



RESEARCH PROGRAM ON
**Climate Change,
Agriculture and
Food Security**



Village Midline Study:
Site Analysis Report for Doggoh, Lawra-Jirapa,
Ghana (GH-0108)

July 2018

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CGIAR Research Program on Climate Change,
Agriculture and Food Security (CCAFS)

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To cite this report

Jasaw GS, Adams M, Asani A, Kpeno E, Terkpen J, Ouedraogo M, Cramer L. 2018. Village Midline Study – Site Analysis Report for Doggoh, Lawra-Jirapa, Ghana (GH-0108). CCAFS Report. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

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The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is led by the International Center for Tropical Agriculture (CIAT), part of the Alliance of Bioversity International and CIAT, and carried out with support from the CGIAR Trust Fund and through bilateral funding agreements. For more information, please visit <https://ccafs.cgiar.org/donors>.

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Abstract

Doggoh village is in one of the CCAFS benchmark site Jirapa-Lawra in Ghana. The village is located in a Sudan Savannah characterized by a considerable tree population, and the farming system it practices involves cultivation among trees. Land is cultivated by individuals but owned and administered communally through a traditional system of local chiefs. The average land productivity is low and the community can only produce enough to feed themselves for 3 months a year, resulting in the need to seek food from other sources for 9 months of the year. To survive, people depend on remittances. Trees are communally managed with community sanctions against those who break the accepted practice. Nonetheless, the sale of wood fuel is putting pressure on the tree population. There is evidence of degradation on the landscape where vegetation has been removed and there is bare soil. The community relies on boreholes for their domestic water supply and take for granted the value of wetlands and the rivers, which remained effectively unmanaged.

The village midline survey (VMS) was carried out from the 2nd -12th July, 2018 in Doggoh village. The aim of the VMS was to assess the performance of the indicators around natural resource, organizational landscape and information networks and the changes that have occurred since the baseline (VBS) in 2011. A participatory approach was adopted. Whole community for a were conducted and later, focus group discussions (FGD) were held separately for men and women. The men and women were purposively sampled during the whole community meeting, after which 15 members were randomly selected for each category. The protocols that were used during the VBS were the same ones used for this VMS.

The assessment shows that overall, community resources are improving as more trees have since been planted in the settlement area and reduced indiscriminate felling of trees as well as banning of small-scale gold mining have contributed to improved vegetation cover. Climate-smart agricultural techniques including tie ridging is improving crop yield outputs. The organizational landscape has recorded some changes since the VBS. The participants identified 22 organizations since the last VBS operating within and also in locations outside Doggoh village. For men, the five top priority organizations in terms of natural resources and

food security related activities included CCAFS, SADA, MoFA, ProNet North and Forestry Commission while the women prioritized GHS, Pogfaabargone, CCAFS, ACDEP and Mother-to-mother support group. The analysis showed that, the prioritized organizations were active in interventions on natural resource management, infrastructure, agriculture and food security. Organizations that operate within the community and from outside were differentiated. On information networks, friends, mobile phones, radio and neighbours are amongst the sources identified for information related to rainfall, time of planting and/or fertilizer applications as well as market information for farm inputs and agricultural produce. Stone gathering for sale to the construction industry was identified as a new resource that has a potential to generate income for many households.

A new vision was developed during the community forum around how they want to see the natural resource, infrastructure, climate change and food security situation by 2030. This was based on an update of earlier vision developed during the VBS in 2011. The drivers, enablers and constraints were assessed to inform new approaches for achieving the vision.

Based on the assessment information, it is recommended that CCAFS interventions in CSA, agro-forestry and soil improvements be sustained since their impact is already evident on the ground. Other dimensions of livelihood diversification, livestock farming and increased utilization of community resources such as the stones in the landscape will enhance the drive towards achieving food security in the area.

Keywords

Midline; Ghana; village study; participatory mapping; natural resources and food security; organisational Landscape; information network.

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Introduction

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is a strategic ten-year partnership between CGIAR and Future Earth to help the developing world overcome the threats posed by a changing climate, to achieving food security, enhancing livelihoods and improving environmental management. Starting in 2010, CCAFS carried out a major baseline study at household, village and organisation levels across its five target regions, namely East Africa, West Africa, South Asia, Latin America and Southeast Asia (more information about CCAFS sites is available on our website <http://ccafs.cgiar.org/where-we-work>). In 2018, CCAFS carried out a midline study at one of these sites (Lawra-Jirapa in Ghana) to determine if there is scope for conducting more midlines in other sites. CCAFS trained survey teams from partner organisations in the site to conduct the midline.

The midline effort consisted of three components – a household survey, village study and organisational survey. The household midline survey, a quantitative questionnaire on basic indicators of welfare, information sources, livelihood/agriculture/natural resource management strategies, needs and uses of climate and agricultural-related information and current risk management, mitigation and adaptation practices, was implemented by CCAFS partners in 1 site (7 villages) with 140 households to date as a test. CCAFS partners implemented a village midline study (VMS) and an organisational survey in one out of the seven villages within the Lawra-Jirapa site where the household survey was implemented. Data from the current midline study, as well as an end line study that will take place in roughly 5 years, will be used to monitor what changes have occurred since the baseline study was carried out. The goal is not to attribute these changes to the program, but to be able to assess what kinds of changes have occurred and whether these changes are helping villages adapt to, and mitigate, climate change.

The focus of this site analysis report is the village midline study (VMS). The VMS aims to provide information about changes since the village baseline study (VBS) at the village level about some basic indicators of natural resource utilisation, organisational landscapes, information networks for weather and agricultural information, as well as mitigation midline information, which can be compared across sites and as well as with the situation at baseline.

The objectives of the village midline study are to:

- 1) Provide an initial comparison of the situation found during the VBS to allow us to monitor changes in these villages over time. In particular, changes that allow people to:
 - a) Manage current climate risks,
 - b) Adapt to long-run climate change, and
 - c) Reduce/mitigate greenhouse gas emissions.

- 2) Understand the enabling environment and changes on it, that mediates certain practices and behaviours and creates constraints and opportunities (policies, institutions, infrastructure, information and services) for communities to respond to change.
- 3) Explore social differentiation:
 - a) Perceptions of women and men will be gathered separately to be able to present different gender perspectives.
 - b) Focus group participants will be selected to present perceptions of groups differentiated by age.

The detailed tools and guidelines used for the implementation of the village midline study across all CCAFS sites, as well as the manuals, data and analysis reports can be accessed on our website (<http://ccaafs.cgiar.org>). This report presents the results of the Village Midline Study (VMS) conducted on from the 2nd to 12th July, 2018 in the village of Doggoh, Ghana (Lawra-Jirapa site) (Map 1). The village's geo-coordinates are – 10.567; -2.750. Doggoh was chosen for the baseline survey because of its relative central location in the block, among other criteria. There is reasonable accessibility to the village although the roads can be difficult to navigate in the event of heavy rain. The survey team arranged a visit to the village to prepare for the fieldwork. The team was composed of two facilitators, two note takers and one site coordinator. Each pair was male and female. The team consulted with the village authorities concerning the time and place of meeting. It selected shade under a big tree centrally located in the village where most meetings of the village are always held at.

The site coordinator sent out invitations by word of mouth through the village Chief and his elders who convened a community meeting to invite all the members to the survey sessions on the agreed dates. On the first day of the survey the whole community was invited to participate in an introductory session where the team explained the survey to them and shared with them the results of the village baseline survey, sampling for the VMS workshop participants was then carried out. Men were separated from women and each participant in the men and women groups balloted for position one, two or three. Those with the number one, stayed back to participate in Day 1 workshop. Those who picked the number two, went home and returned on second day to participate in day 2 workshop while those who picked the number three, were slated for day 3 workshop. The separate sampled group for each day composed of 15 men and 15 women participants. Each group had men or women of varying age categories (Young, Adults and Elderly). The whole community was again invited at the end of the third day to attend a debriefing session where a summary of the findings was shared.

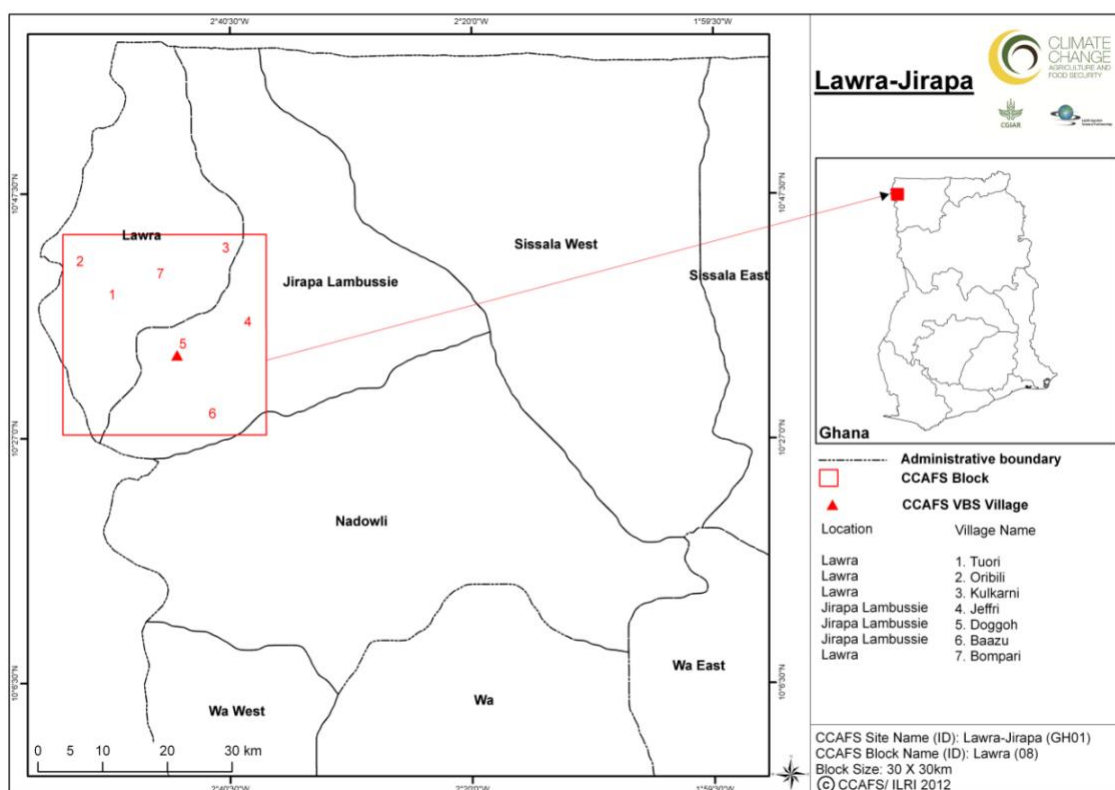
The survey used participatory methods of data collection. Throughout the data collection process groups of male and female members of the community worked separately. The team used a satellite image of the block with sketches of resources that were identified by the baseline participants as being important to the community. The midline participants identified any additional important resources and added them to the map. Changes in the state of the previously identified resources were also analysed by the group. The outputs were maps and sketches. The process of working with

the community to identify the resources that are important to them depended entirely on how well they are able to understand and interpret the image and the sketches made by the group.

The task on day 2 was to work with each group to understand the organisational landscape and the links that exists in relation to food security in a normal year, and in relation to natural resource management. After putting together their organisational landscape, the groups also compared it to the one that was created during the baseline. The outputs were diagrams showing the organisational landscape. Information on each organisation was also captured in cards.

There were two main tasks on day 3. The first task was to work with each group to understand how information networks in relation to weather issues and farming activities have changed since the baseline study. The outputs were diagrams. The second task was to bring the male and female groups together to discuss a vision of what the community would like their village to be in the future. The group was later split up into two mixed groups, one assessing the progress that was made towards the vision that was created during the baseline, the other group creating a new vision. The output was a map/sketch showing “the vision of the community.”

Information generated from the survey was captured on sketches, maps, flip charts, information cards and notes. All these needed to be brought together in one debriefing report from which this final report is written. The debriefing report was prepared in the field so that it could benefit from the presence of the site team. The photographed sketches and maps were inserted in the debriefing report. In this site analysis report proper maps and diagrams derived from the field outputs replaced them.



Map 1. Location of the Doggoh village in the CCAFS site, Lawra-Jirapa, Ghana.

Data analysis

Topic 1: Community resources - participatory satellite imagery interpretation and visioning

Community infrastructure and resources as well as gender-differentiated access and utilisation of those resources have been analysed, based on a process of participatory visual interpretation of high-resolution satellite imagery (Airbus SPOT 6/7 imagery). The aim was to analyse how community resources and community dynamics in relation to the environment have changed since the baseline study. The participants were presented with the maps created by the baseline participants and discussed any changes in the state of those resources in terms of quality, access, management and potential drivers of change. Later on, two mixed groups respectively 1) developed an image of village resources and human well-being into 2030 and 2) assessed the progress made towards the future vision that was created by the baseline participants. The detailed approach to this exercise is outlined in the CCAFS Village Midline Study Implementation Manual. Follow the link:

<https://doi.org/10.7910/DVN/ZXBP6W>.

A. Changes in natural resources

Male and female participants provided the following information on changes in their community's resources, including infrastructure (building on Table 1 and 2 and Maps 2 and 3). Participants in both male and female groups compared the current satellite image of the area and compared it to the image taken in 2011. The analysis was on features such as Rivers, Wetlands, Farmlands, Woodlots, Grasslands, Boreholes, Degraded lands, School buildings, Market, Church, Mosque and Hospital building amongst others. The community determined use for the resources, their location, current state, management and environmental benefits were discussed. Changes observed for each of the inventoried resources was also discussed and reasons assigned for the said changes. Additions to the features/ resources were also discussed and noted. Wetlands were found to be reducing in size due to the fact that, rainfall pattern has been changing, increased crop cultivation around the wetland catchment area amongst others. Degraded land was said to be spreading with the advent of small-scale mining in the area as well as more eroded areas found in the community compared to the time the baseline study was conducted. Tree cover in the settlements portions of the community landscape were said to be increasing as more tree planting took place since 2011. Other new features since the last baseline survey included the Royal Cosy Lodge (Dubai), a new Clinic building, new housing and school infrastructure amongst others.

There are a number of seasonal river systems within Doggoh village. They serve as open water ways that offload water through the village and out to connect to other tributaries. The Black Volta River flows through parts of the CCAFS block. It is a very big river and also serve as a national boundary between Ghana and Burkina Faso. The waters of the Black Volta are of good quality and provide a habitat for fish, hippopotamus and also provides hydro power at the Bui Dam site. Some men from Doggoh village carry out fishing in the Black Volta River to supply to household consumers and other commercial food sellers in the district and regional capitals. It takes one hour of cycling to travel from Doggoh village to the Black Volta River. The community does not use river water for domestic purposes because they have boreholes and because it is relatively far. There does not appear to be

an established mechanism for managing the rivers as a valuable resource. The seasonal rivers carry rich alluvial silts that are good for cultivation. The region is prone to a long dry season and the rivers dry up then. The Black Volta does not dry up and its nearby lands could be explored for all year-round irrigation agriculture. The male participants were of the view that some more innovative engineering by building a wall embankment at the valley close to the metal bridge to allow for temporal holding of the water before it slowly flows under the bridge.

The wetland in Doggoh village is a section of a seasonal river system that collects as a water pan and is called 'Kulbog'. The water pan (called "dam" locally) has good quality water that is collected by the community at specific collection points. The wetland has limited vegetation along its banks. The time required to walk from the village to the wetland is about 15 minutes. The wetland is utilised and managed by landowners whose lands are adjacent to it. The wetland and the catchment facilitate rice farming, fishing and crop irrigation. Both men and women indicated that the wetland was reducing in size and frequently dries up more quickly since the last VBS.

The community uses the woodlands as a source of wood fuel for both domestic and commercial purposes. Timber from the trees is used as construction material and provide several other ecosystem services including regulatory, supporting and cultural services. There is an untapped potential for beekeeping and a generally low level of commercial exploitation of the forest/tree resources in the community. There is now a mix of indigenous trees as well as others such as grafted mangoes, Moringa and teak trees in the landscape. There is a young Teak tree plantation while the mangoes and Moringa trees are found in the settlements area.

The trees are managed through traditional systems that do not allow members to cut down fruit bearing trees particularly the Shea tree (*Vitellaria paradoxa*). Agricultural productivity is low due to poor soils and unreliable rainfall during the months of drought and the years of crop failure are many. Hence, the fruits from the trees supplement the food requirements of the community. There is a difference in the management of trees that fall on community owned land (open access) and those that fall on individually owned land (controlled access). There is ready market for wood fuel in the towns such as Jirapa, which is putting pressure on the tree population. The absence of alternative sources of income increases the risks of the trees to being cut for sale. The community, however, has not yet come up with mechanisms to regulate cutting down of trees to sell as wood fuel. The reported environmental benefits of the trees include improvement of soil fertility and the provision of shade and fresh air. The region is subject to very strong winds called the "Harmattan." Trees provide a windbreak, especially during the Harmattan. According to farmers, trees are also associated with "attracting" rain.

The farming system practiced by the community involves cultivation of land between trees. They maintain the natural trees and introduce other trees of economic value such as mangoes. Some of the natural trees like the shea nut trees and the dawa-dawa are retained for their fruits while others like *Acacia albida* are retained to improve soil fertility.

Farmland/cultivated fields are in the form of compound farms around the scattered settlements and outskirts of the village. The community grows a variety of crops such as Maize, Groundnuts,

Cowpeas and Rice, Bambara nuts, Sorghum, Yam, and also keep livestock. All land is owned and managed by the community, which allocates plots to community members for use. Farmland is therefore given in usufruct and not purchased. All members of the community have land that they cultivate. In spite of everyone having land to cultivate, and cultivating many crops in their plots, community members did not grow enough food to meet their needs. The situation is changing with interventions such as application of climate-smart agricultural techniques. They can only produce enough food to feed themselves for 3 months a year and must seek food from other sources for the remaining nine months of the year. The average land productivity is low due to poor soil fertility and the little, unreliable rainfall received in the region. Members rely on remittances from their children who go south to seek employment.

The community in Doggoh village graze livestock between the cultivated fields and the woodland. During the rainy season, livestock are tethered during the day to graze on nearby grasses. The livestock in Doggoh are mainly short-legged goats and pigs. There is a noted absence of cattle. The community feel that they do not have adequate pasture for their livestock and this is a constraint to keeping larger stock such as cattle. The grazing fields are both private and publicly managed but access to the grazing areas is relatively open in the privately owned lands because individual land ownership is governed by traditional systems that encourage resource sharing. There is evidence of degraded land. In several parts of the village the free ranging of livestock has contributed to removal of vegetation that exposes soils to agents of erosion. There are also parts of the village with rocky outcrops and no vegetation. This area cannot be used for farming. The government has initiated a programme to rehabilitate this degraded environment.

Jirapa, Babile and Lawra are the closest big towns where farm produce are sold. The closest market to Doggoh is Jirapa, which is a 30 minutes' bicycle ride away. Babile and Lawra are further away at, respectively, 1.5 and 4 hours of cycling. Lawra is on the border of Ghana and Burkina Faso and serves a wider area than the rest of the markets. There are other smaller markets such as Karisagra, Duori, Tizza, Downi and Eremon that offer lower levels of service and draw traders from smaller hinterlands. There is also a small market in the village square. People gather under a big tree with a few surrounding sheds where trading transactions take place. The markets are also centres of traditional or cultural significance where the community meets to socialize usually over a local alcoholic drink called Pito.

There are two schools in the vicinity: Kunzokola primary school and Wulley primary school. The children from Doggoh village and other villages attend Kunzokola primary school, which is 30 minutes' walk from the Doggoh village. The community owns the schools but the government manages them. The Kunzokola school is big and in good condition, and provides the children in the village the chances of getting a good education and eventually a better job.

The main roads close to Doggoh are: 1) Jirapa-Babile-Lawra, 2) Jirapa-Doggoh-Lawra. They are both gravel surfaced roads and not in very good motor able condition. Roads facilitate movement of people, goods and services to and from one place to another. Government maintains the roads and derives revenues from them when the users are taxed. The road network has improved access/communication within the region, but the roads' poor conditions have compromised the

quality of the services provided and increased the cost of transport, which in turn affects the cost of goods.

There are six boreholes in the village and these provide enough water for the community. The water from the boreholes is of good quality. The boreholes were drilled by the government but are owned and managed by the community through a committee comprised of men and women. Since people have adequate water there is no effort to harvest rain water.

There is a Community Health Planning and Services (CHPS) compound recently built government in collaboration with JICA to provide primary and essential healthcare to the community. There is a big referral hospital in Jirapa and another in Lawra.

A summary of the discussion outputs is presented below.

Table 1. Major changes in natural resources since the baseline study (2011), as perceived by men (M) and women (F).

Land cover class as per the baseline study	Community determined land use	Location Names	Has there been a change since baseline? Yes/No	Description of the change	Reason for change	Agents of change
Rivers (M)	Drinking source for animals, dry season gardening and some fishing	Doggoh community, in valleys around steel Bridge	yes	Dries up more quickly than 7 years ago (as early as November)	The rain water cannot stay, they flow away because of river siltation. No impoundment or water storage measure in place	Rainfall amounts Siltation of rivers Dam construction
Farm Lands (M)	Maize, Guinea corn cowpeas Ground nuts	Compound farms around settlements and distant farms	yes	Farm lands are now more fertile than before and have better water retention	Better farming practices adopted Farm lands no longer burnt during land preparation Compost making and usage	CCAFS interventions in climate smart agric practices such as bonding, composting, tree intercropping etc
Woodlots (F)	Fuelwood for cooking	2 locations in Doggoh (Dar Domaballu & Tonyaayi Pogdaa) which is about 45mins walk	yes	Difficult to find fuelwood tree species	No alternative trees to be used as fuelwood Uncontrolled tree cutting	Population increase, desertification, resource wastage
Boreholes (M, F)	Main portable water source	Tamparizieri located about 45min walk from the central community	yes	Breakdown every quarter after repairs	Bore Hole overburdened as more people now use facility	Population increase
Roads (M)	From Doggoh to Babile From Doggoh to Bulebaa	Use road for market Use road to access health care	yes	Full of pot holes Big gutters that need serious repairs	Regular use by vehicles Regular wash away by rains No maintenance by government agencies for several years	Circumstances/ conditions District assembly

Schools (F)	Doggoh Kunzokala, willy Tea and Tampoe	Same environment with Doggoh Primary school	yes	3 class room Block	More children for transition to JSS	PTA District Assembly
Market (F)	Sale of farm Produce	“Doordaa” close to the school building	yes	Market women from Wa no longer patronize this market	Market determinants	Market forces
Hospital (F)	To Access health care	Near the village school about 15 to 30 minutes’ walk	yes	CHPS compound with resident nurses	The need for a nearer health care facility	District Assembly Jirapa District Health Directorate

Table 2. New elements added to the map.

Land cover class	Community determined land use	Location Names	Current state (quality)	Time to resource	Management and ownership issues	Environmental Benefits	Opportunities	Limitations
School (M)	Yes	Doggoh	In good state	30 – 45 minutes by foot	Government and community	Training future generations to contribute to community development	Available school building/TL materials and teachers	Difficult to access during rainy season: stream cuts off access
CHIPS Compound(F)	Yes	Doggoh	Newly constructed	30 – 45 minutes by foot	Government through JICA and community	Help prevent communicable diseases	Available land and community labor support	Difficult to access during rainy season of water on the away
Royal Cosy Lodge (Jirapa Dubai) (M)	No	Kanzokala	In good state	One hour by foot and 20 minutes by bicycle	Individual	Has zoo to Promote eco-tourism	Source of job creation for youth	Production sectors still under construction

Borehole (F)	Yes	Doggoh	Three functioning two broken down	10 minutes depending on individual's house location	Community	Provide clean drinking water for household and animal	Good water table, possibility of drilling more boreholes.	Intermittent break downs affect usage
Steel Bridge (M)	No	Doggoh	In good shape	45 minutes by foot and 15 minutes by bicycle	Community and government	Allows easy flow of water from stream and prevents flooding	Links the community with other for easy trade	Poor engineering. Doesn't allow for small water retention in the bridge catchment area
Stones (M, F)	Yes	Doggoh	Available in good quality and quantity for building construction sector	5 minutes by foot	Community	Used as stone bonds in checking soil erosion	Creation of off farm jobs for community members	No ready market for stones
Farm Lands (F)	Maize, Grand nuts, Guinea corn Cowpea	Farms around wily rocks and close to boarders of the community	Land is stony	About 1 hours walking to the farm at wulley rocks site	Individuals		Rainfall Increase harvest	In-adequate rain fall

B. Gender-differentiated comparison of changes in conditions

The participants also compared the current resources identified by male and female participants to what existed in the past. The women were familiar with resources that were closer to the village and could describe them in detail. This shows that they interact less with resources that were further away.

The women identified the seasonal rivers as a community resource while the men only identified the Black Volta, which is a very big river and situated much further away. The men, however, said they hardly go to the river in recent times for fishing.

Both men and women were able to identify the wetland land which they use for early maize cultivation. They both noted that the size of the wetland was reducing in size.

Both men and women appreciated the fact that the trees/forests/woodlots were the sole source of domestic energy (wood fuel) for the community, and also noted the importance of wild fruits trees (shea fruits and dawa-dawa) in supplementing the diet. The women identified limited potential for the commercial exploitation of tree/forests resources but raised the issue of beekeeping potential especially that they were now planting tree such as mango, Moringa in the landscape. The women spoke highly of Moringa in particular as they use the leaves for soup and also as mixture for Koose (fried bean cake).

Women pointed out the degradation of community resources, which is probably an indication that they interacted more intimately with the natural resources and could therefore detect its gradual degradation. They particularly referred to sites that have been left degraded by activities of small-scale miners and increased erosion that have taken place on many sections of their farm plots.

The women also mentioned that they now have compost pits in which they prepare compost manure to support the poor soils on their fields. They now have easier access to tricycle motor transport to cart their farm produce.

The many stones occurring in the settlements area was seen particularly by the women as a key resource from which they could derive a lot more income. Some of the women had started gathering and selling them to the construction industry. They however face a challenge of poor road connectivity to Doggoh village which makes it difficult for tipper trucks to access the stone gathering sites in the village.

C. Eye comparison of new satellite image with baseline satellite image

The participants compared the new satellite image with the old one used during the baseline exercises. It easy for them to notice that forested areas had increased in size including more greenery in the settlement areas. Participants were also able to see the new Royal Cosy Hotel (Dubai). Both men and women were also able to locate Jirapa township, Babile and Lawra clearly on the new map.

Other smaller features within the community such settlements, rivers, wetlands, roads, and school buildings were however difficult to clearly locate on the new map.

Table 3. Changes observed when comparing the satellite images (men).

Main changes observed	Reasons for the change
Forested area increased	Tree planting intervention by SADA, CCAFS and Forestry Commission
Construction of CHIPS compound	JICA, government and community to improve access to healthcare delivery
Construction of new JHS block	Government initiative on improvement in education infrastructure

Table 4. Changes observed when comparing the satellite images (women).

Main changes observed	Reasons for the change
More visible features	Cosy Lodge (Dubai) now seen, More vegetation cover, particularly in mining areas

D. Progress towards vision of the future as created during baseline study

During the baseline survey, a mixed group of men and women develop an image of village resources and human wellbeing into 2030 to understand the opportunities and constraints, as well as aspirations for the future. This exercise built upon all the work completed in the previous sessions. In addition, the exercise took into account the photographs of the landscape, including things they are proud of and things that need to be improved upon in the future, that a group of young people had produced. Each of the resources and features were singled out and discussed to arrive at the preferred state envisioned by 2030. Not much progress has been made on the infrastructure side of the vision. Participants indicated that they still have not realized the vision of getting a bridge across the river towards the Babile road and that a secondary school building as well as a university in the village show little progress or no progress at all. Weak government commitment has been cited as the main reason. Small scale mining has now been banned in the community and so, it is anticipated that the degraded land at the mining sites will begin to regenerate and eventually restore itself. In the settlements area, a number of trees particularly Moringa and Mango have now been planted which are thriving well. Soil conditions have been improving in recent years with the adoption of climate-smart agricultural practices such as tying of ridges, compost manure application amongst others. A summary is presented in Table 5.

E. New vision of the future

The community members were brought together to discuss a new vision for their community by 2030. The issues/areas around which the vision was couched included the dam, woodlots, climate-smart agricultural (CSA) techniques and roads amongst others. They envision that the broken dam wall will be reconstructed and re-enforced to last longer and withstand the water pressure. They also looked at a situation where the stone bounding and tie ridging and other CSA techniques can be widespread and adopted by all community members and even extend to surrounding communities. Another area is the increased utility of abundant stone resources for the construction industry. The

limiting factor is the poor access road for tipper trucks to easily drive into the village to load the stones already gathered. They wish to see this road reconstructed to target easy carting of the stones and also their farm produce to market centres. The community also had a vision of increased establishment of Woodlots, Moringa trees and other fruit trees for a greener landscape. A summary of the new vision is presented in Table 6.

Table 5. Update about the vision of the future that was created by the baseline study group (2011).

Feature or resource discussed during baseline study	Describe any progress in moving toward achieving this goal	What has helped in making progress (if any)	What has hindered progress (if any)	Who has helped and how>
Forest	About 10 acres of teak planted	SADA afforestation project by government	Change of government	SADA/ government initiating the project
Road	Upgrading / surface reshaping	Political campaigning	Lack of political will	District assembly
Market	Few stores built	Individuals' effort	Inadequate resources	Individuals
Hospital	New CHIPS compound and maternity ward constructed	Community and government	n/a	JICA and community
School	New JHS block constructed, Senior High School at foundation level	Government initial commitment	Change of government showing no commitment to continue with the project	Central government and District assembly

Table 6. New vision of the future.

Feature or resource discussed	Preferred condition for 2030	Opportunities	Constraints	Organisations to be involved
Broken dam wall	A constructed pavement to hold on water and allow slow passage through the bridge	Materials included stones and community labour is available	Limited or no funding sources	District Assembly and NGOs
Stone Bunding	Productive farm lands the conserves water	Occurs in abundance in the landscape	Can be highly tedious to gather	CCAFS
Established wood lots	Source of fuelwood for household use and sale in nearby markets	Existence of fast-growing species that can grow well in dry regions	Rampant bushfires and extended droughts	Forestry department/CCAFS

Improved utility for abundant stones in the community	Active stone supply industry for the building industry	Doggoh is centrally located and can supply Jirapa, Lawra, Babile etc	Sales are a bit slow due to access road	District Assembly
Commercial Maize fields on wetlands	Bridges to be engineered in such a way that more water is held on the wetland to allow for maize and rice cultivation	Available and willing labour force	Frequent droughts and small land holding sizes	District Assembly/NGOs
Abundance of moringa trees	To Have abundant Moringa plantation for business purposes including Moringa soap and tea factory	Pilots are doing well. Available seeds for multiplication by other farmers	Frequent droughts and bush fires. Market linkages	CCAFA/District Assembly
Road from Doggoh to Willey Rocks site	A bridge constructed to easily link road from Doggoh to the main road	Seeking support from all other organisations working in Doggoh	Availability of funding support	District Assembly/JICA/ other NGOs
Dangerous mining sites	To plant trees and grass to claim back the lost farm lands	Labour available, CCAFS and Forestry commission can supply tree seedlings	Water to constantly water the plants till the whole area is reclaimed	NGOs/Community/ District Assembly
Fruit tree plantations	Establish quick maturing fruit tree plantations such as Guava, Mango, Cashew etc	Presence of fruit juice processing factory in Wa to buy the raw materials	Land exists in only small patches. Droughts and bush fires	NGOs/Businesses

Topic 2: Organisational landscapes

This topic aims to show evidence of organisational capacities that help address food security and manage resources. This will inform CCAFS about how prepared the village is to respond to the challenges envisaged as a consequence of climate change or other future challenges and to engage with CCAFS partners at a collective level.

Specifically, this section presents the different formal and informal organisations involved in the community in general terms, as well as with respect to food security and natural resources management (NRM). It also elaborates on what types of activities the organisations are engaged in, who their members are, whether the organisations are useful, etc.

A. Basic spheres of operation

Participants were asked to draw three large concentric circles on the ground. The inner circle would represent the community, the middle circle the locality and the outer circle beyond the locality. Participants were then asked to name organisations working in the area, whose names were written on cards, and place the cards in the appropriate circle. Thus, the group placed in the inner circle the cards of organisations that worked in the community, in the middle circle the cards of organisations operating in the locality, and in the outer circle those that operated beyond the locality. See Photo 2 for an example of the activity as carried out with the study participants. The results are shown in the diagrams that follow. Based on this structure, the men identified 22 organisations in the village while the women identified 11.

In Tables 7 and 8, more detailed information is provided on the five most important organisations as they were ranked by the men's and women's groups.



Figure 1. Organisational landscape of the men's group.



Figure 2. Organisational landscape of the women's group.

There have been a number of organizations that were present during the VBS and currently no longer operating in the area. At the same time, there are a number of new organizations that were not present at the time the VBS took place. CCAFS was mentioned on the new organisations by both men and women and that its activities are directly responding to some of the community needs. CCAFS trains farmers on good agricultural practices including planning in lines, mixed cropping, composting and tie ridging amongst others. CCAFS is also planting trees such as Moringa and Mango and other fruit trees to improve the landscape. FIC is another organisation that currently operates in Doggoh but was not present during the baseline surveys. Meanwhile, some organizations that were present during the VBS but currently do not operate in the community includes ProNet North, SADA, Sung taa Nuntaa, School for Life and Agamal. The participants indicated that most of the organisations have now folded up and left the community. The activities of these organizations were connected with project which have now elapsed the project time frame.

Table 7. Information on the first five organisations ranked by the men.

Organisation name	Main activities	Number of members (estimate)	Access (open or restricted to...)	Origin (indigenous, state, NGO, project)	Sphere of operation: community, local, beyond local	Sources of funding (members, external, both)	Existed how long (less than 1 yr, 1-5, longer)	Formal or informal
CCAFS	Tie ridging Bonding to conserve water Compost making Provision of improved seeds Information on timing of fertilizer application Contour farming / ploughing across the slope	Over 50	Open access	NGO	Beyond local	External	7 years	Formal
SADA	Tree planting	45	Open access	state	Beyond local	External	Less than a year	Formal
MoFA	Provision of extension services in Row planting Livestock rearing Marketing of products Supply of improved seeds	200	Open access	state	Beyond local	External	Over 10 years	Formal
ProNet North	Organises community – school meetings Creation of awareness on girl child education Educate community on the effects of teenage pregnancy Organises meetings with PTA, DAs and community on improving school enrolment	Over 100	Open access	NGO	Beyond local	External	4years	Formal
Forestry commission	Encourages tree planting Teaches grafting of mango plants Education on the effects of bush burning and Excessive felling of trees	About 100	Open access	State	Beyond local	External	7years	Formal

Table 8. Information on the first five organisations ranked by the women.

Organisation name	Main activities	Number of members (estimate)	Access (open or restricted to...)	Origin (indigenous, state, NGO, project)	Sphere of operation. community, local, beyond	Sources of funding: members, external	Existed for: less than 1 yr, 1-5, 5+	Formal or informal
GHS	Health Care Deliveries OPD service First Aid & Referrals Child welfare	The whole community (95%)	Open to all	NGO	Community and local	Members & external	3 years	Formal
Pogfaabargone	Contributions & savings Meetings Funeral support Loaning Shear out	37 (45%)	Open to all	NGO	local	Members	About 7 years	Informal
CCAFS	Meetings Field demonstrations Compost preparation Compost application Fertilizer application Best farming methods (making Ridges to conserve water for farmlands) Planting in rose Seed variety	The whole community (about 95%)	Open to all	State	community	External donors	7 years	Formal
ACDEP	Supply animals as initial start up Animal rearing Use of manure Composite preparation Seed supply	10%	Restricted	NGO	community	External	3 years	Formal
Mother-to-mother support group	Participate in meetings Participate on balance diet training programs Individuals' contribution Peer education	60%	Open to all breastfeeding members	state	community	Members	3 years	Informal

B. Organisational landscape of food security

The goal of this exercise was to get an improved understanding of how the organisational landscape contributes to the food security of the group. Food security is mostly measured at the household level. Nonetheless, community-level organisations and interactions influence the food security of different groups within the community differently. Male and female participants were asked to discuss the concepts of food availability, access and utilization, and then review each organisation they had previously identified by asking which of them had activities that fell under these categories.

The CCAFS project was part of the key intervention efforts at food security that the participants kept making reference to throughout the discussions. CCAFS started after the VBS and have been implementing improved seed supply, farmer training on agronomic practices, soil improvement techniques including composting, tree planting and other climate-smart agricultural (CSA) techniques. Another organization that came up is the ACDEP which implemented the feed the future project in which improved seed and fertilizer was supplied to selected farmers as well as supply of grains to households to make up for shortfalls in harvest.

Farm Plus also provided support to households to carry out crop production including input supply. MoFA continues to provide extension and technical backstopping support within the community for interventions aimed at achieving food security in the community.

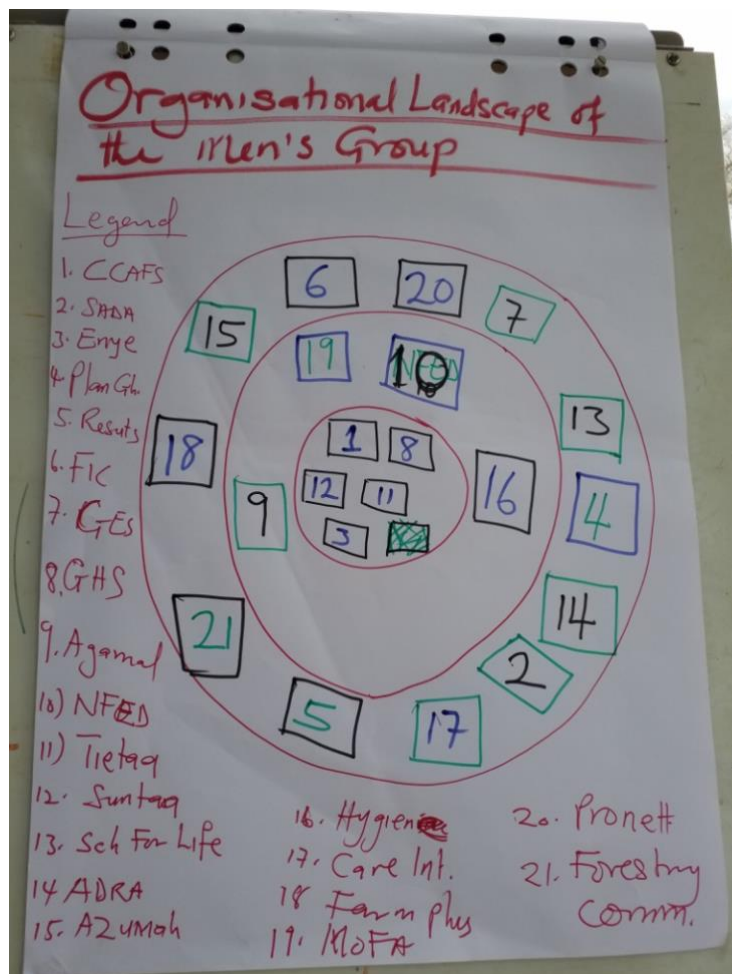


Figure 3. Organisational landscape of food security - men.

Table 9. Organisations that did not appear in the food security landscape during the midline study.

Men:

Name	Why were they not included in today's organizational landscape
ADRA	Participants say they did not work with it and cannot remember line of activities of ADRA in the community
Agriculture group	This was specifically name as forestry commission by participants and no longer functioning
Techno service	Participants could not remember the nature of activities /intervention

Women:

Name	Why were they not included in today's organizational landscape
Timedonbaea	Women engaged in this discussion could not remember this group and also attributed this to the fact that perhaps none of them were part of baseline exercise.
Enye group	This group transformed into Kameienye group which now involve a few men. Only women were managing the affairs but eventually encountered difficulties and had to dissolve.
Tentaabaerebo group	Women said this group has been dissolved for which reason they could not explain. Most members involved in this discussion were not members and therefore could not explain why the group failed to function.
FARM plus	This organisation seems to have folded up. Women said they have not seen or engaged with them for a number of years now.
Non formal education	This organisation used to provide English class for us but has not turned up for some time now.

Table 10. Organisations that appeared in the food security landscape during the midline but not during the baseline.

Men:

Name	Explain why they did not appear in the baseline study
SADA	Was not in inception
AZUMAH RESOURCES	This was given as integrated mining solutions in the baseline
FORESTRY COMMISSION	This was previously given as Agriculture group
CCAFS	Did not commence at the time of the baseline surveys

Women:

Name	Explain why they did not appear in the baseline study
ACDEP	This immersed after the baseline was collected. Women were not able to say exactly when it started in the community. they estimated its inceptions to be four years ago
CCAFS	This did not appear in the baseline because CCAFS started work with them seven years ago. This also means that baseline was collected before CCAFS intervention started.
GHS	According to women the Health facility provided through Ghana Health Services existed for the past three years. It means that this was not present at the time of

	baseline data collection. Further discussions show that GHS was not physically (in terms of infrastructure) operating in the community until now.
GES	It was an omission
Mother-to mother support group	The CHPS compound did not exist
Youth group	It did not exist at the time of the baseline
Tietaainuba	Did not exist at the time of the baseline
Nungtaatietaa	Did not exist at the time of the baseline
Soap makers	Did not exist at the time of the baseline

C. Organisational landscape of natural resource management

In this section, the organisational landscape in relation to natural resource management (NRM) is discussed. Specifically, what organisations were actively working to protect the environment, manage natural resources, etc.? The process entailed asking the group to highlight what organisations are involved in the management of natural resources in the community; developing a list of natural resources important to the livelihoods of the community; and asking the group to decide on a symbol for each type of natural resource listed.

Agamal and Azumah Resources Limited engaged prospecting for mineral resources in the area during the VBS. The attracting some people to the area to engage in small scale illegal mining. This contributed to a lot of destruction of the landscape by tree cutting and digging of soil as well as use of chemicals such mercury which ended up polluting the rivers in the area. SADA planted a teak plantation that is now established a teak forest in the area. SADA has since left the community. CCAFS through the Forestry Commission (FC) trained farmers on grafting of mangoes and nursery production of tree seedlings. Trees such as Mangoes and Moringa have now been planted in the landscape.

Table 11. Organisations that did not appear in the NRM landscape during the midline study.

Men:

Name	Why were they not included in today's organizational landscape
ADRA	Participants say they did not work with it and cannot remember line of activities of ADRA in the community
Agriculture group	This was specifically name as forestry commission by participants and no longer functioning
Techno service	Participants could not remember the nature of activities /intervention

Women:

Name	Explain why they did not appear in the baseline study
ACDEP	This immersed after the baseline was collected. Women were not able to say exactly when it started in the community. they estimated its inceptions to be four years ago

CCAFS	This did not appear in the baseline because CCAFS started work with them seven years ago. This also means that baseline was collected before CCAFS intervention started.
GHS	According to women the Health facility provided through Ghana Health Services existed for the past three years. It means that this was not present at the time of baseline data collection. Further discussions show that GHS was not physically (in terms of infrastructure) operating in the community until now.
GES	It was an omission
Mother-to mother support group	The CHPS compound did not exist
Youth group	It did not exist at the time of the baseline
Tietaainuba	Did not exist at the time of the baseline
Nungtaatietaa	Did not exist at the time of the baseline
Soap makers	Did not exist at the time of the baseline

Table 12. Organisations that appeared in the NRM landscape during the midline but not during the baseline.

Name	Explain why they did not appear in the baseline study
SADA	Was not in inception
AZUMAH RESOURCES	This was given as integrated mining solutions in the baseline
FORESTRY COMMISSION	This was previously given as Agriculture group
CCAFS	Did not commence at the time of the baseline surveys

Topic 3: Information networks

The aim of this exercise was to understand the diversity of options people use for accessing information on agriculture and weather; how people take advantage of sources of information available, and if some sources are not used and why. The baseline site analysis report described networks of how people access and share information within the community. The current midline study investigated if these networks have changed. Currently, the type of information community members require includes time for land preparation, weather information, storage protocols, market information and guidelines to seed selection. The people continue to source these pieces of information from family and friends, neighbours, organizations, radio and observation. Recently, farmers are able to call through the mobile phones to the Esoko call centre where information such as time of planting fertilizer application, weather forecast in different local Ghanaian languages as well as text alerts. Some community members also report that they are also able to source important information members of the CCAFS project who come to work in the community.

Table 13. Networks of information as identified during baseline study.

Information source	Topic (men)				Topic (women)			Total
	Market information	Rainfall	Planting time	Farm inputs (seeds and fertilizer)	Land preparation	Manure application	Weather info	
Family	0	0	1	1	0	0	0	2
Friends	1	0	1	1	1	1	1	6
Neighbour	1	0	0	0	0	0	1	2
Organisations	1	1	1	1	1	1	1	7
Radio	1	1	1	0	1	1	1	6
Observation	0	1	0	0	1	0	1	3

Table 14. Changes in the sources of information for different topics (type of information) as mentioned by women.

Type of information	New source of information that has become available	Sources of information that are no longer used
Land preparation	none	n/a
Manure application	none	n/a
Weather information	Esoko (mobile phone calls and text alerts)	Particular bird sound and animal movements
Storage	none	storage
Marketing	Radio, Esoko, neighbours	Information vans
Seed selection	CCAFS workers	n/a

Table 15. New topics (types of information) mentioned by men and women

Type of information
Drought Period
Input supply information
Sources of small loan support
Post-harvest storage information
Use of chemicals
Access to fertilizer
Elimination of fall army worm
Market for shea butter and Moringa soap

Conclusion and recommendations

Doggoh village is located within a vegetation type known as Sudan Savannah, which is characterized by a considerable tree population. Many trees shed off their leaves during the dry season and regenerate when the rains come. Bush fires are rampant in the area and can be devastating to crop fields. Economic trees such as shea and dawa-dawa abound in the area. Everyone has some land to cultivate, Doggoh villagers can only feed themselves for 3 months a year. They rely on remittances from their children who go south to seek employment in order to support the families in the village. High poverty levels increase the pressure to over exploit tree resources to which the community has open access. Income derived from the sale of wood fuel has created incentives for increasing the rate at which trees are cut down. Not surprisingly, two-thirds of the organizations identified by men and women in the study provided food security assistance. Recently, it's easy to see younger trees of moringa and mango trees in the settlements area. There are a lot of stones in the landscape that can be gathered and sold to the construction industry for increased household income and also to free up some more arable land for crop cultivation. It is easy to see compound farms in the settlement area. Most households keep livestock to support household incomes. The people engage in subsistence farming of rice, maize, cowpea, yam, beans, sorghum and other vegetables like okra, pepper and pumpkin. There are small plantations of teak and moringa near the wetland. The dawa-dawa and the shea nut trees are not domesticated due to social issues and not scientific ones. Women interact with resources that are close to the village. The men interact with resources further away from

the village and control resources, although it is women who provide the labour. Wood fuel is the sole source of domestic energy in the village therefore there is constant harvesting to meet both domestic and commercial demand. Trees produce fruits that are very significant in the local diet and supplements agricultural production. It is therefore important to sustain efforts at retaining trees and planting short maturing fruit bearing tree species on the landscape which can also contribute to nutritional security.

The natural resource stock appears not to have significantly changed since the VBS in 2011. Small rivers and streams, forest and wetlands. Teak forest is now established while the wetland is decreasing due to encroachment and siltation around the catchment area. Not much has been done on improving access roads and laying a bridge over the stream towards the school area. Efforts will need to be made to work on the access road in particular as that has the potential of facilitating transportation to the community for easy sale of the stone resources to the construction industry and also facilitate easy carting of farm inputs and produce.

Information networks for agricultural and weather information in the community are made up of media, organizations and individuals. The radio is the most used form of media. The radio offers several programmes in the Dagaare language, which provides the community with information. The Ministry of Food and Agriculture (MOFA), Farm Plus, RAAP, ADRA and recently Esoko are organizations that provide the community with information on agriculture. Access to mobile phone ownership is the limiting factor for many farmers to access the Esoko call centres or text alert on weather, timing of fertilizer application, market price information etc.

There is satisfactory progress towards building a natural resource management regime to contribute to food security in the face of climate and ecosystem changes. More attention ought to be paid particularly to the interventions of the CCAFS project for sustained outputs. Synergies with other organizations would need to be pursued to avoid duplication of interventions.

Implications for CCAFS and recommendations of major opportunities

Findings from the VMS show that community members are aware of their community level vulnerability to climate and ecosystem changes as well as their food security risk profile. Resources such as forests, rivers and wetlands are exposed to anthropogenic factors and therefore faces multiple levels of risks. Soils are beginning to improve in structure and form due to the CCAFS intervention in CSA practices. It is recommended that every household participates in at least one of the CCAFS intervention to accelerate the extent of adaptation penetrability. Measures on landscape restoration such as tree planting should be closely monitored and evaluated. It is possible to encourage each household to plant a certain number of trees and care for them till they are established while providing regular incentives. Annual crop yield calculations should constantly inform what support protocols are provided for food crop farmers. Another important recommendation is to aggressively pursue livelihood diversification and local economic development especially for women in the community. In evaluation the current crops being cultivated under the CSA, market-based demand dynamics should be factored in. That way, there would also be a market incentive for choice of crop cultivated. Finally, promotion of dry season gardening as well as home gardening has a potential of accelerating the efforts at attaining food and nutritional security for Doggoh community.