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Feed the Future Ghana Agriculture and Natural Resource Management Project Quarterly Progress Report Fiscal Year 2017 - Quarter 3



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Feed the Future Ghana Agriculture and Natural Resource Management Project Quarterly Progress Report

Fiscal Year 2017 | Quarter 3 – April 1 to June 30, 2017

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ACTIVITY/MECHANISM Overview

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Reporting Period:	April 1, 2017 – June 30, 2017

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ACRONYMS AND ABBREVIATIONS

ADVANCE	USAID Agricultural Development and Value Chain Enhancement Project
AgNRM	USAID Ghana Agriculture and Natural Resource Management Project
AGRA	Alliance for Green Revolution for Africa
AMEP	Activity M&E Plan
AOR	Agreement Officer's Representative
ATT	USAID Agriculture Technology Transfer Project
BA	Business Advisors
BVC	Black Volta Corridor
BY	Builsa Yening
CA	Conservation Agriculture
CBE	Cocoa Butter Equivalent
CEC	CREMA Executive Committee
CECOTAPS	Center for Conflict Transformation and Peace Studies
CLPT	Community Land Use Planning Teams
COP	Chief of Party
CREMA	Community Resource Management Area
CRIG	Cocoa Research Institute of Ghana
CRMC	Community Resource Management Committee
CSA	Climate Smart Agriculture
DCOP	Deputy Chief of Party
ECO	Winrock Ecosystem Services Team
EPA	Environmental Protection Agency
ES	Ecosystem Services
FC	Forestry Commission
FinGAP	USAID Financing Ghanaian Agriculture Project
FMNR	Farmer-Managed Natural Regeneration
FSD	Forest Services Division
FtF	Feed the Future
FY	Fiscal Year
GHG	Greenhouse Gas
GIS	Geographic Information System
GoG	Government of Ghana
GPS	Global Positioning System
GSA	Global Shea Alliance
IITA	International Institute of Tropical Agriculture
IK	Indigenous Knowledge
M&E	Monitoring & Evaluation
METSS	Monitoring, Evaluation and Technical Support Services
MoFA	Ministry of Food and Agriculture
MOU	Memorandum of Understanding
MUS	Multiple-Use Water Services
MWK	Moaduri Wuntaluri Kuwesasi
NASWG	Northern Agriculture Sector Working Group
NCRC	Nature Conservation Research Centre

NGGA	Northern Ghana Governance Activity
NGO	Non-Governmental Organization
NRM	Natural Resource Management
NRP	Natural Resource Product
NWP	Nature, Wealth and Power
OFSP	Orange Flesh Sweet Potato
PES	Payment for Ecosystem Services
Q	Quarter
REDD+	Reducing Emissions from Deforestation and Forest Degradation plus
RING	USAID Ghana Resiliency in Northern Ghana Project
RMSC	Resource Management Support Centre
SARI	Savanna Agricultural Research Institute
SFC	Savannah Fruit Company Ltd
SET	Sheanut Equivalent Ton
SKGK	Sanyiga Kasena Gavara Kara
SLWMP	Sustainable Land and Water Management Project
SPRING	USAID Strengthening Partnerships, Results, and Innovations in Nutrition Globally Project
STTA	Short-term Technical Assistance
SWAT	Soil and Water Assessment Tool
SWOT	Strengths, Weaknesses, Opportunities and Threats
TNS	TechnoServe
ToR	Terms of Reference
UNFCCC	United National Framework Convention on Climate Change (UNFCCC)
USAID	United States Agency for International Development
USGS	United States Geological Survey
VSLA	Village Savings and Loan Associations
WBC	Western Biodiversity Corridor
WD	Wildlife Division
WITAMA	Web Interactive Tool for AgNRM Management
WRC	Water Resources Commission
ZOI	Zone of Influence

I. ACTIVITY IMPLEMENTATION PROGRESS

The Feed the Future (FtF) Ghana Agriculture and Natural Resource Management (AgNRM) project is a five-year, \$24,900,000 program that will run from May 2, 2016, to April 30, 2021. It is the main vehicle within the United States Agency for International Development's (USAID) Ghana FtF portfolio to address issues of environment and natural resource management in the north of Ghana. AgNRM is implemented by Winrock International in partnership with TechnoServe (TNS), Nature Conservation Research Centre (NCRC), and Center for Conflict Transformation and Peace Studies (CECOTAPS). The third quarterly progress report for Fiscal Year (FY) 2017 covers the period from April 1, 2017 through June 30, 2017, and presents a summary of the progress made during the quarter.

The project supports USAID|Ghana's Development Objective 2 and the Ghana FtF Multi-Year Strategy. Winrock's AgNRM approach builds on USAID's resilience strategy and its investments in the FtF Zone of Influence (ZOI). Our approach focuses on mutually reinforcing, systemic changes that align with and augment the Government of Ghana (GoG) Food and Agriculture Sector Development Policy, and the Nature, Wealth and Power (NWP) framework. Our conceptual model adds health as a fourth dimension to that framework. This ensures integration of food security and water systems and highlights the importance of these factors to nutrition and resilience.

The Winrock AgNRM team will achieve the project goal of poverty reduction through sustainable increases in wealth and nutrition from natural and non-traditional agriculture products by addressing environmental, agricultural, governance, and natural resource management challenges. The AgNRM project interventions are expected to result in transformative change: adoption of improved practices, technologies, and behaviors; better functioning value chains and governance structures; more equitable access to land and resources; and increased capacity of organizations to improve natural resource management, address drivers of environmental degradation, and enhance rural livelihoods. AgNRM project activities are being implemented under four project outcomes: 1) Increased Incomes from Natural Resource Products; 2) Improved Food and Nutritional Security; 3) Increased Farmer and Community Security/Access to Land and Natural Resources; and 4) Strengthened Environmental Stewardship. This progress report focuses on progress made toward achieving results under these four interrelated outcomes during the third quarter of FY 2017.

This report is divided into four main sections: activity implementation progress, integration of cross-cutting issues, activity progress by Outcome and planned tasks/interventions for the next reporting period.

1.1 Progress Narrative & Implementation Status

AgNRM's Fiscal Year (FY) 2017|Quarter (Q) 3 was an active implementation period with the AgNRM team in full operation, with activities under all four project outcomes across six targeted Community Resource Management Areas (CREMAs). USAID|Ghana's Mission Director, Mr. Andrew Karas, visited the AgNRM for a final time before his departure. Members of the new Dorimon CREMA enthusiastically welcomed the Mission Director and his team and demonstrated their new knowledge in applying climate smart technologies in home gardens, producing new moringa-based products and exhibiting the benefits of the efficient InStove institutional cookstove in shea processing.

Operations

By the end of FY2017 Q3, Winrock had finalized and submitted to USAID|Ghana several important project documents (see table below).

Key AgNRM Documents Finalized in FY 2017|Q3

No.	Action Item	Submission Date
1.	Revised AgNRM Gender Integration Strategy	May 30, 2017
2.	Revised AgNRM Communications Strategy	June 8, 2017
3.	Revised AgNRM M&E Plan	June 19, 2017
4.	Revised AgNRM Grants Manual	June 23, 2017

Staffing and Short-Term Technical Experts

Winrock and its implementing partners continued to staff up during the quarter, with seven (7) additional people joining the team in the third quarter of FY 2017. By June 30, 2017, AgNRM had **53** full-time team members. At the end of Q3 staffing was almost complete (Annex D) although several new members will not assume their posts until Q4.

During the reporting period, two Winrock Home Office staff traveled to Ghana to contribute to AgNRM activity implementation. Ms. Megaan Milke and Mr. Gabriel Sidman led the Multiple-Use Water Systems training activity in April 2017.

1.2 Implementation Challenges

Winrock faced some challenges toward the end of Q3. AgNRM continues to dialogue with the Forest Commission's (FC) Wildlife Division (WD) to establish a clear protocol of engagement between WD and the AgNRM project.

1.3 Monitoring and Evaluation

AgNRM's M&E Team was fully staffed in the third quarter of FY 2017 with the arrival of the M&E Director and two M&E Officers for the Upper East and Upper West regions (one per AgNRM satellite office). In the current reporting period the new team members were trained in AgNRM's data requirements, data quality issues and the use of hand-held GPS field units. The M&E Officers have been an invaluable addition to the AgNRM project, allowing for more accurate and timely data collection, analysis and reporting.

The M&E team finalized and submitted the project's Program Monitoring and Evaluation Plan (PMEP), in accordance with comments from USAID|Ghana and the Bureau for Food Security (BFS),

Washington. Documents related to the project's baseline were also finalized and submitted to USAID. These included:

- a. Methodology for AgNRM Annual Monitoring Survey
- b. Household Form and Baseline Questionnaire
- c. Request for Proposals (RFP) – Baseline Survey

These baseline documents have received approval from USAID|Ghana, paving the way for AgNRM to initiate the process for engaging a service provider to conduct the survey and profile the project's beneficiaries.

The firm engaged to develop the project's database (WITAMA), has completed the design of the web and mobile applications (apps) for data collection and storage. These will be tested and used for the baseline survey and profiling of the project's beneficiaries. Subsequently, mobile apps will be developed for all routine data collection tools to ensure real time access to quality and credible data. An ArcGIS geo-database has also been created by the GIS Specialist to manage the spatial data. These data are stored locally as shapefiles, which will be migrated into WITAMA when completed. AgNRM expects WITAMA to be fully operational before the end of FY 2017.

2. INTEGRATION OF CROSSCUTTING ISSUES

The AgNRM team continued to strengthen stakeholder engagement and build partnerships throughout the quarter.

2.1 Stakeholder Engagement and Partnerships

Consultative meetings and workshops with target CREMAs. AgNRM initiated the process of establishing a Memorandum of Understanding (MoU) with each of the beneficiary CREMAs in the Black Volta Corridor and in the Western Biodiversity Corridor. The project held consultative meetings with chiefs, CREMA and local government representatives in each of AgNRM's target CREMAs. Inputs from the consultative meetings were used to produce MoU drafts. AgNRM followed the consultative meetings with a one-day workshops in Wa for the Wechiau Community Hippo Sanctuary and the Dorimon Paramountcy CREMA, respectively. The MoU between each CREMA and the project will help secure strong collaboration and cooperation between the parties and is an important step in ensuring that project investments are sustained. The CREMA representatives cited illegal timber harvesting, mining and unauthorized hunting as the critical environmental management issues they would like to address with the support of the AgNRM project.

Stakeholder forum on uncontrolled harvesting of rosewood and illegal mining in the Western and Eastern Biodiversity Corridors. The AgNRM project, in collaboration with the Wildlife Division (WD) of the Forestry Commission, held a stakeholder forum on uncontrolled harvesting of rosewood and illegal mining in the Western and Eastern Biodiversity Corridors on April 26, 2017. Participants discussed the impact of these activities on the natural resource base, community conservation initiatives and donor investments in the two corridors. AgNRM supported this initiative in response to concerns expressed, by CREMA Executive Committee members and concerned citizens in the two Biodiversity Corridors, about the negative impacts of rosewood logging on the environment. Uncontrolled harvesting of rosewood and illegal mining undermine biodiversity conservation, ecosystem functions and sustainable livelihoods initiatives in the AgNRM's Zone of Influence. Stakeholders at the forum brainstormed possible mitigation measures and identified measures to reduce and/or eliminate the menace. About 60 participants including chiefs, CREMA representatives, officials of the Environmental Protection Agency (EPA) and the Forestry Services Division (FSD) attended the forum. In sharing his impression, the paramount chief of Nakon Pe, Joseph Banampe Afagachie (IV), remarked "This meeting is eye opening...we did not know we were

destroying ourselves by looking on while our future is destroyed by these loggers.” USAID’s Mr. Ellis Ekekepi attended and expressed his appreciation of the workshop but urged the participants to work together to tackle the issue head on. The AgNRM team will continue to support WD and FSD to effectively address the rosewood issue in and around AgNRM’s targeted CREMAs.

Socio-Economic Assessment of the Eastern Biodiversity Corridor. AgNRM completed a socio-economic assessment of the Eastern Biodiversity Corridor during the reporting period. The assessment examined the prevailing socio-economic, institutional and environmental conditions in the Eastern Biodiversity Corridor and provides AgNRM with vital information to support the team to determine the best approach for working in the Eastern Biodiversity Corridor and a better idea about the most important interventions AgNRM should pursue in the landscape. Preliminary observations suggest a year-round presence of elephants in some areas in the northern section of the Corridor, as well as rampant illegal rosewood harvesting and mining throughout the corridor. The draft report, which will be finalized early in FY 2017|Q4, recommends that the AgNRM project initiate activities in the northern reaches of the Red Volta Valley of the Eastern Biodiversity Corridor. Prior to finalizing the draft report, AgNRM will organize a key stakeholder workshop to share the report findings and discuss recommendations and potential activities and approaches for working in the Eastern Biodiversity Corridor.

Engagement with Wildlife Division. AgNRM invited representatives from the Forestry Commission’s (FC) Wildlife Division (WD) senior management team to join Winrock and its consortium partners to discuss issues related to the activities AgNRM is implementing in the Western Biodiversity Corridor targeted CREMAs. WD and AgNRM agreed on a ‘protocol for engagement’ to ensure stronger collaboration and better communication between activities of the AgNRM and ongoing WD-led interventions in the Western Biodiversity Corridor. Follow-on meetings with the WD have been scheduled for next quarter to discuss joint activities that could be implemented by WD and AgNRM. The two sides will discuss plans for a stakeholder workshop on AgNRM entry strategy in the Eastern Biodiversity Corridor. AgNRM will be meeting the Technical Coordinating Office of the Sustainable Land and Water Management Project (SLWMP) in the coming month to identify and agree on interventions in the Western and Eastern Biodiversity Corridors for stronger and more effective collaboration between AgNRM and the SLMWP.

Collaboration with Feed the Future Projects. AgNRM held consultative meetings with ADVANCE, Agriculture Technology Transfer (ATT) and West Africa Biodiversity and Climate Change Project (WaBiCC) project. The meetings discussed areas of collaboration as well as sharing of tools and lessons learnt during project implementation. A member of the AgNRM team attended the special training session on the Fall Army Worm organized by the ADVANCE project. In April 2017, one representative from each of the Black Volta targeted CREMAs participated in USAID’s RING project’s Orange Flesh Sweet Potato (OFSP) propagation, production and processing training in Tamale.

2.2 Communications

This quarter the Communications Director worked closely with Gender Integration Specialist to develop a communications framework for highlighting gender activities by addressing existing inequalities between men and women in AgNRM target CREMAs. The framework will integrate inputs from AgNRM’s Behavior Change Communications activities to establish forums for exchange of ideas and opinions including round-table discussions, listener clubs and drama and identify the best communication approaches for engaging both men and women and to share the best practices with the AgNRM team.

The AgNRM team will continue to develop factsheets for Western Corridor CREMAs focusing on activity progress and key information about the CREMAs and unique biodiversity significance. In addition, a series of thematic factsheets on AgNRM’s targeted value chains, land tenure activities,

access to finance, women empowerment and Climate Smart Agriculture practices will also be developed to highlight AgNRM's major interventions and achievements.

AgNRM plans to produce the project's first newsletter next quarter, a key communication target for the project. The newsletter is expected to highlight up-to-date AgNRM's major areas of intervention so far and collaborative efforts with key partners. It will enable the AgNRM team to reach out to wider target audience with informative content about areas where the project strives to make a difference and demonstrate impact.

2.3 AgNRM Behavior Change Communications

Prior to the planting season, AgNRM focused on educating community members about the cultivation and consumption of highly nutritious, Vitamin A rich, crops, with a particular focus on the Orange-Fleshed Sweet Potato (OFSP). The targeted Behavior Change Communications (BCC) campaign created widespread interest in cultivating the crop both on small and medium scales, for household consumption and to sell surplus production to generate income.

As Q3 ended, the BCC Specialist was working closely with a Tamale-based theater group to produce a video about the use of child labor in AgNRM's targeted Natural Resource Product value chains.

2.4 AgNRM Small Grants Program

During Q3 the grants manager finalized AgNRM's grants manual, a key resource document for implementing AgNRM's small grants program. AgNRM's strategy is to use grants to achieve AgNRM's objectives to build the capacity of targeted CREMAs and develop the targeted value chains by providing matching funds aimed at catalyzing private sector investments, as well as implement multiple-use water systems activities and promote behavior change through innovative communication campaigns.

Five of AgNRM's targeted CREMAs are ready to receive AgNRM's in-kind grants after having completed their Idea Generation Forms (IGF) and a pre-award assessment. The Grants Manager walked the respective CREMA executive committees through a series of questions to ascertain the CREMA's legal status and the robustness of their financial and administrative systems; all five CREMAs received a satisfactory rating.

2.5 Integrating Gender into AgNRM Activities

AgNRM submitted its revised Gender Integration Strategy to USAID|Ghana in Q3; thus shifting the AgNRM team's focus from strategy development to implementation. On-going mentoring activities will help to build strong women leaders who can act as change agents in the CREMA governance structures and in their communities, where opportunities for women playing leadership roles have been limited in the past.

As part of the CREMA constitution review process in Wechiau and during Dorimon's constitution development, leaders were encouraged to ensure adequate female representation in CREMA leadership positions at all levels – both in the CREMA Executive Committee (CEC) and the Community Resource Management Committees (CRMC). The AgNRM team suggested using gender inclusive language that reflects the participation of women in management and leadership positions, along with the possibility of affirmative actions through a female representation quota in the CEC.

The Multiple-Use Water Systems (MUS) training during in May provided an opportunity to highlight gender issues in a deliberate manner to ensure AgNRM's MUS activities adequately address both the productive and time-saving needs of women in the target communities.

3. ACTIVITY PROGRESS BY OUTCOME

The AgNRM team implemented activities across six CREMA landscapes, three in the Black Volta Biodiversity Corridor and three in the Western Biodiversity Corridor. The team emphasized joint planning and integrated implementation across Outcomes.

Outcome I – Increased incomes from natural resource products

Being the dry, non-productive season in northern Ghana, implementation activities during Q3 focused on training and other capacity building activities.

1.1 Natural resource value chains developed

Prepare sector analyses and market systems upgrades. As part of AgNRM's efforts to develop a greater understanding of the prevalence, production, processing and marketing of the project's targeted natural resource products (NRP), four sector analyses were completed during the reporting period: a rapid assessment on the economic potential of the NRPs in the CREMAs,¹ an assessment of value chain financing options, a survey of economic trees in the Black Volta Corridor and an assessment of end market engagements.

The NRP rapid assessment sought to ascertain the production and market feasibility of AgNRM's selected NRPs in the project's targeted CREMAs. The rapid assessment employed six main indices: 1) local market ranking, 2) international market ranking, 3) estimated abundance of each species in the BVC, 4) estimated abundance of each species in the WBC, 5) gestation period and 6) ease of silviculture to rank both selected species and other species growing in the targeted CREMAs. The results of the rapid assessment confirmed that shea, moringa, dawadawa, and tamarind are among the top five most promising and viable NRPs in the selected CREMAs, thereby validating AgNRM's initial NRP selection. Baobab, which ranked second per the six criteria, is another economic tree species that is prevalent and widely exploited in at least some of the AgNRM targeted CREMAs.

AgNRM conducted a field survey of the economic tree species in the project's targeted CREMAs in the Black Volta Corridor to ascertain more complete data about the prevalence of AgNRM's targeted NRPs. The results from the survey substantiate AgNRM's rapid assessment study findings on the commercial potential of the top five NRPs (see economic tree survey data for the Black Volta Corridor in Annex A, p. 23). Data collected reveal that shea and dawadawa are the most important NRPs exploited commercially in AgNRM's targeted Black Volta CREMAs.

The economic tree field survey in the BVC recorded a total of 88,807,500 live trees of the top five species (shea, baobab, dawadawa, tamarind, moringa), 28,412,250 (32%) of which were counted as mature trees and 60,395,250 were counted as 'regenerating' (68%). The survey results indicate that shea is the most common NRP in all three BVC CREMAs, with large numbers of both mature and young trees. Moringa is found in Dorimon and Zukpiri CREMAs, with Zukpiri having a higher density of mature moringa trees. With the notable exception of Zukpiri, tamarind is not common in the BVC.

The tree survey also revealed that just under 50% of the trees are in "poor condition." Several significant threats to the NRPs were identified, including traces of fire on about seven million of the standing individuals and the survey estimated that about five million of the inventoried trees suffer from parasites or other maladies. In Year 3 AgNRM will liaise with Ghana Fire Service to sensitize and train CREMA communities about fire prevention and will collaborate with relevant agencies, including the Cocoa Research Institute of Ghana and the Wildlife Division and the Forest Services

¹ Please refer to AgNRM's draft Shea Roadmap

Division of the Forestry Commission, to employ practical techniques to reduce the incidence of fire, pests and diseases that are destroying these important economic tree species.

Throughout the quarter, the AgNRM team engaged with key NRP actors to discuss the modalities of the various NRP market systems in the targeted CREMAs and to explore how the project can best support the local NRP collectors and processors so they benefit from private sector-led NRP market developments, achieving economies of scale, while also meeting the quality standards required by buyers.

The AgNRM team continued to identify market partners and investors associated with the AgNRM targeted value chains. The project has started the process of linking financial and market partners to NRP collectors and processors in the AgNRM-targeted CREMAs. The team has engaged with Moringa Connect (Accra), Moringa King (Accra) and Bobobo Enterprise (Tamale) to discuss options for producing, processing and marketing moringa both locally and internationally. These enterprises have expressed an interest in investing in moringa in the CREMAs; such partnerships would greatly enhance market access for the growing number of moringa producer groups. MALTI Enterprise (Tamale), a dawadawa processing and exporting company, has expressed interest in working in the CREMAs to support dawadawa collectors to process and market dawadawa. The AgNRM team has identified dawadawa tea and powder as the most economically and nutritionally viable products for CREMA-level development.

Organize and strengthen producer/collector groups. To strengthen NRP groups in the Black Volta CREMAs, 582 people were trained on ways to add value to moringa seeds and leaves. The participants were taught how to make moringa-based products including *tom brown* (i.e., a local porridge), baby food/porridge, soaps, cosmetics and other products. The primary purpose of the training sessions was to expose community members to the wide range of products for which moringa can be used since moringa is a relatively new and little known crop in most communities. The AgNRM team's objective is to expose people to both the economic and nutritional benefits of the moringa plant to stimulate interest in cultivating moringa on their land.

Their new knowledge about moringa products has already yielded positive results. Subsequent to the training, sixty women have started processing and selling moringa-based products in their communities and in the local markets. The women have started earning modest supplementary incomes, allowing them to improve the welfare and nutrition of their respective households. For example, every two days Pokua Solomon, of Dorimon CREMA, invests Ghc 90 and earns Ghc 150 from moringa based laundry soap. Yussif Mamunatu, of Wechiau, summarized the impact the training has made: *"After the training I got some money from our VSLA and started to produce moringa bathing soap. I sell it in my community and at the Wechiau market. I now make about Ghc 50 every week from the sales and I am now planning to expand my business to include laundry soap."* Kasim Sahadatu enthusiastically reported: *"I prepare tom brown [breakfast cereal] and cerelac [infant cereal] and sell it in my community and at the local market, making an average of Ghc 100 a week."* Another training participant, Balkisu Hakim, explained *"I prepare rice with moringa sauce to sell at the community school. School children really enjoy the moringa sauce and I make an average of Ghc 150 every week. Because I have reduced the cost of making the sauce by replacing canned products, such as tomato paste, with moringa leaves, I earn a higher profit."*

As AgNRM moved into the Western Biodiversity Corridor (WBC) CREMAs in Q3, the team began by profiling the communities to determine the appropriate capacity building activities to implement in these communities. By the end of the quarter, the project had reached out to 2,661 beneficiaries in the WBC, including 1,899 women. Thirty-four collector/processor groups have been profiled and 650 members sensitized on moringa production, utilization and storage. The sensitization sessions were part of AgNRM's campaign to raise awareness about the uses of moringa for household consumption and as an income generation activity. In Q4, the WBC beneficiaries will be trained on moringa processing and utilization.

Strengthen market linkages and investment. Moringa Connect, an end buyer for moringa, has agreed to set up a model farm in the Dorimon CREMA, to train interested farmers on best practices for moringa production. The Ghana Permaculture Institute, another end buyer for moringa, facilitated training sessions for 650 beneficiaries in the Western Biodiversity Corridor on the production and use of moringa as part of AgNRM's campaign to raise awareness about moringa. The Institute has assured community members that it is interested in purchasing both moringa seeds and leaves.

A study of value chain financing options conducted in Q3 revealed that access to finance to develop robust and sustainable value chains enterprises is sorely lacking. Based on these findings, the AgNRM team has embarked on designing an NRP business finance strategy to create more opportunities for local producers and collectors and to enhance collaboration between critical stakeholders, including financial intermediaries. AgNRM will also focus on building the capacity of VSLAs through training on financial literacy to enable them to deliver greater value to their members. The team will also continue to explore opportunities to link VSLAs with formal finance providers, with the ultimate objective of establishing a long-term financial relationship between them. A combination of the right financial options, improvements in the quality and quantity of NRPs, and strong market linkages, the collectors and processors of AgNRM's targeted NRP value chains will get the needed boost to grow their local enterprises.

1.2 Increased income from the shea butter value chain

In Q3 107 shea collector/processor groups (against a target of 40 shea groups for FY 2017), from five CREMAs, participated in shea quality trainings using training materials developed by the Global Shea Alliance (GSA). A total of 1,304 individuals, including 1,181 women, participated in the trainings. The training sessions were designed to emphasize the importance of consistent product quality in the

SOTUO AND HER GROUP ARE EXCITED TO LEARN ABOUT MANY ECONOMIC OPPORTUNITIES OF MORINGA



"We are happy to have received the training that will help us improve upon the various uses of the Moringa plant. We can now process Moringa into oil, ointment, liquid and bar soaps to increase our sources of income and eventually take care of our needs," remarked Naa Sotuo at the close of AgNRM's moringa utilization training.

Naa Sotuo, a 32-year-old resident of Bienye, a farming community in the Dorimon CREMA, is receiving support from the USAID AgNRM project. In April 2017, Sotuo participated in a moringa utilization training that provided participants with practical knowledge and techniques for incorporating moringa into daily meal preparation and processing moringa into various cosmetic products such as cream, oil and soap. AgNRM expects that through direct consumption and income gained from sales of moringa products, the training will contribute to improvements in household nutrition in the target CREMAs.

international marketplace and to help the groups to build their capacity to meet these quality standards. The training focused on the proper way to pick, de-pulp, boil, dry, de-husk, sort and store shea kernels. There were practical sessions during which the groups were trained on how to parboil fresh fruits within the stipulated 40 minutes. Every participant was given hard copies of the training manual/pictorial learning materials. The collector groups appreciated the shea quality training and said the information acquired was practical and easy to apply. Most shea collectors in the CREMA communities admitted that, before the training, they did not remove rotten and germinated shea kernels, sand, sticks, stones and other debris before processing their shea kernels. They also had not realized how and where they dried and stored their kernels had such an impact on the quality of the kernels.

In Q4 AgNRM will conduct a survey to ascertain the income collector/processor groups earn from shea.

Develop a comprehensive roadmap for shea sector investments. AgNRM completed a roadmap for the project’s interventions and activities in the shea sector. The document summarizes the existing dynamics in the shea parklands, and examines key aspects of the shea value chain (collection, processing, marketing), as well as articulates more sustainable pathways to develop the shea industry in AgNRM’s targeted CREMAs. The shea roadmap indicates that, across northern Ghana, annual average prices (per ton of dry shea kernel) have risen from US\$150 in 2003 to US\$350 in September 2016. If recent growth in international demand continues and regulatory changes (e.g., the United States and Indian markets) allow Cocoa Butter Equivalent (CBE) use in chocolates, sheanut prices are predicted to reach US\$450 within 3-5 years. With good harvests, current annual sub-regional revenues of over US\$150 million, from shea kernel sales alone, can be expected. With relatively low shea production volumes in Ghana (averaging approximately 50,000-70,000 Sheanut Equivalent Tons (SET)), the shea factories in Ghana usually rely on sheanut imports from neighboring countries to meet capacity. Thus, there are clear opportunities for AgNRM to facilitate a more robust shea value chain that is capable of upscaling production to meet the market shortages in Ghana. AgNRM is holding a roadmap validation workshop with GSA members in Q4.

Maximize opportunities through private sector and collector/processing groups. In this reporting period AgNRM explored both organic and conventional market opportunities for shea kernels and butter. Working closely with Ecocert, a certification body, and Savannah Fruits Company Ltd (SFC),



Shea collectors from Bienye participated in AgNRM’s shea quality training

as the end buyer, AgNRM is supporting 240 women in Zukpiri to complete the rigorous organic certification process. The initial certification process is expected to be completed before the end of FY 2017. On the conventional shea market front, AgNRM is collaborating with GSA and IOI Loders Croklaan to secure a market for the shea kernels women collect and process during the 2017 season. The pilot CREMAs are Zukpiri and Dorimon in the Black Volta Corridor and Moagduri-Wuntanluri-Kuwomssasi (MWK) and Sanyiga-Kassena-Gavara-Kara (SKGK) in the Western Biodiversity Corridor. Under this agreement, Loders will pick truckloads of shea kernel from designated collection points.

Recognizing the shea quantity issue is directly linked to the productivity of northern Ghana’s shea parklands, AgNRM is exploring options for increasing the number of productive shea trees in the project’s targeted CREMAs. AgNRM will help to increase shea production both by encouraging community members to plant more shea trees, using propagation techniques

such as grafting to improve the existing stock and reduce the gestation period, and by improving the pollination of the existing stock. In the coming months AgNRM and the Cocoa Research Institute (CRIG) will collaborate on several activities to promote natural regeneration, as well as enrichment planting methods, to increase the tree density to 25-30 shea trees per hectare. Field sessions on both approaches will commence in the next quarter.

AgNRM started sensitizing communities about the importance of shea pollination, with the bee as pollinating agent, during Q3. Five communities per CREMA have been selected as pilot communities for this intervention. Twenty-five people per community will be trained to manage apiaries to improve shea pollination. Installation of beehives, apiary management and pollination training will commence next quarter. This work compliments Wildlife Division’s beekeeping activities already underway in the Western Biodiversity Corridor under the World Bank-funded Sustainable Land and Water Management Project (SLWMP).

To reduce shea butter contamination from smoke and to improve the health and safety of the shea processors, in April 2017 AgNRM introduced 394 processors from different communities, across the



Adams Zenaibu (left) and Jahanatu Osman (right) processing shea at Wechiau during the InStove demonstration. According to Jahanatu Osman, “the cookstove is fast and does not require a lot of time to do the job!”

Black Volta CREMAs, to InStove’s industrial cookstove. Widespread use of these highly efficient stoves would reduce fire wood consumption, carbon emissions and the quantity of smoke and particulates emitted. One participant, Hadiya from Dorimon, remarked that the stove produced very little heat allowing the women to stand right next to it to stir the shea butter. Aser, from Pase, wanted to know how they could acquire the stoves when she witnessed how little smoke was produced and how little fuelwood was needed. Another participant commented that she had been considering quitting shea processing for both health and safety reasons but the introduction of the new stove from InStove was enough to make her stay.

As part of AgNRM’s efforts to improve the shea value chain, the team contracted the Burn

Design Lab to conduct a study on ways to develop more efficient and safer shea roasters. Key objectives are to reduce smoke emissions, biofuel consumption and address the problem of uneven heat distribution experienced with current shea roasters. The consultants undertook field visits to Wechiau and Zukpiri CREMAs to assess the roasters being used by shea processors. Key issues discussed included the smoke emissions, quantity of fuel used and the weight and size of roasters. The women described how they would like their new roasters to look and made it clear that they are willing to pay for improved roasters. Both InStove and Burn Design Lab have a long-term goal of identifying local partners to manufacture the cookstoves and roasters in Ghana to reduce cost, carbon footprint and improve the capacity of local manufacturers. These activities are key to achieving AgNRM’s performance indicator of number of shea producer groups selling shea butter and kernels that meet international exporting standards as a result of USG assistance.

Outcome 2 – Improved food and nutritional security

In FY 2017|Q3, Climate Smart Agriculture interventions, messaging about the nutritional value of moringa and orange flesh sweet potatoes (OFSP), as well as preparation for field demonstrations were the main activities implemented. Against an annual target of training 500 people in child health and nutrition, 2903 people benefited from nutrition-related training ranging from the importance of dry season gardening for household nutrition to the utilization of vitamin rich OFSP and moringa.

2.1 Intensified and diversified climate smart technologies for production

Farmers in all six CREMAs were sensitized on critical climate smart agriculture (CSA) methods and technologies such as minimum tillage, retention of crop cover, use of drought tolerant varieties as well as the benefits of agroforestry. Beneficiaries of the dry season garden in Dorimon were trained on CSA practices such as the construction of basins as a land preparation technique, use of animal manure as a valuable soil amendment, use of organic insecticides such as neem extracts and hot pepper solutions as well as the importance of timely harvesting. The AgNRM team engaged farmers in all six CREMAs to identify and select 10 sites per CREMA for CSA demonstration activities during the agricultural season. These sites are to serve as learning centers for farmers. In Q4, the focus will be on land preparation and farmer field-level training on CSA methods and technologies.

Promote CA alongside indigenous crops and livestock. AgNRM hosted a Climate Smart Agriculture (CSA) Forum in Wa on June 1, 2017, with the theme of *Achieving Sustainable Development through Climate Smart Agriculture*. This forum created a platform for CSA actors and practitioners to share ideas on the practices and possibilities for scaling up CSA within AgNRM's Zone of Influence. The forum brought together AgNRM stakeholders including the Forestry Commission, Ministry of Agriculture, Ghana National Fire Service, Paramount and Divisional Chiefs, other USAID implementing partners and AgNRM CREMA beneficiaries. Uncontrolled bush burning and indiscriminate tree felling were highlighted as negative practices that are causing widespread degradation. Discussing highlights from the keynote address, a technical expert panel suggested several practices that farmers could adopt to make a difference, including tree planting, use of composting, soil testing, planting early maturing varieties, formation of voluntary fire brigades and educating the population on the negative effects of common practices that contribute to low soil fertility and environmental degradation. Chiefs and farmer representatives who contributed to the discussions pledged their support to the project to join forces in educating their communities on CSA practices. In subsequent years AgNRM plans to organize CREMA level forums so that more farmers can participate and discuss CSA issues specific to their communities.

During the land demarcation exercises, the AgNRM team observed that many of the parcels given to women are of very marginal quality and cannot support crop cultivation before the soil's health is improved. Because few if any of the women can afford to purchase inputs to enrich the soil, AgNRM team members have been training the women to use organic materials they can find locally to improve the soil's health and water retention capabilities using a modified zai pit concept. As a result, some of the women have constructed zai pits along their plot boundaries before planting moringa seeds. In follow up visits the women exclaimed at the zai pits' immediate benefits and said they have been sharing their positive experiences with neighbors and friends.

Promote vegetable gardening. AgNRM established one dry season demonstration garden in FY 2017, which was started in the previous quarter but reached its peak in Q3 at which time most of the vegetables were harvested and consumed. A total of 63 women, drawn from three established women's groups in Dorimon, benefited from this intervention. The women cultivated bean and pumpkin leaves, okra, hibiscus, amaranth and orange flesh sweet potatoes (for vine production). The garden yielded ample produce for household consumption with some surplus for sales. The estimated monetary value of the total bean leaf harvest was Ghc 2,100, with the group selling approximately 25% of the total yield and consuming 75%. The estimated value of the total okra harvest was Ghc 1,920, of which the women sold 50% of the total. The participants were very happy with AgNRM's dry season garden activity; they claimed it allowed them to use fresh vegetables in their meals through much of the dry season, something they have not previously been able to do. In addition, they are proud of producing their own vegetables and to be able to choose from several nutritious crops to prepare more balanced meals for their families.

The filtration and use of grey water for watering gardens in the dry season created excitement and interest among the women in Dorimon. The technology involves the use of fine sand, neem leaves, moringa seeds and plastic water bottles to make a simple but effective filter; the filtered water is

suitable for home garden cultivation and makes efficient use of a vital but scarce resource during the lengthy dry season in northern Ghana.

Support agroforestry systems. AgNRM is promoting moringa as an important crop in the project's promotion of agroforestry in the targeted CREMAs. In this quarter, training and sensitization on moringa planting was carried out across all CREMAs. In collaboration with Moringa Connect, a model moringa farm is being established in the Dorimon CREMA. In the next quarter, a similar model moringa farm is to be established in the Western Biodiversity Corridor, with technical support from the Ghana Permaculture Institute. Farmers have expressed interest in this activity, with 39 farmers in the Black Volta Corridor CREMAs having already prepared and planted moringa on 21 acres of land. Many more farmers are registering for the activity. Next quarter, small moringa plantations will be established in each of the six targeted CREMAs, to serve as learning centers for farmers and as a source of reliable planting material. Moringa will also be incorporated in the CSA demonstration plots during Q4.

Meet domestic and productive water needs. AgNRM conducted a two-week training of project staff on the Multiple-Use water Services (MUS). The training included an overview of MUS, a holistic approach to considering all water needs of a community – from domestic to productive uses. Application of MUS in the targeted CREMA will allow project staff to integrate water budgeting, accounting and management into many of the AgNRM supported activities from water for household use to shea butter processing and dry season garden production. Because of the training, AgNRM team members can now apply rapid assessment techniques such as community mapping, water source surveying and focus group discussions. The acquired skills will enable the AgNRM team to assess water needs throughout the target CREMAs and to identify sustainable solutions and improvements.

2.2 Strengthened capacities to modify and enhance livelihoods and improve nutrition

Food and nutritional insecurity are significant challenges for many rural households in the AgNRM targeted communities. The lack of sufficient nutritional food is especially pronounced in northern Ghana's long dry season. AgNRM project activities are focused on building household resilience by introducing women to time-saving, appropriate technologies to increase their incomes and improve household access to nutritious foods.

Improve access to finance and promote time and labor-saving technologies for women. Since the project's inception, AgNRM has been raising awareness about the importance of savings and investment to improve a household's ability to withstand economic, social and climatic 'shocks.' Considering the isolated nature of project communities, access to mainstream financial services is very limited; thus, Village Savings and Loan Associations (VSLAs) have been identified as the most appropriate and reliable way to improve community member access to financial services. Based on an assessment of the existing VSLAs in the targeted CREMAs, the team determined that VSLAs are an effective mechanism by which micro-businesses can access flexible start-up capital to grow their enterprises.

Activities in Q3 targeted 80 VSLAs in the Wechiau, Dorimon and Zukpiri CREMAs. By the end of the quarter, AgNRM had supported the creation of 16 new VSLAs and trained members of 64 existing VSLAs. Training sessions focused on record keeping and improved meeting management techniques. Through AgNRM's VSLA sensitization, monitoring and profiling work, members expressed a renewed interest in their respective VSLAs; 15 of which increased their weekly savings "share" from Ghc 2 to Ghc 5. Some of the VSLA members said they are intending to invest their savings into stockpiling sheanuts during the collection season, while others want to invest in the processing of moringa based products.

Community sensitization sessions were carried out in the WBC CREMAs to introduce the VSLA concept to 60 groups. In contrast to the CREMA communities in the Black Volta, the VSLA concept is quite new to most communities in the WBC. In the next quarter, the AgNRM team will focus on leveraging credit from formal institutions for CREMA-level entrepreneurs through the development of bankable business plans. The AgNRM team will support project beneficiaries to strengthen their financial and business record keeping skills. Improved record keeping can help inform investment decisions, particularly for credit purposes.



Children enjoyed taste testing the moringa and OFSP dishes their mothers produced during the practical cooking training.

Coordinate with community health centers to promote better nutrition. AgNRM is promoting the cultivation and consumption of Orange Flesh Sweet Potatoes (OFSP) to help households to reduce Vitamin A deficiencies and add to their nutritional diversity. The OFSP is highly nutritious and has clear health benefits for pregnant women, nursing mothers and young children. AgNRM introduced community members in the Black Volta CREMAs to the OFSP through a sensitization program about the cultivation and utilization of the crop.

Women in Dorimon were trained on the nutritional value of the vegetables they produced in their dry season garden and their importance to the household's health and well-being. The women learned how to prepare dishes, which culminated with a cooking demonstration, using the vegetables they had produced in the dry season garden and OFSP that they will cultivate in the upcoming rainy season. A special flour made from orange flesh maize and OFSP (both rich in Vitamin A) was used to prepare a local favorite, *Tou Zafi* (T.Z.). Women with children under five years old were allowed to bring them for the cooking demonstration so the children could taste test the dishes as well. In all, 50 women and 14 children benefited from the practical, hands-on demonstrations. The women expressed appreciation to the project for training them on how to use the vegetables in meal preparation to improve the health and wellbeing of their families.

In addition to home garden vegetables, CREMA community members were trained on the health and nutritional benefits of moringa. During the reporting period, a total of 332 individuals in the three Black Volta CREMAs, including 300 women, were educated on the health and nutritional benefits of the moringa plant. The impact of these informational sessions was bolstered with cooking (and tasting!) demonstrations. The objective of the training sessions was to share knowledge on the nutritional benefits of moringa to encourage both increased production and consumption within their households—especially for children. Follow-up visits with training participants revealed that some of the women had taken the message to heart and were preparing more moringa for their families. The visits also revealed that training participants have shared their new knowledge with group members who had not attended the training. Participants expressed an increased interest to cultivate moringa, and are investing more in their existing moringa trees by pruning them regularly and making real efforts to protect the trees from fire and grazing livestock. Several women have become self-appointed ambassadors of moringa consumption, taking it upon themselves to educate their fellow community members on the nutritional value of moringa.

Other training participants indicated that they are now adding moringa to T.Z., the major staple food that their families eat every day, and were very proud to report their families are routinely eating moringa. Jeriwana Jabia (of Kantu) exclaimed: *"I now cook tom brown with moringa for my family, and I regularly add moringa to T.Z., rice and porridge. I really appreciate the training! It was truly an eye opener."*

AgNRM VSLA MODEL WILL IMPROVE WOMEN'S ACCESS TO FINANCE



Improving access to finance for the rural communities in the Community Resource Management Areas (CREMAs) is crucial for achieving sustainability of CREMA management activities and household resilience. Ordinary community members are unable to access loans from banks due to the absence of secured collateral. This has been an age-old challenge for Donlari Winifred, Secretary of the Suntaado group, and her fellow group members based in Guojuyiri community, Wechiau.

A ray of hope came to the CREMAs in the Black Volta when USAID AgNRM commenced the sensitization, strengthening and formation of old and new Village Saving and Loans Associations (VSLAs), in which the Suntaado group participates. The VSLA model is designed to provide access to self-managed financial services that will enable community members to become financially self-sufficient and capable of investing in diverse income-generating activities. Winifred (far right in photo) sums it up:

“we had no place from where we can borrow money to conduct economic activities that will help us generate more income. Therefore, we were all limited to subsistence farming. With the support from USAID AgNRM, we can now make regular savings into our own ‘bank’, take money from it to do other businesses and pay later without many difficulties.”

The thirty-member Suntaado VSLA group is among sixty-four (64) groups that currently participate in the USAID AgNRM project in the Wechiau CREMA alone. Each member buys weekly shares ranging from Ghc1 to Ghc5 with a total of Ghc 600 shares bought so far. USAID AgNRM is currently working with VSLA groups to create an online database that will be used to manage all VSLA activities, and enable the VSLA groups to join forces and transform themselves into a federation.

Within the same period, OFSP trainings were carried out for 18 communities within the three Western Biodiversity Corridor CREMAs, in which 1,645 people participated, including 1,107 women. The trainings focused on cultivation techniques, the utilization of OFSP in the preparation of different types of meals and proper storage of OFSP. The training sessions stimulated a high level of interest in OFSP production and participants were anxious to get on the list of those who would receive OFSP seed vines in the upcoming planting season.

Outcome 3 – Increased natural resource access and tenure security

AgNRM is working with targeted communities to increase the tenure security for at least 250 individuals or organizations. The project is focusing on strengthening women's access to land and other natural resources to improve their ability to produce nutritious food for their families and earn additional income to support their households.

3.1 Strengthen women's access and rights to land and natural resources

During Q3 AgNRM demarcated 234 parcels of land, including home gardens, agricultural fields and uncultivated land. The demarcations took place in the Zukpiri, Dorimon, Builsa-Yening, Moaduri-Wuntaluri-Kumwusasi CREMAs. Two hundred and twenty-one (221) women had their land parcels demarcated as one important step in their negotiations to formalize their access and use rights. Formalizing women's land rights provides them with the tenure security needed to promote long terms investment on those lands.

AgNRM achieved the quick uptake in negotiating more secure land use agreements by working closely with traditional authorities, leveraging local practices with Ghana's current laws and policies. The team is working hand in hand with traditional land authorities to solicit their knowledge and understanding of resource access and use rights to develop locally acceptable and secure secure resource tenure options for women and other vulnerable groups. This process will ultimately strengthen women and other vulnerable groups' rights and reduce conflicts related to the use and management of land resources.

Women recently trained in "Interest Based Negotiations" are applying their newly acquired knowledge and skills to self-advocate for and broker better resource access arrangements. AgNRM has been guiding women through reiterative engagement and negotiation sessions with traditional leaders and land owners prior to demarcating the land plot. Furthermore, women have realized the importance of inviting all the land owners of the plots bordering their proposed plot to further avoid disputes. If a disagreement or dispute arises, the land demarcation process is suspended until the conflict is resolved.

Identifying and training Community Land Demarcation Volunteers has been an effective approach for increasing community engagement and ownership of the land use negotiation process. The volunteers will also play a role in the community-level land use planning activities in Year 3. To date, sixteen community members, eight of whom are women, have been trained to use Global Positioning System (GPS) devices and other skills needed for land demarcation. These trainees can be used as resource persons for further land demarcation throughout the life of the project and beyond. AgNRM has encouraged the respective CREMA and community-level executive committees to consider adding a Land Use Planning Committee to their governance structures to achieve greater sustainability of the activities. As part of the land demarcation exercise, AgNRM is helping to develop a comprehensive land database, which will be housed and managed within the targeted CREMAs.

Another approach AgNRM has pursued is to identify "Male Champions of Women's Rights." The identified men have demonstrated leadership in supporting women's rights in the CREMA communities. Many of these men have given their own land to women to use for productive purposes and have been supportive of AgNRM's land demarcation work in their communities. Women in Dabozesi (MWK CREMA) have successfully negotiated the right to plant moringa on more than 60 acres of land with the support of several "Male Champions". These women were empowered to obtain use rights to these lands by putting their new "interest based negotiation skills" to use. The women are negotiating with traditional land holders, with support from the male champions, as well as applying their new GPS skills.

WITH FULL TENURE RIGHTS OVER A LAND PARCEL, ALIMA GROWS VEGETABLES IN A HOME GARDEN



Land tenure security for women remains a huge challenge across northern Ghana. This becomes more important in rural communities where the value of land is tied to agricultural productivity. AgNRM is collaborating with traditional authorities and state agencies to improve the situation for women and other marginalized groups in the project targeted Community Resource Management Areas (CREMAs), including the Dorimon landscape in the Black Volta Basin.

Alima Sulemana is a beneficiary of USAID AgNRM's efforts to help women to gain access to productive land; she has secured land from her husband, which she now uses for a household garden. With her land rights secured, Alima is applying knowledge and skills gained from the AgNRM team to improve the plot's soil fertility by creating zai pits, and adding composted organic household waste, mixed with animal droppings, to the soil. With a sense of pride on her face, Alima remarked:

"Thanks to USAID, I now have a secure plot of land for household gardening. I am currently nursing moringa seedlings with plans to grow vegetables. The new technologies are helping me to improve the fertility of the soil so that my crops can grow well."

Alima is among 41 women in Dorimon who have successfully negotiated with their spouses and traditional authorities for more secure land tenure rights, thanks to the USAID AgNRM project.

Newly acquired Alternative Dispute Resolution (ADR) skills, acquired during AgNRM training sessions organized for traditional leaders, women and youth in Q3, have already been put to use to prevent, mediate and resolve resource related conflicts. The chief of Zukpiri, Naa Yienye Ziemah, explained that he applied the skills he learned in the ADR training to negotiate with fishermen to stop using chemicals for fishing. This issue has been an on-going and often contentious challenge in the community; sometimes resulting in violent confrontations. After learning negotiation and mediation

skills, the chief invited the fishermen to discuss the significant health dangers of the use of chemicals for fishing poses to people, livestock and the environment. By all accounts, the fishermen were very surprised at the chief's new issue-based approach and the fishermen promised the chief they would abandon the harmful practice. The chief reflected: "Before the training I saw my role as determining who was right and who was wrong and how much the culprits should be fined. Often disputants left my house still angry at each other. Since the training, I have tried to find win-win solutions and help the disputing parties reconcile."

Women involved in VSLAs, where conflicts between members is common, also reported positive results from applying their new ADR skills. For example, Stella Nuyzala from Zukpiri asked her fellow VSLA members if she could use her mediation skills when chaos broke out in their VSLA meeting after a woman who had failed to repay her loan was brought before the group, reprimanded and charged extra interest as a punishment. After Stella intervened, peace was restored, the fine removed and the woman's debt payment rescheduled. Through the mediation process, the members heard for the first time some of the challenges the defaulter was facing and the group realized helping their fellow VSLA member find real solutions to her challenges, rather than ostracizing her, was a better solution for everyone.

As the AgNRM team began working with the targeted communities to demarcate land plots, it formed Community Land Use Planning Teams (CLPT) to encourage community ownership of the process. The CREMAs will be encouraged to integrate the CLPTs into their management structures. This will ensure that the processes are integrated formally into CREMA land use planning even after the AgNRM project has ended. Currently eight community members, including four females and four males have been trained on the use of GPS devices, the main tool for the land demarcation exercise.

3.2 Develop clear land boundaries for project interventions to avoid conflict

AgNRM has developed a data-collection tool for the land demarcation work within CREMA communities. The tool captures spatial data and information on the tenure status of the land, parties to the agreement (land holder, land user, land owner) and the potential use of the newly registered and demarcated land.

AgNRM's GIS Specialist assisted the Outcome 3 and 4 teams to demarcate lands and map CREMA boundaries. The ongoing land demarcation exercise is aimed at facilitating the formalization of lands to increase the security of tenure over household lands. Within the period under review, 121 parcels/plots totaling 76.6 hectares were successfully digitized and 30 cadastral plans prepared. In addition, maps of each of the three CREMAs in the Black Volta Corridor were completed during Q3.

Especially in the Western Corridor CREMAs, AgNRM will shift its focus from demarcating CREMA boundaries to conducting participatory mapping of community level boundaries.

Outcome 4 – Environmental stewardship strengthened

Working within the GoG's CREMA model, AgNRM is supporting communities to improve natural resource management and add value to local ecosystem conservation efforts through ecosystem services valuation.

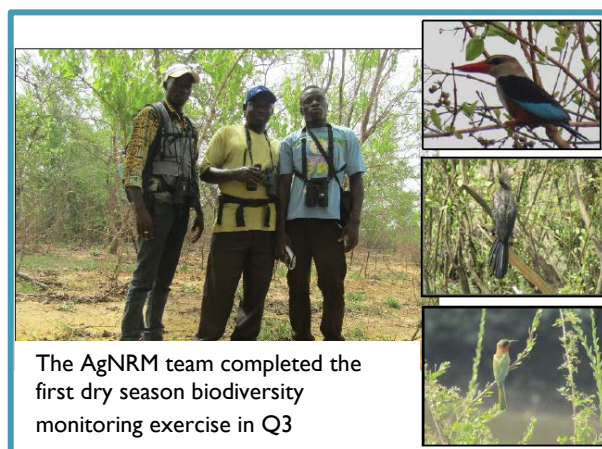
4.1 Improved management and conservation of select CREMAs and biodiversity corridors in the Volta Basin

The Q3 achievements and progress under Outcome 4.1 reflect milestones in AgNRM's objective of building the organizational and human capacity within the targeted CREMAs so that the CREMAs are empowered and capable of managing their natural resource base to meet both their conservation and economic development objectives.

Biodiversity monitoring in CREMA

landscapes. Wechiau completed its dry season biodiversity monitoring of birds and hippos in April, thereby concluding the first dry season monitoring for the Black Volta Basin (see

Figure 1). Analysis of results across the three Black Volta CREMAs reveal:



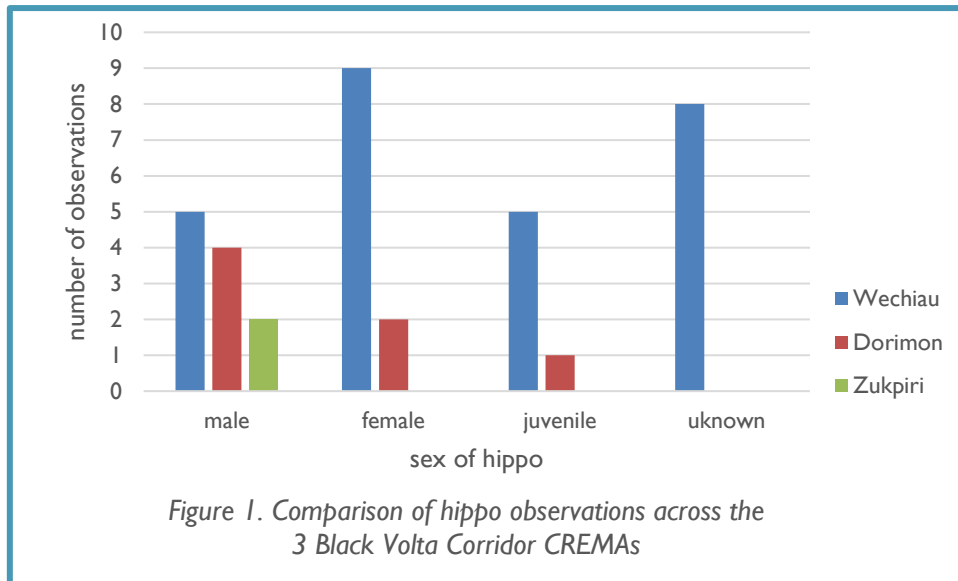
- A total of 134 bird species were recorded. The highest species richness was found in Wechiau, with 106 species out of which 24 species were unique to the CREMA. Zukpiri had a species richness of 90 and Dorimon had 82, with 8 species being unique to the CREMA.
- A total of 36 hippopotamus observations were made across the three CREMAs. Twenty-seven of which were observed along the Wechiau transects, comprised of 5 males, 9 females, 5 juveniles and 8 unknown. Seven hippos were observed along the Dorimon transects, with 4 males, 2 females, and 1 juvenile. In Zukpiri, 2 adult hippos, one male and one female were observed.

When hippo monitoring first started in Wechiau over ten years ago, there were only 6 hippo observations recorded. The fact that 27 hippos were observed in 2017 is a testament to the Wechiau CREMA's conservation success. And the indication that the population is expanding into stretches of the river protected by the Dorimon and Zukpiri CREMAs means that further work and support to these CREMAs could significantly expand the population and secure a much larger area of safe habitation. Continued monitoring across all three CREMAs over the life of this project, and beyond, will be important to monitoring this keystone species.

In future biodiversity monitoring exercises AgNRM will include additional environmental variables to enhance the analysis and permit the team to draw more meaningful conclusions from the data. For example,

- Basic transect features, such as vegetation features (tree density, presence of fruiting trees, closeness of agricultural farms), landscape features (rocky/flat terrain), transect orientation (perpendicular/parallel to river/sun direction), and land use types can easily be recorded.
- Mean climatic conditions such as mean temperature, humidity and rainfall for each CREMA can be sought from third party and included in the analysis.

It will also be useful to collect GPS coordinates of the permanently established transects. These can be incorporated into the maps of the various CREMAs to physically indicate the biomonitoring zones established under the AgNRM project.



Strengthen CREMA organizational structures. Dorimon community members have made great strides toward CREMA formation in a very short period of time. Representatives from the communities that are interested in being part of the new Dorimon Paramountcy Community Resource Management Area have already drafted and adopted their constitution. Thirty-seven communities have established Community Resource Management Committees (CRMC), an activity that has been strongly supported by the resident district assembly representative. In Q3 the CRMC representatives elected the CREMA Executive Committee members, the top tier CREMA governance structure in this nascent CREMA. The support of traditional and local authorities, including representatives from the Dorimon Traditional Council and the Paramount Queen Mother, along with five assembly representatives, has ensured strong buy-in and ownership of the process. Furthermore, AgNRM’s gender integration specialist worked closely with other AgNRM team members and the CREMA representatives to ensure women’s concerns were prioritized and adequately captured in Dorimon CREMA’s constitution development.

Address CREMA sustainability issues. Members of the AgNRM team and the Wildlife Division completed site visits as part of a Strategic Landscape Planning exercise in the Western Biodiversity Corridor. The team is assessing the corridor’s human, wildlife and ecological resources as a first step in developing a corridor-level strategic management plan; a corridor-level landscape plan would provide the foundation on which individual CREMAs can develop their land use and management plans.

4.2 Ecosystem Services Improved

During the quarter, the AgNRM team made significant progress on the Ecosystem Valuation Study. The ecosystem services analysis intends to assess the costs and benefits of landscape change scenarios across northern Ghana. The land uses to be studied were determined through consultation with in-country personnel, and extensive research was conducted to obtain values for variables needed for the water, greenhouse gas, and economic components of the study. Those data and assumptions were then applied to complete the greenhouse gas and water ecosystem service analyses (see Annex B for the analytical work completed to date).

Research. A dedicated effort was made to derive values for key components of the analyses that appropriately reflect land use and conditions in northern Ghana. Through consultation with in-country personnel, internet searches, and review of published literature, the team developed a list of assumptions and values that describe land management practices, including fertilizer application, soil

management, cultivated species, irrigation practices, and carbon stocks contained in different land use types.

Next steps: Application of the ecosystem valuation study. The intention of AgNRM’s ecosystem valuation is to develop a decision support tool useful for CREMA members and relevant stakeholders, that will help in quantifying trade-offs between natural resources management decisions and will inform decision-making on land use, sustainable development and climate change adaptation.

We plan to illustrate the scenarios analyzed in a series of CREMAs-based Ecosystem Services Case Studies. These case studies will apply the decision support tool to a specific land use decision scenario in a CREMA, giving practical examples of how CREMA members can use the decision support tool in their land use and natural resources management process.

An example of how AgNRM’s ecosystem valuation can be used to understand the effect of the four possible land use transitions in the landscape is depicted in Figure 4 of Annex B.

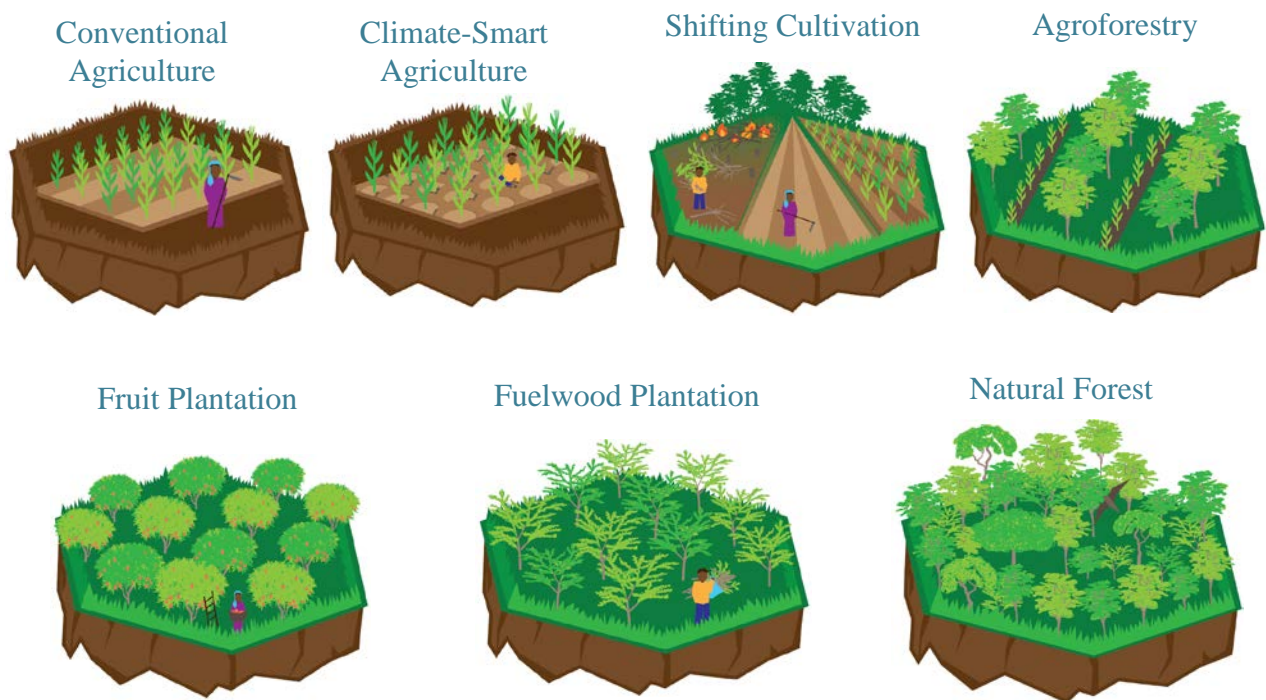


Figure 2. Graphic representations of land uses included in the Ecosystem Valuation Study

4. LESSONS LEARNED DURING REPORTING PERIOD

To improve AgNRM’s collaboration with the Wildlife Division of the Forestry Commission and with SLWMP, AgNRM, WD and the SLWMP management unit have established a protocol of engagement, which includes quarterly meetings and regular review of AgNRM implementation, especially in the Western Biodiversity Corridor, where AgNRM is implementing activities in the same areas the SLWMP has been working since 2011.

5. REPORTED RESULTS FOR FY 2017|Q3

At the end of FY2017|Q3, over 3,800 individual project beneficiaries had received one or more trainings, representing over 190% achievement of AgNRM's FY target for number of individuals who have received USG supported short-term agricultural sector or food security training. Out of the 3,810 beneficiaries, 2,313 of them received trainings on child health and nutrition, exceeding the target by over 400%. About 80% of the beneficiaries were women. These participants included most of those who benefited from trainings in the previous quarters.

Indicator Number	Indicator/Disaggregation	FY17 Target	FY17 Actuals				Comments
			Q1	Q2	Q3	Q4	
Cross Cutting							
9. Custom	Number of people trained in child health and nutrition through USG-supported programs	500					
	Male			463	551		
	Female			982	1762		
	Total			1445	2313		
15. EG.3.2-1	Number of individuals who have received USG supported short-term agricultural sector or food security training (RAA) (WOG)	2,000					
	Producers		306	2954	3810		
	People in private sector firms		18	35			
	People in civil society			8			
	People in government			4			
	Male		183	941	655		
	Female		141	2060	3155		
	Total		324	3001	3810		
20. Custom	Number of people trained in sensitization to child labor practices	600					
	Male						
	Female						
	Total		0	0	0		

6. PLANNED ACTIVITIES FOR THE NEXT REPORTING PERIOD

Please refer to Annex E for a Gantt chart of FY 2017|Q4 activities highlighted.

7. PROJECT EXPENDITURES AND PROJECTIONS – Q3 & Q4

Budget Line Item	FY 2017 Q3 Expended	FY 2017 – Quarter 4 Projected			TOTAL FY 2017 (projected)
		July	August	September	
Direct	\$608,754.33	\$434,242	\$339,902	\$412,430	\$3,054,633.07
Indirect	\$189,537.53	\$67,970	\$92,355	\$91,822	\$809,081.91
Total	\$798,291.86	\$502,212	\$432,257	\$504,252	\$3,863,714.98

Annex A. Economic Tree Survey in AgNRM-targeted CREMAs

The most common economic tree species – survey results for AgNRM Black Volta Corridor targeted CREMAs:

Local name	Scientific name	Zukpiri		Dorimon		Wechiau	
		Mature	Regenerating	Mature	Regenerating	Mature	Regenerating
Shea	<i>Vitellaria paradoxa</i>	4,777,500	2,079,000	1,173,375	2,638,125	2,268,000	14,028,000
Dawadawa	<i>Parkia biglobosa</i>	409,500	304,500	78,750	118,125	-	-
Moringa	<i>Moringa oleifera</i>	-	441,000	212,625	606,375	-	-
Tamarind	<i>Tamarindus indica</i>	546,000	966,000	-	-	-	-
Baobab	<i>Adansonia digitata</i>	178,500	273,000	7,875	23,625	-	-
Balanites	<i>Balanites aegyptiaca</i>	756,000	178,500	70,875	86,625	336,000	-
Yellow berry	<i>Saba senegalensis</i>	63,000	10,500	7,875	31,500	-	-
Mango	<i>Mangifera indica</i>	-	73,500	362,250	456,750	12,000	-
Red berry	<i>Ximenia americana</i>	84,000	168,000	7,875	7,875	-	-
Black berry	<i>Vitex doniana</i>	126,000	273,000	15,750	15,750	-	-
Ebony	<i>Diospyros mespiliformis</i>	409,500	1,606,500	86,625	181,125	-	-

Source: AgNRM Economic Tree Field Survey (2017)

Annex B. Ecosystem Valuation Study – Land Use Transitions Analysis

To frame the Ecosystem Valuation Study analysis, a land use change matrix was developed that illustrates the complete set of land use changes considered in the Study. The matrix is shown below:

From \ To	Bare land	Conventional Agriculture	CSA- Manure	CSA- Mulching	CSA- Ripper	CSA- Stone Ridging	Agroforestry	SC - 5 year fallow	SC - 10 year fallow	Mango Plantation	Cashew Plantation	Fuelwood Plantation	Natural Forest
Bare land													
Conventional Agriculture													
CSA - Manure													
CSA - Mulching													
CSA - Ripper													
CSA -Stone Ridging													
Agroforestry													
SC - 5 year fallow													
SC - 10 year fallow													
Mango Plantation													
Cashew Plantation													
Fuelwood Plantation													
Natural Forest													

Figure 1. Land Use Change Matrix (CSA is Climate-Smart Agriculture; SC is Shifting Cultivation)

Research:

A dedicated effort was made to derive values for key components of the analyses that appropriately reflect land use and conditions in northern Ghana. Through consultation with in-country personnel, internet searches, and review of published literature, the team developed a list of assumptions and values that describe land management practices, including fertilizer application, soil management, cultivated species, irrigation practices, and carbon stocks contained in different land use types.

These assumptions were used to develop the following land use change scenarios for northern Ghana:

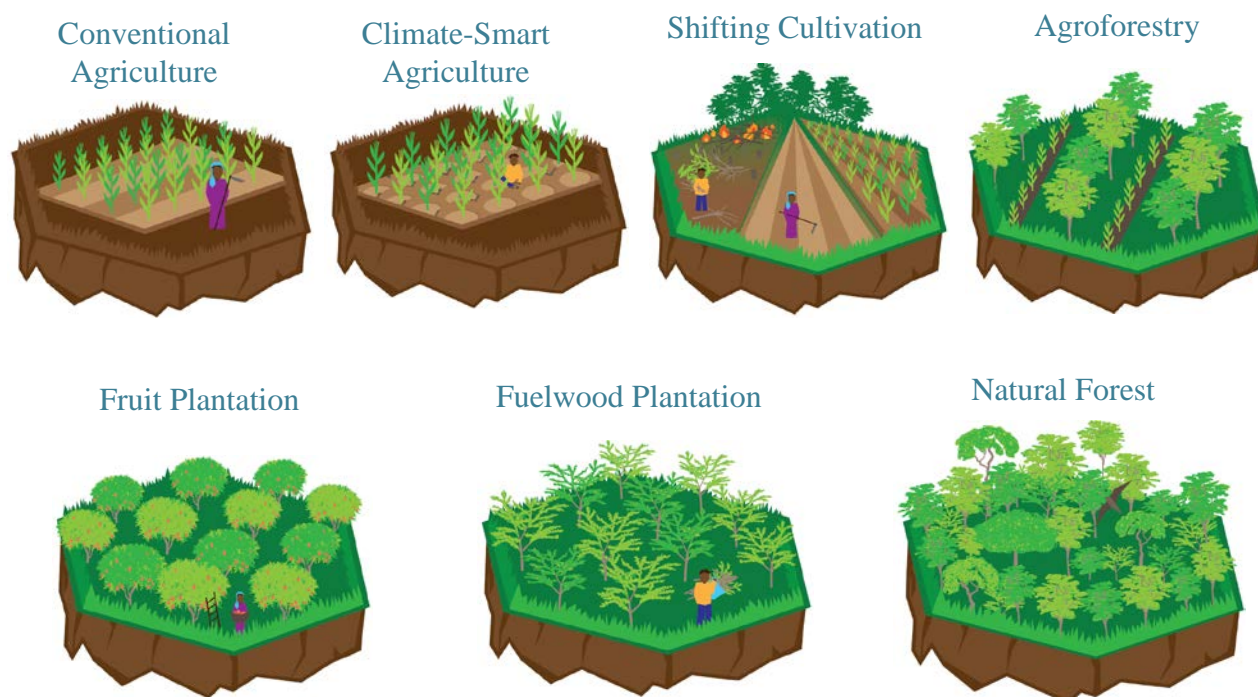


Figure 2. Graphic representations of land uses included in the Ecosystem Valuation Study

The assumptions of these scenarios are, briefly, a conventional agriculture of maize crops under tillage and fertilizer application; a Climate-Smart Agriculture that considers manure application, mulching, stone ridging, ripper till, and agroforestry; a shifting cultivation scenario considers a cycle of 5 or 10 years of fallow land followed by 2 years of conventional agriculture; and a fruit plantation of mango or cashew plantations while fuelwood plantations consist on Acacia and Cassia.

Under these land uses, our team started evaluating the effect on water, greenhouse gas emissions, and economy of the following land use change transitions, appropriate for Northern Ghana:

Transition Scenario 1: Use of natural or fallow areas for fuelwood;

Transition Scenario 2: Planting woodlots or plantations;

Transition Scenario 3: Converting natural or fallow land to agriculture;

Transition Scenario 4: Transitioning from conventional agriculture to climate-smart agriculture.

The analyses of these transitions are based on indicators of key ecosystem values. These indicators are represented below:

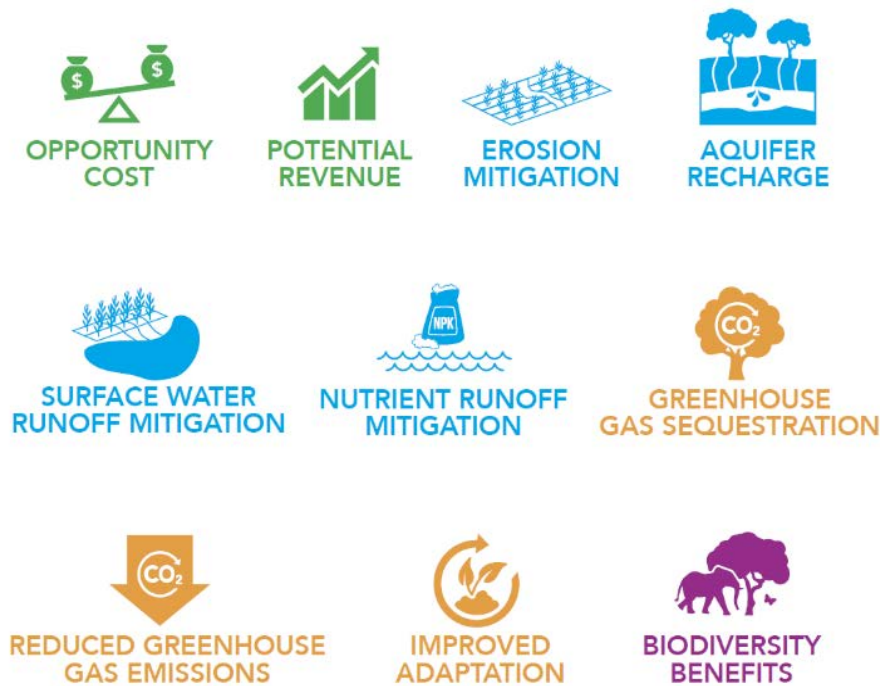


Figure 3. Graphical representation of ecosystem values. Green indicators represent economic ecosystem values, blue indicators represent water ecosystem values, orange indicators are climatic or greenhouse gases, and the purple indicator is the biodiversity ecosystem value.

To improve and strengthen the final presentation of the Ecosystem Valuation Study results, Winrock International’s communications team was engaged to develop the graphics presented in Figure 2 and Figure 3. The Winrock communications team has also committed to providing further support to the presentation of the Ecosystem Valuation Study in designing and formatting the final product, to be delivered in Q4.

Detailed information about each valuation component of the ecosystem under the land use change transitions:

- **Water Analysis:** Using maps of soil, terrain, and land cover types, the Soil and Water Assessment Tool (SWAT) was used to estimate the impact of land use change on rates of surface runoff, nutrient runoff, sediment yield, and groundwater recharge. These four indicators were estimated generally at the per hectare level. The matrices 1 through 4 in the Annex show the results of the water analysis. Changes highlighted in green in these matrixes represent a land use change that causes an increase in the ecosystem service provided, whereas changes highlighted in red represent a decrease.
- **Economic Analysis:** An economist was hired to conduct the economic analysis of land use change, including an assessment of opportunity costs and potential revenue. His assessment is currently underway, supported by an in-country economist who is helping to supply key data for the analysis and ensure it appropriately captures the economic impact of land use changes in northern Ghana. The Winrock team has worked in close collaboration with the economist to ensure the research conducted by the economist is in agreement with assumptions and land use changes considered in the other components of the Ecosystem Valuation Study. The economic analysis is expected to be completed by the end of Q4 (Sept. 2017).

- **Greenhouse Gas Analysis:** The greenhouse gas impact of land use changes was assessed by applying the IPCC stock change approach. Annual emissions of carbon removals were estimated for each land use transition, including emissions/removals from vegetation, fertilizer use, and soil management. For land uses that include significant tree cover (agroforestry, fruit plantations, fuelwood plantation, and natural forest), emissions for the first year after transition were estimated in addition to annual emissions in subsequent years to capture the significant initial losses of carbon associated with the removal of trees. Results are summarized in the land use change matrix 5 on the Annex, and the estimated emissions for the first year after transition are indicated in yellow.

Next steps: Application of the ecosystem valuation study:

The intention of this ecosystem valuation is to develop a **decision support tool** useful for CREMA members and relevant stakeholders, that will help in quantifying trade-offs between natural resources management decision and will inform decision-making on land use, sustainable development, and climate change adaptation.

We plan to illustrate the scenarios analyzed in a series of CREMAs-based **Ecosystem Services Case Studies**. These Case Studies will apply the decision support tool to a specific land use decision scenario in a CREMA, giving practical examples of how CREMA members can use the decision support tool in their land use and natural resources management process.

An example of how our ecosystem valuation can be used to understand the effect of the 4 possible land use transitions in the landscape is depicted in Figure 4. This figure shows how each land use transition has a positive or negative effect on the ecosystem indicators listed in Figure 3. The size of the arrows in Figure 4 represent a qualitative assessment of the magnitude of the impact.

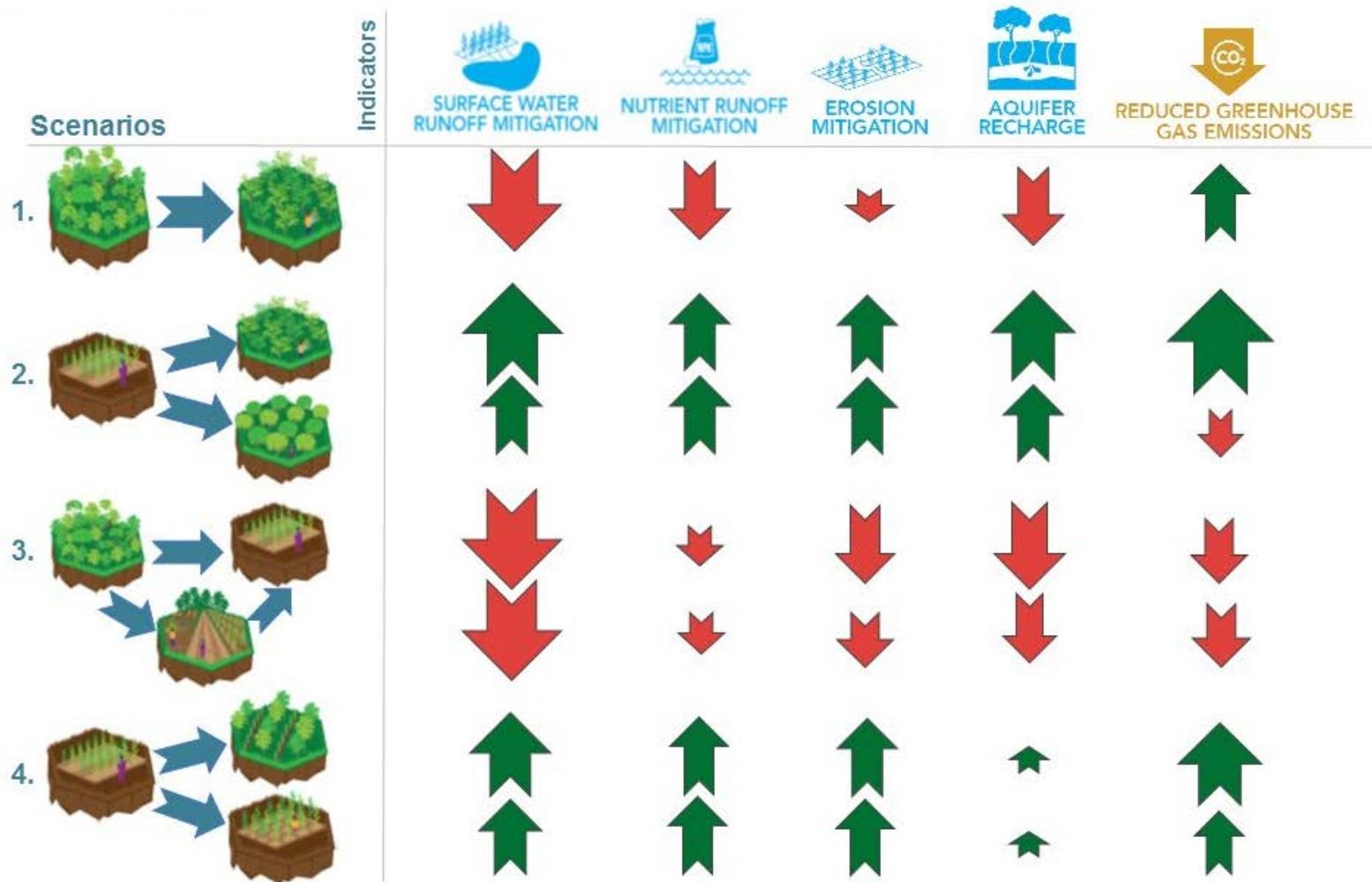


Figure 4. Graphical representation of the effect of land use transitions on the water and greenhouse gas indicators included in the ecosystem valuation. Green arrows represent a positive change in the indicator after the transition, while red arrows represent a negative change. The size of the arrow represents qualitatively the expected magnitude of the change.

Land use transition analyses

1. Results of Nutrient Runoff Analysis (kg/ha):

To From	<i>Bare land</i>	<i>Permanent Agriculture, Conventional</i>	<i>CSA Manure</i>	<i>CSA Mulching</i>	<i>CSA Ripper</i>	<i>CSA Stone Ridging</i>	<i>Agroforestry</i>	<i>SC - 5 year fallow</i>	<i>SC - 10 year fallow</i>	<i>Mango Plantation</i>	<i>Cashew Plantation</i>	<i>Fuelwood Plantation</i>	<i>Natural Forest</i>
<i>Bare land</i>		-0.68	-0.32	-0.71	-0.68	-0.75	-0.82	-0.83	-0.84	-0.82	-0.82	-0.84	-0.85
<i>Permanent Agriculture, Conventional</i>	0.68		0.36	-0.03	0.00	-0.07	-0.14	-0.15	-0.16	-0.14	-0.14	-0.17	-0.17
<i>CSA Manure</i>	0.32	-0.36		-0.39	-0.36	-0.43	-0.50	-0.51	-0.52	-0.50	-0.50	-0.53	-0.53
<i>CSA Mulching</i>	0.71	0.03	0.39		0.03	-0.05	-0.11	-0.12	-0.14	-0.11	-0.11	-0.14	-0.15
<i>CSA Ripper</i>	0.68	0.00	0.36	-0.03		-0.07	-0.14	-0.15	-0.16	-0.14	-0.14	-0.17	-0.17
<i>CSA Stone Ridging</i>	0.75	0.07	0.43	0.05	0.07		-0.07	-0.07	-0.09	-0.07	-0.07	-0.09	-0.10
<i>Agroforestry</i>	0.82	0.14	0.50	0.11	0.14	0.07		-0.01	-0.02	0.00	0.00	-0.03	-0.03
<i>SC - 5 year fallow</i>	0.83	0.15	0.51	0.12	0.15	0.07	0.01		-0.02	0.01	0.01	-0.02	-0.03
<i>SC - 10 year fallow</i>	0.84	0.16	0.52	0.14	0.16	0.09	0.02	0.02		0.02	0.02	0.00	-0.01
<i>Mango Plantation</i>	0.82	0.14	0.50	0.11	0.14	0.07	0.00	-0.01	-0.02		0.00	-0.03	-0.03
<i>Cashew Plantation</i>	0.82	0.14	0.50	0.11	0.14	0.07	0.00	-0.01	-0.02	0.00		-0.03	-0.03
<i>Fuelwood Plantation</i>	0.84	0.17	0.53	0.14	0.17	0.09	0.03	0.02	0.00	0.03	0.03		-0.01
<i>Natural Forest</i>	0.85	0.17	0.53	0.15	0.17	0.10	0.03	0.03	0.01	0.03	0.03	0.01	

2. Results of Surface Water Analysis (mm):

To From	<i>Bare land</i>	<i>Permanent Agriculture, Conventional</i>	<i>CSA Manure</i>	<i>CSA Mulching</i>	<i>CSA Ripper</i>	<i>CSA Stone Ridging</i>	<i>Agroforestry</i>	<i>SC - 5 year fallow</i>	<i>SC - 10 year fallow</i>	<i>Mango Plantation</i>	<i>Cashew Plantation</i>	<i>Fuelwood Plantation</i>	<i>Natural Forest</i>
<i>Bare land</i>		-214.7	-215.1	-253.5	-214.7	-305.1	-310.2	-378.2	-403.5	-310.2	-310.2	-420.3	-430.3
<i>Permanent Agriculture, Conventional</i>	214.7		-0.4	-38.8	0.0	-90.4	-95.5	-163.5	-188.8	-95.5	-95.5	-205.6	-215.5
<i>CSA Manure</i>	215.1	0.4		-38.3	0.4	-90.0	-95.1	-163.0	-188.4	-95.1	-95.1	-205.2	-215.1
<i>CSA Mulching</i>	253.5	38.8	38.3		38.7	-51.7	-56.8	-124.7	-150.0	-56.8	-56.8	-166.9	-176.8
<i>CSA Ripper</i>	214.7	0.0	-0.4	-38.7		-90.4	-95.5	-163.5	-188.8	-95.5	-95.5	-205.6	-215.5
<i>CSA Stone Ridging</i>	305.1	90.4	90.0	51.7	90.4		-5.1	-73.0	-98.3	-5.1	-5.1	-115.2	-125.1
<i>Agroforestry</i>	310.2	95.5	95.1	56.8	95.5	5.1		-68.0	-93.3	0.0	0.0	-110.1	-120.0
<i>SC - 5 year fallow</i>	378.2	163.5	163.0	124.7	163.5	73.0	68.0		-25.3	68.0	68.0	-42.2	-52.1
<i>SC - 10 year fallow</i>	403.5	188.8	188.4	150.0	188.8	98.3	93.3	25.3		93.3	93.3	-16.9	-26.8
<i>Mango Plantation</i>	310.2	95.5	95.1	56.8	95.5	5.1	0.0	-68.0	-93.3		0.0	-110.1	-120.0
<i>Cashew Plantation</i>	310.2	95.5	95.1	56.8	95.5	5.1	0.0	-68.0	-93.3	0.0		-110.1	-120.0
<i>Fuelwood Plantation</i>	420.3	205.6	205.2	166.9	205.6	115.2	110.1	42.2	16.9	110.1	110.1		-9.9
<i>Natural Forest</i>	430.3	215.5	215.1	176.8	215.5	125.1	120.0	52.1	26.8	120.0	120.0	9.9	

3. Results of Sediment Yield Analysis (t/ha):

From \ To	<i>Bare land</i>	<i>Permanent Agriculture, Conventional</i>	<i>CSA Manure</i>	<i>CSA Mulching</i>	<i>CSA Ripper</i>	<i>CSA Stone Ridging</i>	<i>Agroforestry</i>	<i>SC - 5 year fallow</i>	<i>SC - 10 year fallow</i>	<i>Mango Plantation</i>	<i>Cashew Plantation</i>	<i>Fuelwood Plantation</i>	<i>Natural Forest</i>
<i>Bare land</i>		-25.4	-27.3	-38.8	-25.5	-37.8	-39.1	-34.9	-38.1	-39.1	-39.1	-39.7	-39.9
<i>Permanent Agriculture, Conventional</i>	25.4		-1.9	-13.4	-0.1	-12.4	-13.6	-9.4	-12.6	-13.6	-13.6	-14.3	-14.4
<i>CSA Manure</i>	27.3	1.9		-11.5	1.8	-10.5	-11.8	-7.6	-10.8	-11.8	-11.8	-12.4	-12.6
<i>CSA Mulching</i>	38.8	13.4	11.5		13.3	1.0	-0.2	4.0	0.8	-0.2	-0.2	-0.9	-1.0
<i>CSA Ripper</i>	25.5	0.1	-1.8	-13.3		-12.3	-13.5	-9.3	-12.5	-13.5	-13.5	-14.2	-14.3
<i>CSA Stone Ridging</i>	37.8	12.4	10.5	-1.0	12.3		-1.3	2.9	-0.3	-1.3	-1.3	-1.9	-2.1
<i>Agroforestry</i>	39.1	13.6	11.8	0.2	13.5	1.3		4.2	1.0	0.0	0.0	-0.6	-0.8
<i>SC - 5 year fallow</i>	34.9	9.4	7.6	-4.0	9.3	-2.9	-4.2		-3.2	-4.2	-4.2	-4.8	-5.0
<i>SC - 10 year fallow</i>	38.1	12.6	10.8	-0.8	12.5	0.3	-1.0	3.2		-1.0	-1.0	-1.6	-1.8
<i>Mango Plantation</i>	39.1	13.6	11.8	0.2	13.5	1.3	0.0	4.2	1.0		0.0	-0.6	-0.8
<i>Cashew Plantation</i>	39.1	13.6	11.8	0.2	13.5	1.3	0.0	4.2	1.0	0.0		-0.6	-0.8
<i>Fuelwood Plantation</i>	39.7	14.3	12.4	0.9	14.2	1.9	0.6	4.8	1.6	0.6	0.6		-0.2
<i>Natural Forest</i>	39.9	14.4	12.6	1.0	14.3	2.1	0.8	5.0	1.8	0.8	0.8	0.2	

4. Results of Groundwater Recharge Analysis (mm):

To From	<i>Bare land</i>	<i>Permanent Agriculture, Conventional</i>	<i>CSA Manure</i>	<i>CSA Mulching</i>	<i>CSA Ripper</i>	<i>CSA Stone Ridging</i>	<i>Agroforestry</i>	<i>SC - 5 year fallow</i>	<i>SC - 10 year fallow</i>	<i>Mango Plantation</i>	<i>Cashew Plantation</i>	<i>Fuelwood Plantation</i>	<i>Natural Forest</i>
<i>Bare land</i>		52.4	54.9	81.4	52.4	125.2	78.4	251.4	287.6	78.4	78.4	269.4	302.7
<i>Permanent Agriculture, Conventional</i>	-52.4		2.5	29.0	0.0	72.7	26.0	198.9	235.1	26.0	26.0	217.0	250.3
<i>CSA Manure</i>	-54.9	-2.5		26.5	-2.4	70.3	23.5	196.5	232.7	23.5	23.5	214.5	247.9
<i>CSA Mulching</i>	-81.4	-29.0	-26.5		-29.0	43.7	-3.0	169.9	206.1	-3.0	-3.0	188.0	221.3
<i>CSA Ripper</i>	-52.4	0.0	2.4	29.0		72.7	26.0	198.9	235.1	26.0	26.0	217.0	250.3
<i>CSA Stone Ridging</i>	-125.2	-72.7	-70.3	-43.7	-72.7		-46.7	126.2	162.4	-46.7	-46.7	144.3	177.6
<i>Agroforestry</i>	-78.4	-26.0	-23.5	3.0	-26.0	46.7		172.9	209.1	0.0	0.0	191.0	224.3
<i>SC - 5 year fallow</i>	-251.4	-198.9	-196.5	-169.9	-198.9	-126.2	-172.9		36.2	-172.9	-172.9	18.1	51.4
<i>SC - 10 year fallow</i>	-287.6	-235.1	-232.7	-206.1	-235.1	-162.4	-209.1	-36.2		-209.1	-209.1	-18.1	15.2
<i>Mango Plantation</i>	-78.4	-26.0	-23.5	3.0	-26.0	46.7	0.0	172.9	209.1		0.0	191.0	224.3
<i>Cashew Plantation</i>	-78.4	-26.0	-23.5	3.0	-26.0	46.7	0.0	172.9	209.1	0.0		191.0	224.3
<i>Fuelwood Plantation</i>	-269.4	-217.0	-214.5	-188.0	-217.0	-144.3	-191.0	-18.1	18.1	-191.0	-191.0		33.3
<i>Natural Forest</i>	-302.7	-250.3	-247.9	-221.3	-250.3	-177.6	-224.3	-51.4	-15.2	-224.3	-224.3	-33.3	

5. Results of Greenhouse Gas Analysis (t CO₂e/ha/y). Yellow cells represent greenhouse gas emissions/removals occurring in the first year after change due to the removal of trees:

To From	Bare land		Permanent Agriculture, Conventional		CSA Manure		CSA Mulching		CSA Ripper		CSA Stone Ridging		Agroforestry - Moringa		SC - 5 year fallow		SC - 10 year fallow		Mango Plantation		Cashew Plantation		Fuelwood Plantation		Natural Forest	
Bare land			-4.3		0.9		-5.1		-5.1		-5.1		-21.9		-18.8		-20.6		2.7		-6.8		-72.0		-26.5	
Permanent Agriculture, Conventional	10				5.2		-0.8		-0.8		-0.8		-17.6		-14.5		-16.3		7.0		-2.5		-67.7		-30.4	
CSA Manure	2.6		-5.2				-6.0		-6.0		-6.0		-22.8		-19.7		-21.5		1.8		-7.7		-72.9		-30.0	
CSA Mulching	10.2		0.8		6.0				0.00		0.00		-16.8		-13.75		-15.6		7.8		-1.7		-65.4		-22.5	
CSA Ripper	10.2		0.8		1.2		0.00				0.00		-16.8		-13.8		-15.6		7.8		-1.7		-65.4		-22.5	
CSA Stone Ridging	10.2		0.8		6.0		0.00		0.00				-16.8		-13.8		-15.6		7.8		-1.7		-65.0		-20.8	
Agroforestry - Moringa	525.9	23.2	520.2	17.6	525.5	22.8	519.5	16.8	519.5	16.8	519.5	16.8			505.7	3.1	503.9	1.2	527.3	24.6	517.7	15.1	452.5	-50.2	501.4	-1.3
SC - 5 yr fallow	21.0		14.2		19.4		13.4		13.4		13.4		-3.4				-4.7		21.2		11.7		-53.6		-8.0	
SC - 10 yr fallow	22.8		16.0		21.2		15.2		15.2		15.2		-1.6		-1.1				23.0		13.5		-51.8		-6.2	
Mango Plantation	136.7	-1.4	131.1	-7.0	136.3	-1.8	130.3	-7.8	130.3	-7.8	130.3	-7.8	113.5	-24.6	116.6	-21.5	114.7	-23.3			128.6	-9.5	63.3	-74.7	108.9	-29.2
Cashew Plantation	143	8.1	137.3	2.5	142.6	7.7	136.6	1.7	136.6	1.7	136.6	1.7	119.8	-15.1	122.8	-12.0	121.0	-13.8	144.4	9.5			69.6	-65.2	115.2	-19.7
Fuelwood Plantation	73.8	19.5	68.2	13.4	73.4	19.0	67.4	13.1	67.4	13.1	67.4	13.5	50.6	-17.3	53.6	-0.7	51.8	-2.5	75.2	20.8	65.7	11.3			13.5	-8.4
Natural Forest	85.3	29.0	78.4	22.2	83.6	27.4	77.7	21.4	77.7	21.4	77.7	21.4	60.9	4.6	63.9	7.7	62.1	5.8	85.4	29.2	75.9	19.7	10.7	-45.6		

Annex C. AgNRM Operations Actions FY 2017|Q3

No.	Action Item	Completion Date
1.	Deliberations and signing of MoUs in two Black Volta Corridor CREMAs	June 21-23, 2017
2.	Initial AgNRM key stakeholder meeting in the Eastern Biodiversity Corridor, Bolgatanga	June 28, 2017
3.	Revised AgNRM Grants Manual	Submitted to USAID on June 23, 2017
4	Monthly AgNRM Technical Team Planning Meeting	June 19, 2017
5	Revised AgNRM Gender Integration Strategy	Submitted to USAID on May 30, 2017
6.	Revised AgNRM Communications Strategy	Submitted to USAID on June 8, 2017
7.	USAID Mission Director Site Visit (Dorimon)	May 9, 2017
8.	AgNRM – Wildlife Division Meeting	June 21, 2017
9.	<i>Inside NGO Training on USAID Rules and Regulations: Grants and Cooperative Agreements – DCOP, Senior HR and Operations Manager</i>	June 12-14, 2017
10.	<i>Inside NGO Training on Procurement Planning and Execution: USAID Grants and Cooperative Agreements – Finance Manage, Procurement Officer, Senior HR and Operations Manager</i>	June 15-16, 2017

Annex D. AgNRM Staffing – FY 2017 | Q3

No.	Title	AgNRM Partner Institution	Name	Status on March 31, 2017
1	Chief of Party (COP) – Key Personnel	Winrock	Julie E. Fischer	At post
2	Deputy Chief of Party (DCOP) and Technical Office Chief – Key Personnel	Winrock	Patrick Adjewodah	At post
3	Governance, Land & Conflict (GL&C) Specialist – Key Personnel	Winrock	Martin Yelibora	At post
4	M&E Director	Winrock	Emmanuel Morna	Assumed post on May 2, 2017
5	Senior Finance Manager	Winrock	Antoinette Akanlise	At post
6	Management Information Specialist and Information Technology (MIS/IT) Specialist	Winrock	Eric Yartey	At post
7	Accountant	Winrock	Margaret Oketola	At post
8	Senior Operations and Human Resources Manager	Winrock	Baptista Sarah Gebu	At post
9	Procurement Officer	Winrock	Joyce Adongma Abugre	At post
10	Administrative Assistant	Winrock	Diana Donkoh	At post
11	Communications Director	Winrock	Abdul Wahab Gibrilu	At post
12	Gender Integration Specialist	Winrock	Diana Ndego	At post
13	Behavior Change Communications Specialist	Winrock	Abdul-Wahab Musah	At post
14	Grants Manager	Winrock	Modesta Asooh	At post
15	Geographic Information Systems Specialist	Winrock	Eric Forson	At post

16	Natural Resource Management/Multiple Use Water Systems Specialist	Winrock	Bright Boye Kumordzi	Assumed post on April 3, 2017
17	Driver	Winrock	Michael Boakye	At post
18	Driver	Winrock	Julius Akolibila	At post
19	Driver	Winrock	Abdulai Seidu	At post
20	Driver	Winrock	Kyei Baffour	To assume post on August 7, 2017
21	Driver	Winrock	Zakaria Asaah	At post
22	Driver	Winrock	Issah Ahmed	At post
23	M&E Officer	Winrock	David Oppong	Assumed post on May 2, 2017
24	M&E Officer	Winrock	Nelson Osei	Assumed post on May 2, 2017
25	Finance and Administrative Officer	Winrock	Musah Wuniche Abukari	To assume post on August 7, 2017
26	Outcomes 1 & 2 Team Leader	TechnoServe	Kpebesaan Delle	To assume post on July 17, 2017
27	Value Chain Expert (VCE) – Key Personnel	TechnoServe	Abdulai Abdul Nafeo	At post
28	Food Security and Agronomy (FS&A) Expert – Key Personnel	TechnoServe	Stella Obanyi-Brobbe	To assume post on July 17, 2017
29	Market Strengthening Lead (MSL)	TechnoServe	Ruth Wallace	At post
30	Business Advisor	TechnoServe	Patricia Layo Matey-Akuffo	At post
31	Business Advisor	TechnoServe	Owusu Sampah	At post
32	Business Advisor	TechnoServe	Eric Ayamga	At post
33	Business Advisor	TechnoServe	Felix Ayambire	At post
34	Business Advisor	TechnoServe	James Kpengoy Dakora	At post
35	Business Advisor	TechnoServe	Christian Koduah	At post
36	Business Advisor	TechnoServe	Erik Heinno Botir	At post

37	Senior Business Advisor, Collector Groups	TechnoServe	Michael Kweku Dorgor	At post
38	Nutrition & Economic Empowerment Expert	TechnoServe	Christiana Yakubu	At post
39	Finance Lead	TechnoServe	Philemon Sumbo	At post
40	Business Advisor	TechnoServe	Joseph Addah Kantuwine	At post
41	Field Officer	NCRC	Thomas Awini	At post
42	Field Coordinator	NCRC	Haruna Eluysu	At post
43	Field Officer	NCRC	Sulamana Bawa	At post
44	Field Officer	NCRC	Dorcas Akanlugwai	At post
45	Team leader	CECOTAPS	Clement Aapengnuo	At post - Damongo
46	Programs Officer	CECOTAPS	Frank Dugasseh Akowuge	At post - Damongo
47	Field Officer	CECOTAPS	Bede Anyoka	At post – Damongo
48	Field Officer	CECOTAPS	Alpius Dery	At post – Damongo
49	M&E Officer	CECOTAPS	Anita Zimpah	At post – Damongo
50	Field Officer/ Communications	CECOTAPS	Richard Forgor	At post - Damongo
51	Finance Officer	CECOTAPS	Medrid Donneyong	At post – Damongo
52	Secretary	CECOTAPS	Felicity Aburiya	At post - Damongo
53	Cashier/ Reception	CECOTAPS	Juliana Kpeno	At post – Damongo
54	Junior Business Advisor	TechnoServe	Madona Donneyong	Assumed post on May 15, 2017
55	Business Advisor	TechnoServe	Blessilla Na-Afoe Kandoh	Assumed post on May 15, 2017
56	Senior Business Advisor	TechnoServe	Samuel Atia Ayamga	Assumed post on May 15, 2017
57	Senior Business Advisor	TechnoServe	Letitia Sampoia Apam	Assumed post on May 15, 2017
58	Contract Driver	Winrock	Ernest Tug – Uu	Assumed post on June 9, 2017

Annex E. FY 2017|Year 2 AgNRM Gantt Chart, with Quarter 4 highlighted

Activity	Responsible Person	Collaborative Linkages	Estimated Budget (USD)	Quarter 1			Quarter 2			Quarter 3			Quarter 4				
				O	N	D	J	F	M	A	M	J	J	A	S		
Outcome 1: Increased incomes from natural resource products																	
1.1 Natural resource value chains developed																	
1.1.1 Greater understanding of the income generation potential of select natural resource products	Value Chain Expert, Market Strengthening Lead, Business Advisors	Department of Cooperatives, MOFA, Trade Associations, Chiefs and opinion leaders, CREMA management councils, development partners	\$35,000														
Conduct sector and market systems analysis on selected natural resource products (NRPs)																	
Engage trade associations and certification bodies in review and implementation of quality standards																	
1.1.2 Organize and strengthen producer/collector groups	Value Chain Expert, Market Lead	Department of Cooperatives, Trade Associations, MOFA, Chiefs and opinion leaders, management of CREMA, development partners	\$385,000														
Improve organization and structures of collector/producer groups in targeted CREMAs																	
Develop and implement tailored training program for collector/producer groups																	
Strengthen market linkages and investments for three selected NRPs																	
Build the capacity of select trade associations																	
Facilitate collector/producer groups' access to finance																	

Annex E. FY 2017|Year 2 AgNRM Gantt Chart, with Quarter 4 highlighted

Activity	Responsible Person	Collaborative Linkages	Estimated Budget (USD)	Quarter 1			Quarter 2			Quarter 3			Quarter 4				
				O	N	D	J	F	M	A	M	J	J	A	S		
1.2 Increased income through the shea butter value chain																	
1.2.1 Develop a comprehensive roadmap for shea sector investments	Value Chain Expert, Market Lead	SPRING, GSA, Savannah Fruits Company, The Pure Company, IOI Loders & Croklaan	\$37,000														
Map existing shea laws of Ghana and other relevant literature on developing a sustainable shea value chain																	
Engage potential shea investors (e.g., Global Shea Alliance and exporters) on opportunities and weaknesses of Ghana's shea sector																	
Collect and analyze data on shea production, processing and marketing in Ghana																	
Engage Cocoa Research Institute of Ghana on the measures to reduce the gestation period for shea seedlings																	
Engage large scale shea buyers, processors and exporters on demand and supply of shea in northern Ghana																	
Determine the commercialization margins of shea																	
Map out a strategy to establish a relationship between the key market actors and the collector/producer groups																	
Determine the shea infrastructure needs in six (6) targeted CREMAs																	
Produce and validate a roadmap for a sustainable shea value chain in the AgNRM targeted CREMAs																	
1.2.2 Maximize market opportunities through private sector and collector/processing groups	Value Chain Expert, Market Lead	GSA, Savannah Fruits Company, The Pure Company, IOI Loders, Ecocert	\$45,000														
Identify and engage key actors to assess market dynamics for shea kernel and butter																	
Develop guiding principles for market engagements																	
Select forty (40) collector/processor groups in six (6) CREMAs																	
Conduct needs assessment of selected collector/processor groups																	
Develop training materials based on identified needs																	

Annex E. FY 2017|Year 2 AgNRM Gantt Chart, with Quarter 4 highlighted

Activity	Responsible Person	Collaborative Linkages	Estimated Budget (USD)	Quarter 1			Quarter 2			Quarter 3			Quarter 4		
				O	N	D	J	F	M	A	M	J	J	A	S
Review existing VSLA systems in six (6) CREMAs															
Sensitize forty (40) collector/producer groups on VSLA improvements															
Map and engage financial service providers and other value chain actors to invest in identified market systems															
Engage financial service providers to develop and implement innovative and female-friendly products for collector/processor groups and members of trade associations															
Collaborate with trade association(s) to set up warehousing facilities in three (3) target CREMAs (e.g., Global Shea Alliance)															
1.2.3 Increase quality and quantity of shea products	Value Chain Expert, Market Lead	GSA, Savannah Fruits Company, The Pure Company, IOI Loaders, Ecocert	\$130,000												
Assess both quality and quantity of shea demand and supply															
Conduct a needs assessment of the collector/producer groups capacity around quality and quantity issues															
Conduct a series of training sessions on quality and quantity of shea supplies															
Facilitate use and production of appropriate clean energy cook stoves, dryers and roasters															
Identify and engage organic certification bodies on prospects of certification of collector/producer groups															
Facilitate organic certification of collector/producer groups															
Outcome 2: Improved food and nutritional security															
2.1 Climate smart technologies for production intensified and diversified															
2.1.1 Promote conservation agriculture and agroforestry adopted by farmers at scale across project zones	Food Security and Agronomy Expert	SARI, Conservation Alliance, IITA	\$94,337												
Collaborate on a regional forum on CA/CSA to share and learn known/adoptable technologies	Chief of Party	FC, MOFA, FRI, NGOs in forestry/wildlife conservation, agroforestry, conservation agriculture, (AGRA), etc.													

Annex E. FY 2017|Year 2 AgNRM Gantt Chart, with Quarter 4 highlighted

Activity	Responsible Person	Collaborative Linkages	Estimated Budget (USD)	Quarter 1			Quarter 2			Quarter 3			Quarter 4		
				O	N	D	J	F	M	A	M	J	J	A	S
Establish and train farmer groups on adaptable and profitable tools and methods for conservation agriculture															
Support learning and sharing visits to on-going demos for willing individuals, organized groups and institutions on afforestation/ agroforestry interventions															
Support educational efforts/ awareness creation on CS mitigation tools and methods															
2.1.2 Promote integrated soil fertility management, agriculture water management, and integrated pest management adopted by farmers	Food Security and Agronomy Expert	IITA, SARI, MOFA	\$40,405												
Support farmer field schools of IPM for participants drawn from CREMAs															
2.1.3 Develop productive water management technologies and systems	Food Security and Agronomy Expert, NRM/MUS Manager		-												
Develop water strategy and collect water-related data															
Engage stakeholders on appropriate water management ('key-hole garden' and drip irrigation) and technology															
2.2 Capacities for modifications to existing livelihoods and improved nutrition strengthened															
2.2.1 Increase women's ability to save and manage finances	Business Advisor(s)		\$31,104												
Organize community forums of women to discuss intent and purpose of VSLA															
Support registration and required documentation exercise															
Provide twelve (12) savings boxes for VSLAs															
2.2.2 Increased diversity of nutritious plants produced and consumed by households	Business Advisor(s)	MOFA, SARI	\$27,290												
Improve the productivity of home gardens															
Support education on utilization of nutritious plants															

Annex E. FY 2017|Year 2 AgNRM Gantt Chart, with Quarter 4 highlighted

Activity	Responsible Person	Collaborative Linkages	Estimated Budget (USD)	Quarter 1			Quarter 2			Quarter 3			Quarter 4					
				O	N	D	J	F	M	A	M	J	J	A	S			
2.2.3 Develop women's time saving activities	Business Advisor(s)	Targeted equipment dealers, Rural Technology Enterprise of district assemblies, USAID's ATT & ADVANCE projects	\$13,607															
Identify women participants for livestock raising																		
Organize sensitization programs on aims and objectives of women's livestock program																		
Provide support for the construction of needed infrastructure to house livestock																		
Outcome 3: Increased security of farmers and communities seeking access and rights to land and natural resources																		
3.1 Women's access to land and natural resources strengthened																		
3.1.1 Increase understanding of land and water access rights and ownership	Governance, Land, and Conflict Specialist	Traditional and formal authorities, CREMA management	\$77,000															
Complete an assessment on access to land, resource tenure security, and resource-related decision-making processes in targeted CREMA sites																		
Convene stakeholder forums with community, district and regional leaders to present findings and formulate recommendations on strengthening access to land																		
Train women leaders in interest-based negotiation skills and strategies																		
Educate women leaders on laws protecting women's rights and access to natural resources																		
3.1.2 Establish and apply a clear hierarchy of resource access and use rights for each community	Governance, Land, and Conflict Specialist	Traditional and formal authorities, CREMA management	\$7,500															
Facilitate discussion sessions with local leaders and community members to clarify and hierarchy of resource access and use rights																		
Build stakeholder capacity on concepts of land rights and mechanisms to increase tenure security																		

Annex E. FY 2017|Year 2 AgNRM Gantt Chart, with Quarter 4 highlighted

Activity	Responsible Person	Collaborative Linkages	Estimated Budget (USD)	Quarter 1			Quarter 2			Quarter 3			Quarter 4		
				O	N	D	J	F	M	A	M	J	J	A	S
3.1.3 Set up geospatial data base for project intervention sites to support and record access and rights agreements	Governance, Land, and Conflict Specialist, GIS Specialist	Traditional and formal authorities, CREMA management	-												
Build capacity to engage in basic boundary demarcation with GPS and GIS															
3.2: Develop clear land boundaries for project interventions to avoid conflict															
3.2.1 Facilitate community demarcation of land boundaries	Governance, Land, and Conflict Specialist, GIS Specialist	Traditional and formal authorities, CREMA management	\$10,000.00												
Conduct participatory mapping exercises to agree on CREMA and individual community boundaries															
Facilitate landscape zonation in targeted CREMAs															
3.2.2 Increase community awareness of public land boundaries and limitations to their use	Governance, Land, and Conflict Specialist	Traditional and formal authorities, CREMA management	\$18,000												
Select and train community land advocates on land use regulations															
Facilitate community wide advocacy for and awareness about land and resource use boundaries															
3.2.3 Develop mechanisms to mediate land disputes and promote peace and order	Governance, Land, and Conflict Specialist	Traditional and formal authorities, CREMA management	\$7,000												
Develop early warning and response system to prevent conflict															
Build capacity for managing the early warning and early response systems in six (6) CREMAs															
Develop an ADR training manual tailored to natural resource conflicts															
Build capacity for conflict analysis and resolution of CREMA management teams															
Put in place an early warning and early response system to prevent natural resource conflicts															

Annex E. FY 2017|Year 2 AgNRM Gantt Chart, with Quarter 4 highlighted

Activity	Responsible Person	Collaborative Linkages	Estimated Budget (USD)	Quarter 1			Quarter 2			Quarter 3			Quarter 4		
				O	N	D	J	F	M	A	M	J	J	A	S
Outcome 4: Environmental stewardship strengthened															
4.1 Improved management and conservation of select watersheds and biodiversity corridors in the Volta Basin															
4.1.1 CREMA and Farmer Managed Natural Regeneration (FMNR) associations established	NCRC	CREMA management, local government agencies, WD and District Assembly	\$129,500												
Community engagement on CREMA foundation (3 sites)															
Formalization of Community Resource Management Committee (2 sites)															
Engagement with relevant local government agencies															
Development/revision of CREMA constitutions															
Development/revision of CREMA by-laws															
Training of CREMAs patrol teams															
Support to CREMA field teams (4 sites)															
Learning exchange visits to Wechiau Community Hippo Sanctuary (4 sites)															
Learning exchange visits to Burkina Faso (4 sites)															
4.1.2 Improve NRM through community based initiatives	NCRC	CREMA management, local government agencies, WD and District Assembly	\$69,000												
Natural Resource Management and CREMA training															
Boundary agreement and zoning															
Opening of management and NRP access trails															
Development/Revision of CREMA Management Plans															

Annex E. FY 2017|Year 2 AgNRM Gantt Chart, with Quarter 4 highlighted

Activity	Responsible Person	Collaborative Linkages	Estimated Budget (USD)	Quarter 1			Quarter 2			Quarter 3			Quarter 4		
				O	N	D	J	F	M	A	M	J	J	A	S
Monitoring of CREMA biodiversity															
NRP negotiations between CREMAs and concessionaires (3 sites)															
CREMA grant program for riparian actions															
CREMA grant program for CREMA development															
4.2 Ecosystem services strengthened															
4.2.1 Develop values for ecosystem services in targeted areas	WI-HQ/Deputy Chief of Party	GoG partners	\$15,000												
Convene stakeholder and expert meeting	WI-HQ/Deputy Chief of Party	Forestry Commission (CCU, RMSC and FSD), EPA, Wildlife division, Water Resource Commission, CREMA communities)													
Spatial analysis of Payment for Ecosystem Services (PES) in northern Ghana	WI-HQ	RMSC Spatial Unit													
Economic Analysis	Local STTA														
Design options for regional PES market	WI-HQ	Forestry Commission and EPA taking national forest monitoring system into consideration													
Stakeholder event to present analyses and market mechanism options	WI-HQ/Deputy Chief of Party	Forestry Commission (CCU, RMSC and FSD), EPA, Wildlife division, Water Resource Commission, CREMA communities)													
Stakeholder consultation with selected CREMAs	WI-HQ/NCRC														
Finalization of regional PES market plan	WI-HQ/Deputy Chief of Party	Forestry Commission, selected CREMA Communities													

Annex E. FY 2017|Year 2 AgNRM Gantt Chart, with Quarter 4 highlighted

Activity	Responsible Person	Collaborative Linkages	Estimated Budget (USD)	Quarter 1			Quarter 2			Quarter 3			Quarter 4		
				O	N	D	J	F	M	A	M	J	J	A	S
Begin pilot of PES plan in selected CREMAs		CREMA management councils and communities													
4.2.2 Increase understanding of the links between ecosystem services and livelihoods on the part of all stakeholders	WI-HQ/Deputy Chief of Party	GoG partners													
Introductory training on PES in northern Ghana	WI-HQ/Deputy Chief of Party	CREMA communities, other local stakeholders													
Secondary training on PES selected for northern Ghana	WI-HQ/Deputy Chief of Party	CREMA communities, other local stakeholders													
4.2.3 Improved accounting of carbon stocks in target zones	WI-HQ/Deputy Chief of Party	GoG partners	\$10,000												
Establishment of national Forest RL and assessment of data gaps for northern Ghana	WI-HQ	Ghana FC													
Agriculture land use remote sensing analysis for northern Ghana	WI-HQ	RMSC Spatial Unit/USGS													
Forest carbon stock field work	WI-HQ/Deputy Chief of Party/NRM	Ghana FC/EPA													
Tier 2 carbon stock data for forest in northern Ghana	WI-HQ/Deputy Chief of Party	Ghana FC/EPA													
Remote sensing analysis to assess carbon stock in non-forested land	WI-HQ	RMSC/USGS/RMSC													
Modeling for non-forest emission factors	WI-HQ/Deputy Chief of Party	Ghana FC/EPA													