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**CLIMATE SMART AGRICULTURE TECHNOLOGY TO  
ENHANCE FOOD SECURITY IN SIX COSTAL  
DISTRICTS OF WESTERN REGION OF GHANA**

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**Coastal Sustainable Landscapes Project**

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## **Acronyms and Abbreviations**

BAC	Business Advisory Centre
CC	Climate Change
CCC	Climate Change Club
CSA	Climate Smart Agriculture
CSLP	Coastal Sustainable Landscapes Project
DoFA	Department of Food and Agriculture
FGD	Focus Group Discussion
GAW	Greater Amanzule Wetlands
IPM	Integrated Pest Management
MMDAs	Metropolitan, Municipal and District Assemblies
NBSSI	National Board for Small Scale Industries
STMA	Sekondi-Takoradi Metropolitan Assembly
ToT	Trainer of Trainers
USAID	United States Agency for International Development
USFS	United States Forest Service
VSLA	Village Savings and Loan Association

## **Executive Summary**

Farming practices such as slash and burn, poor handling and application of agrochemicals, indiscriminate cutting of trees and removal of vegetation cover were among negative farming practices employed by farmers in the six coastal districts of Ghana's Western Region. These agronomic practices were threats to the environment, food security, and by extension, climate change. To reverse such environmentally unhealthy agricultural practices, the United States Agency for International Development (USAID) funded and US Forest Service-managed Coastal Sustainable Landscapes Project (CSLP) introduced the concept of Climate Smart Agriculture (CSA) technology to communities and farmers. In addition to halting the impact of the bad agricultural practices on the environment, the CSLP through the CSA sought to enhance food production, contribute to improvement in livelihoods and a reduction in greenhouse gas emissions. The approach included series of targeted trainings (including hands-on, mentoring and coaching), establishment of demonstration fields, supply of basic inputs, the formation of enterprise groups and facilitation of market linkages. With time, the project succeeded in helping interested small holder vegetable farmers, shift their attention from inorganic vegetable production to the production of organic produce.

Farmers and other stakeholders have benefited from CSA technologies as a result of trainings, coaching and CSA demo farms. An estimated number of 2,413 beneficiaries ( females -1,212, men 1,203) have undergone different capacity development to adopt CSA technology. Beneficiaries knowledge and skills gained on CSA have led to improvement in best agronomic practices for food crop production, thus enhancing food security in six coastal districts in western region of Ghana. Applied CSA technologies have improved 160 hectares of farmlands under food crop production in terms of soil fertility, environmental health and climate resilience. Women dominated in the capacity development because they are mostly engage in the production of food crops for households.

Fifty (50) enterprise groups evolved out of CSA technology transfer. Main focus of enterprise groups is taking food crop farming as a business with emphasis on organic vegetable production. These enterprise groups have undergone capacity development and have been linked to input dealers and potential buyers.

There are key challenges associated with CSA technology and major one being pests and diseases management. This challenge need commitment from beneficiaries' to adhere to technical principles in CSA as well as MoFA engagement to assist farmers on the field. It is envisioned that well organized enterprise groups who are networking can overcome the challenge of accessing inputs like seeds, organic fertilizers from vendors and have market for their produce from potential buyers. There are opportunities for enterprise groups to increase their incomes from vegetable production as consumer behavior is changing towards organic produce. Enterprise groups can take advantage of this changing trend if they consider organic vegetable production as a business.



## 1.0 BACKGROUND & INTRODUCTION

### 1.1 Background

The Feed the Future Ghana Coastal Sustainable Landscapes Project (CSLP) is a United States Agency for International Development (USAID) funded and U.S. Forest Service-managed intervention being implemented in the six coastal districts<sup>1</sup> of Ghana's Western Region. The project, originally a three-year project (2013-2016) and non-Feed the Future funded, was extended another through September 2018 with Feed the Future funding, based on successes achieved within the initial phase. It works to promote low emissions development in Ghana's Western Region by strengthening community-based natural resource management and monitoring, and improving livelihoods in farming and fishing communities.

The project's second phase, under the U.S. government's Feed the Future Initiative, had a specific objective to reduce poverty and increase resiliency in the target communities through improved natural resource management, livelihood diversification, value chain development, and ecosystem conservation and restoration. Currently, the project interventions cover 43 core coastal communities with smallholder farmers and fisher folks as the main beneficiaries. In total, project actions of one sort or another have reached more than 82 communities as of the end May 2018.

The interventions of the CSLP are guided by two main outcomes: (i) increased incomes from livelihood diversification and, (ii) improved environment and natural resource management. Specific activities include agroforestry and forestry best practices, short- and medium- term livelihood improvement activities (e.g. beekeeping, climate smart agricultural –CSA vegetable production), on-farm tree planting of commercial and agroforestry species and management of greening areas / urban greeneries. Others include wetland/mangrove conservation, spatial planning, Village Savings and Loan Associations (VSLAs) and youth engagement (via formation of environmental clubs in public schools).

CSLP uses in-field consultations, targeted trainings, strategic capacity building, detailed technical assistance, and participation in institutional/policy level discussions and workshops based on field-level experience to achieve project objectives.

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<sup>1</sup> Shama, STMA, Ahanta West, Nzema East, Ellembelle and Jomoro districts/municipal

## **1.2 Introduction**

Prior to interventions of CSLP, farmers in the six coastal districts of Ghana's Western Region were using agronomic practices that were threats to the environment, food production, and by extension, climate change. Among such negative practices were slash and burn method of farming, poor handling and application of agrochemicals, indiscriminate cutting of trees and removal of vegetation cover. Available arable land for food crop production is also rapidly competing with cash crop production such as rubber and extractive industries attractiveness to the region. These have long term effect on household members in terms of food security and access to arable for sustainable food crop farming.

In view of such environmentally unhealthy agricultural practices and threat of food security in the six coastal districts of western region, CSLP introduced the concept of Climate Smart Agriculture (CSA) technology to communities and farmers. Purpose was to halt and reverse the impact of bad agricultural practice for food production and subsequently contribute to an improvement in livelihoods and a reduction in greenhouse gas emissions.

## **1.3 Objectives of Climate Smart Agriculture Technology.**

CSLP intervention on CSA technology to six coastal districts of western region of Ghana had the following objectives;

- To equip project beneficiaries with knowledge and skills to adopt CSA best practices that promote environmental health, food safety and carbon sequestration.
- To encourage project beneficiaries to practice sedentary farming for production of food crops.
- To expose project beneficiaries to entrepreneurship skills to consider food crop farming as a business enterprise.

## **1.4 Target Beneficiaries.**

Target beneficiaries of CSA intervention were peasant farmers whose average land sizes for food crop production is less than one hectare per person, and use simple farm tools. Government institutions such as Ministry of Food & Agriculture, Junior and Senior High Schools were also targeted to provide technical support and knowledge to sustain CSA technology in the region.

## **2.0 Strategies and Methodology.**

Strategies and methodology CSLP adopted to implement CSA technologies were:

- Conducted needs assessment to identify technical gap and designed appropriate training modules to fill these technical gap.
- Recruited people (Community Assistants) resident in respective participating communities to support and embark on farm to farm visit to provide technical advise on CSA technologies to farmers..



- Established CSA demonstration farms in each of the beneficiary communities as learning centers for farmers to adopt CSA best practices.
- Conducted hands on trainings and embarked on regular field visits and monitoring to address farmers challenges.
- Facilitated evolution of enterprise groups to consider food crop farming as a business.
- Conducted Training of Trainers (ToT) for group champions, MoFA Extension Agents, agric teachers /students from Junior and High schools.
- Facilitated market linkages and networking amongst key actors in food production value chain
- Provided starter inputs such as simple tools, improved seeds and organic fertilizers to support and demonstrate CSA best practices.
- Collaborated with sister organizations and relevant actors in the food value chain.

Table 2.0 shows summaries of actors and their key roles in Climate Smart Agriculture.

<b>Key Stakeholders</b>	<b>Stakeholders Key Roles</b>
Ministry of Food and Agriculture (MoFA)	Provide technical advice and field monitoring
National Board for Small Scale Industries (NBSSI)	Facilitate Market linkages , business skills training and registration of groups
East-West Seeds International /TIKOLA Ghana	Supply improve seeds to farmers and train farmers in best practices on seeds management
Ankobra Beach Resort	Established organic farms for site visits and learning and producer of bamboo vinegar for organic pests/diseases control
Market queens/ Hoteliers	Potential buyers of vegetables
Input dealers	Supply of farm inputs such as organic fertilizers
Schools (Junior High and Senior High Schools)	Apply CSA technologies to teach students, students educate their parents and establish school gardens.
Hen Mpoano (HM), Western Region Coastal Foundation (DFID funded project), Ghana Supply Chain Development Program (USAID funded program)	Provide technical support, business advice and market linkages.

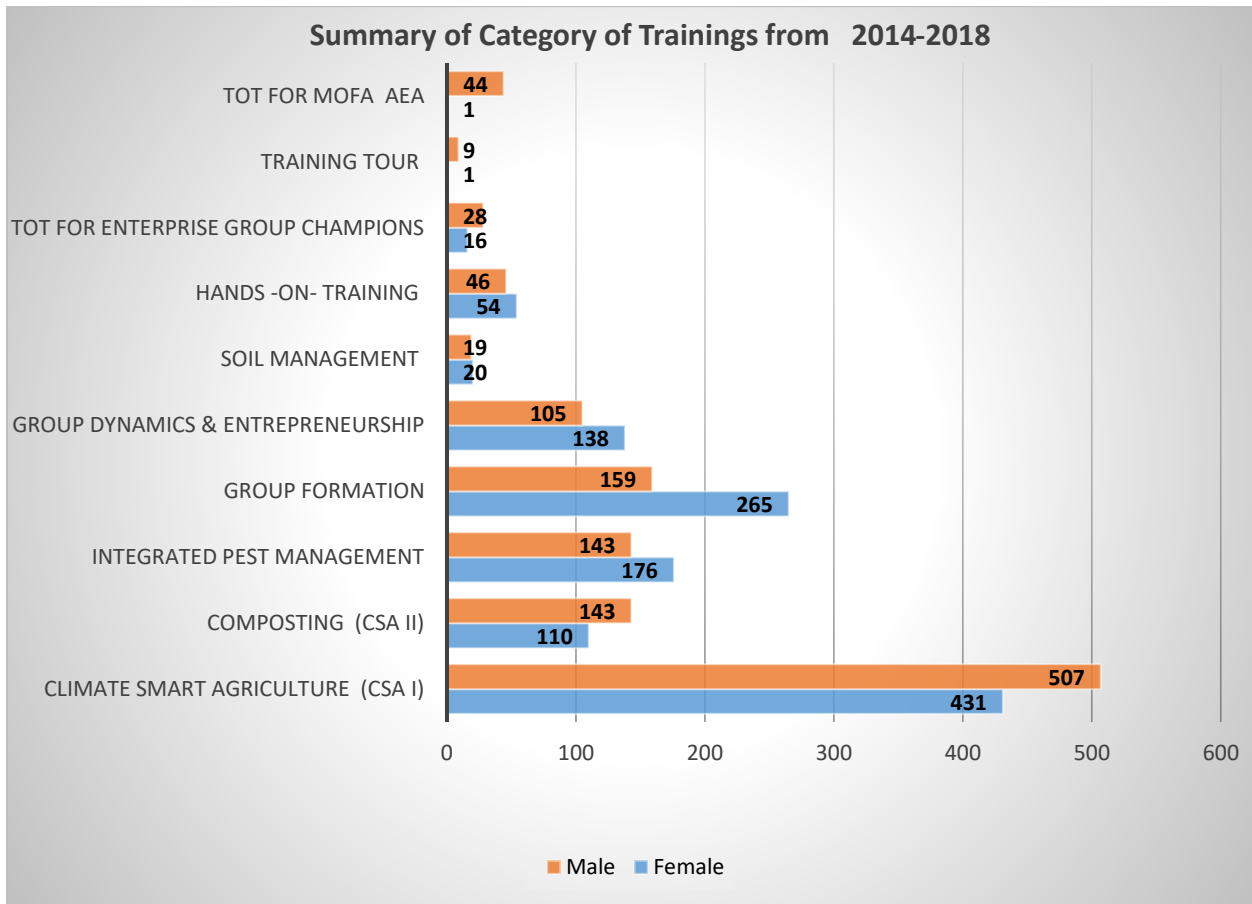
### **3.0 Results, Successes and Benefits**

#### **3.1 Enhanced knowledge on CSA Technology**

Targeted beneficiaries knowledge is enhanced on CSA best agronomic practices .This has been achieved through trainings, hands on trainings and demonstrations. Fig 3.1 shows category of trainings the CSLP conducted for beneficiaries in CSA technology. Total number of 2,413 beneficiaries included 1,212 women and 1203 participated in various CSA capacity building trainings. Knowledge gained is a resource for beneficiaries as a first step to improve their technical knowhow about best farming practices. Women

dominated in the trainings because they are mostly engaged in production of food crops for household consumption.

Fig 3.1 Category of trainings conducted from 2014 to 2018



Source: CSLP List of Participants for Trainings.

### 3.2 Increase in food crops Farmland Areas under improved natural resource management.

Farmers have changed their behavior towards land preparation and usage of agrochemicals in food crop production. They have realized adoption of CSA best practices in food crop production is more sustainable than applying agrochemicals at all times. Total farmland area for food crop production under improved natural resource management is estimated at 160 hectares. These are farmland areas that farmers have not applied weedicides to prepare farmlands, avoided bush burning, applied organic fertilizers and used organic pesticides to control pests and diseases. These CSA best practices enable a farmer to stay on same piece of land (sedentary) to produce food crops year after year. This address the issue of farmers looking for new farmland for food crop production in every farming season. One farmer from Navrongo in Jomoro district of western region of Ghana, Walter Cudjoe who has adopted CSA best practices from 2014 to date said, *“I have cultivated*

*okra on same piece of land for three consecutive planting seasons and the yields keep on increasing from year to year”.*

Land acquisition for food crop farming is becoming a problem in the six coastal districts of western region due to cash crop production such as rubber plantations and presence of oil and gas industries. Adoption of CSA technology to food crop production addresses the issue of land acquisition for food crop production on yearly basis.

### **3.3 Enhanced Food Security in CSLP participating Communities**

At the World food Summit in 1996, food security was agreed to exist when; “all people, at all times have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs, and food preferences for an active and healthy life”. CSLP beneficiaries have made some progress in food security related issues especially on food safety and storage. Beneficiaries have realized good taste of organic food and its longer storage life<sup>2</sup> as one farmer explains: *’organic pepper is much spicier than inorganic ones and organic tomatoes and garden eggs taste much better than inorganic ones.*

Beneficiaries have also added new vegetables to their diets such as carrot, cabbage, cucumber and lettuce which initially were missing in their vegetable production list. Consumption of more vegetables is a plus to improve their dietary needs as one pillar in food security.

### **3.4 Establishment of Demonstration Farms and School Gardens**

CSA demo farms provided sites visits for larger community members to visit and learn CSA best practices. Those who had doubts about CSA success have change of mind and behavior after visiting CSA demo sites. This has brought more farmers to embrace the concept of CSA technology to their farming activities. Teachers and Students from Junior and Senior high schools have adopted concept of CSA technology and established 13 school gardens respectively.



Fig 3.4 CSA farm demo at Ewusiejo in Ahanta West District

### **3.5 Agroforestry Practices**

Food crop farmers have learned to integrate trees with food crops production which was not the case before the CSLP intervention. Food crop farmers cut every tree during land preparation with notion that trees over shadow food crops. After educating farmers about importance of trees, farmers have shown interest by planting trees in food crops farms. Tree trees like *Gliricidia septum* converts nitrogen from the atmosphere to the soil in the

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<sup>2</sup> Food storage in rural communities of Ghana is a challenge due to lack of electricity and high cost of refrigerators

form of nitrates, and therefore nitrogen becomes available for plant absorption and growth. CSLP supplied 15,000 plus *Gliricidia septum* cuttings to farmers for field demonstrations.

### 3.6 Clime Smart Enterprise Groups, Market Linkages and Networking

Currently there are 50 Climate Smart Enterprise Groups (CSLP-15, HM-30, and WRCF-6) within the six coastal districts of western region. The enterprise groups are farmers who have come together and agreed to adopt CSA technology in their daily farming activities. The enterprise groups pull resources together, share ideas, support each other and take vegetable production as a business. CLSP facilitated formation of enterprise groups through trainings, capacity building and development of respective groups' constitution.

Market linkages platforms were created for enterprise groups to have access to inputs and market for their farm produce. As a first step enterprise groups were introduced to aggregators in two community markets (Anyinase - Ellebelle district, Agona Nkwanta- Ahanta West district) with samples of organic vegetables. Second step was two market linkage workshops at Esiama<sup>3</sup>-Ampain and Takoradi<sup>4</sup>. These workshops were jointly organized by CSLP and HM and brought together 174 key actors (both workshops) in food value chain for interacting, market linkages and networking. Participants were hoteliers, restaurant operators, inputs dealers, market queens, private organizations, Ministry of Food & Agriculture, National Board for Small Scale Industries and Government of Ghana School Feeding program. CSLP has compiled list of participants and their contacts, and shared among all participants for further interaction and networking.



Fig 3.6 Introduction of Enterprise group and some vegetables to a market aggregator at Anyinase community market

<sup>3</sup> Esiama is centrally located within the six coastal districts of CSLP operational areas and has attracted several economic activities including hotels, restaurants, offices etc.

<sup>4</sup> Takoradi is the regional capital of western region of Ghana.

### 3.7 Increase in Food crops Income

About 97% of CSLP beneficiaries derive their incomes through farming (cash and food crops). Farmers who have adopted CSA best practices for food crop production have increased their incomes. Production cost has gone because they use locally available materials<sup>5</sup> to improve soil fertility and control pests/disease. Income analysis for three enterprise groups from 2016 to 2018 is shown in figure 3.7. Theresa Ephraim of Adubrim confirmed this: *‘I have gotten many benefits by going the organic way; I bought some okra seeds at GHC8 (US \$ 1.86) from the CSLP-Tikola Training held at Elubo and planted. Within a year, I have harvested and sold more than GHC300 (US \$ 70) worth of okra in my community and the demand is amazingly great. I am a member of one of the Village Savings and Loan Association –VSLA and the proceeds from okra help me to save very well.*

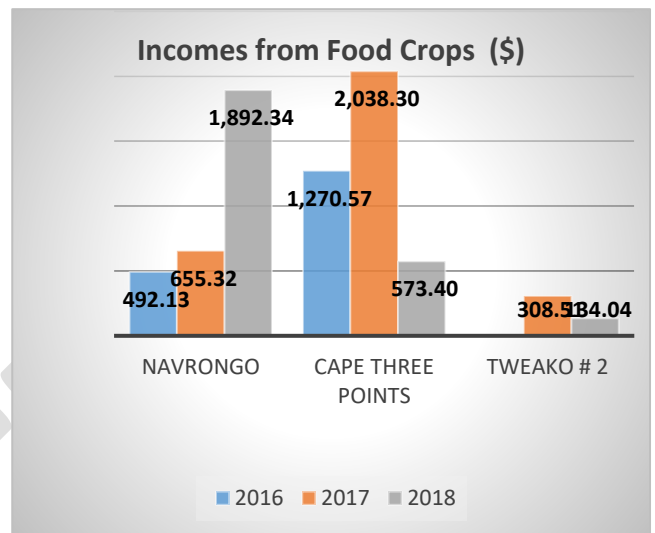


Fig 3.8. Income analysis from three enterprise groups

## 4.0 CSA Challenges, Lessons Learned, and Way Forward

Though farmers and the schools applauded the CSA practices, they were worried with several challenges that seem to have hindered their ability to effectively implement the CSA principles and achieve maximum benefits. Among the key challenges noted were:

### 4.1 Challenges in CSA practices

**4.1.1 Pests and Diseases Control.** This is a huge challenge for farmers adopting CSA. They have been advised to use organic recipes to control pests. The fact is that using organic pesticides do not kill pests but rather repel them from the farm. For example grasshoppers and some garden snails which attack crops at night. This makes it difficult for farmers to take organic measures to control pests after they have arrived. This also limit farmers to expand food crops farms under CSA.

**4.1.2 Access to inputs:** Farmers have difficulty accessing inputs such as organic fertilizers and improve seeds from vendors mostly located in urban centers. Farmers who try to access them incur extra cost due to distance and poor road network.

**4.1.3 Access to quality improved seeds:** Most farmers experience poor germination rates of improve seeds purchased from vendors. This may be due to poor quality of seeds from vendors, or poor management of seeds and nursing by farmers.

<sup>5</sup> Locally available materials include farm waste such as cocoa husks as organic fertilizer, compost made from local materials and use of neem and pawpaw leaves as organic pesticides.

**4.1.4** CSA is labor intensive and time consuming.

**4.1.5 Potential yield per hectare:** A farmer adopting CSA best practices is less likely to achieve a potential yield per hectare due to some challenges mentioned above. However, increase in yield of organic produce has been reported and is possible to achieve potential yield per hectare.

**4.1.5 Impact of changing climate:** Vegetables need constant supply of water for growth and development. Farmers produce food crops under rain-fed conditions which sometimes is unpredictable due to climate change. When there no rains as unexpected farmers carry water from their homes to their fields (cover 1+ km) to help in watering their crops. It is more profitable to produce vegetables in the dry season because fewer farmers are engaged and demand exceeds supplied. Though rivers and streams are abundant resources in the district farmers are not able to afford cost of irrigation facilities.

**4.1.6 Marketing of organic produce.** Farmers face challenges marketing their organic produce because consumers have no knowledge of such produce in the local markets. Therefore aggregators in local markets buy organic produce at the same price as inorganic produce. However, where buyers are willing to buy more especially from hotels and restaurants, farmers are not able to supply quantity demanded at regular time intervals.

**4.1.7 Climate Smart Enterprise Groups.** The enterprise groups are still developing to final stage of group development where the groups have developed and performing according to set objectives and goals. Currently some groups are at the forming stage of group development where most members do not know the reason of joining the group.

#### **4.2 Lessons learned**

Concept of CSA technology has addressed to extent some challenges beneficiaries face in managing food crops farms and access to safer food for household consumption. Adoption of CSA technology is behavioral and takes time for farmers to realize the full benefits. Key lesson is that regular training and coaching of farmers will take care of some of the challenges. There is potential for enterprise to increase their incomes as consumers are becoming aware of organic vegetables in the local markets. Enterprise group champions who participated in market linkages workshop have realized these opportunities in organic vegetable production.

### **5.0 Recommendations and Conclusion**

#### **5.1 Recommendation.**

**5.1.1** Farmers need to be effective to control pests and diseases by applying all the integrated pest management methods. The use of organic pesticides must be applied on regular periods say every three days from the beginning and any findings should be immediately reported to MoFA extension staff for technical advice.

**5.1.2** Enterprise group's members need to be effective in their planning to access inputs from vendors. For example groups can use mobile money technology to purchase seeds from vendors and arrange to deliver at a point,

- 5.1.3 Handling purchased improved certified seeds, enterprise group members need to pay attention to its storage arrange with seed vendors for training on proper nursing of seeds. MoFA extension staff can play key role in this by training and coaching farmers to manage their seeds.
- 5.1.4 Enterprise groups must use the group system (Nnoboa) to support each other in adopting CSA practices.
- 5.1.5 Enterprise group can achieve potential yield per hectare if they are able to surmount challenges mentioned and address soil fertility issues. For example regular application of organic fertilizers.
- 5.1.6 There is market for organic vegetables and enterprise groups needs to plan effectively and schedule their productions to suit demands from potential buyers and network with other enterprise groups.
- 5.1.6 Enterprise group need support from key stakeholders such as MoFA to provide regular technical advice to farmers and also channel some of their resources in marketing linkages and networking. Donor support is needed to reach out to more farmers to adopt CSA and enhance food security.
- 5.1.7 strengthening of Climate Smart Enterprise Groups depends on group champions to motivate their members about the benefits of joining the group. The group registration at the districts is important as registered groups will benefit from government micro financing support to farmers. Farmers recording benefits should share experience with non-group members as farmer-to-farmer learning is effective. However, the focus should not be on increasing the membership alone but the quality of the groups. The enterprise groups will also need capacity development from sister organizations operating in the region.

## **5.2 Conclusion**

Beneficiaries have acquired knowledge and skills under Climate Smart Agriculture technology that will improve upon current farming practices. Challenges associated with CSA adoption is surmountable and it needs commitment, constant practice, time and support from key stakeholders to realize its full benefits. This has the potential to enhance food security in the six coastal districts of western region of Ghana. As consumers are gradually becoming concerned about what they buy and eat from farmers especially for vegetables, Climate Smart Enterprise Groups have potential to increase their farm incomes if they undertake organic vegetable production as a business.

Annex 1: Summary of CSA Trainings from 2014 to 2018

<b>Trainings</b>	<b>Participants</b>	<b># Participants</b>	<b>F</b>	<b>M</b>	<b>Key Messages</b>
Climate Smart Agriculture (CSA I)	CSLP Enlisted farmers	938	431	507	Best practices to establish a CSA farm
Composting CSA II	CSLP Enlisted farmers	253	110	143	Compositing techniques
Integrated Pest Management	CSLP Enlisted farmers	319	176	143	Preventive measures/control of pests/diseases using organic pesticides.
Group formation	Enterprise groups	424	265	159	Farming as Business
Group Dynamics & Entrepreneurship	Enterprise groups	243	138	105	Group Strengthen and cohesiveness/ Farming as a business
Soil Management	Enterprise Group	39	20	19	Improving soil fertility
Hands -On- Training	Enterprise Group	100	54	46	Adopting CSA best practices.
ToT for Enterprise Group Champions	Enterprise Group Champions	44	16	28	Seed nursing and Management/Green Lable Certification Standards
ToT for MoFA AEA	MoFA Extension Staff	45	1	44	Best practices CSA practices
Training Tour	Teachers and Students	8	1	9	Best practices CSA practices
<b>Total</b>		<b>2,413</b>	<b>1,212</b>	<b>1,203</b>	