective technical and business advice and R&D.

Policy (*Strengthened enabling environment)*	• Develop policies to expand the establishment of scion gardens in the NSZ to propel production.
Specific /technical	
Improving value addition ***(Increased profitability)***	• Set targets and promote more processing of Shea nuts. • Conduct studies to understand the distribution of gains and value through the value chains.
Governing quality standards ***(Improved marketability)***	• Explore opportunities to formalize premium payments for quality products. • Establish mechanisms to ensure quality compliance. • Pursue certification schemes.
(Production: **Increasing productivity)** **(Also see Agroforestry)**	• Support research to further reduce the gestation period of the shea nut tree. • Support collection of shea nut in the wild by strengthening the use of tricycles and donkey-driven carts. • Organize campaigns to scale up the dissemination of early-fruiting planting material for shea trees. • Provide training, extension support, and promote FMNR to boost the survival rates of shea trees. • Explore incentives to enhance productivity. • Intensify campaigns to stop the cutting of shea trees for charcoal burning and explore the potential of agroforestry woodlots. • Promote the use of shea nut cake in composting as organic manure.
Greening AF value chain ***(Building sustainability)***	• Develop strategies to reduce water use and energy consumption, e.g., the use of energy-saving devices such as solar-powered water pumps or biogas. • Explore mechanisms and strategies to provide incentives (carbon credits) to producers.
Building Resilience	• Promote crop diversification in the AF parklands of the NSZ. • Explore opportunities for carbon credits.

(Climate-resistant AF parkland system)	
Marketing ***(Improving market access)***	• Develop regulations and policies on the marketing of shea products. • Continue to support producers' association and women working groups to have access to modern equipment for processing shea butter and support market linkages.

4.3 Further research needs

99. The recommendations above have identified some areas that need further research. Broadly speaking, some other possible areas include:

- Developing databases and management information systems that build upon existing platforms. Currently, access to pertinent data on the VC is quite difficult.
- Assessing farmers' perceptions of new shea tree seedlings that were distributed in 2020.
- Pursue research and capacity building on vegetative propagation of early-yielding shea planting materials.

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Annex I: List of stakeholders and project beneficiaries consulted.

- Dr. Shaibu Azumah, Director, Action for Shea Parklands, Global Shea Alliance.
- Dr. K. A. Nuamah, Nana Damoah Kofaboye IV, Akyeamehene of Wenchi Traditional Area, CEO, K & A Genesis Limited
- Ms Addo Nunana, GIZ-COMCASHEW
- Dr. Julius Yeboah, Senior Researcher, CRIG.
- Dr. Forster Boateng, Deputy Chief Executive Officer, TCDA
- Mr Seth Osei-Akoto, Director, Directorate of Crop Services, MOFA
- Mr. Yaaana Yahaya, CEO ROWFAD
- Mr Sarpong, CEO, Gensap Ventures
- Field survey covered:
    - 7 shea pickers/collectors
    - 3 shea merchants
    - 12 shea butter processors
    - TREE AID
    - 1 CREMA