NEEDS ASSESSMENT FOR ENHANCING RESILIENCE TO CLIMATE CHANGE BY MAINSTREAMING ADAPTATION CONCERNS INTO AGRICULTURAL SECTOR DEVELOPMENT

BONG AND GRAND GEDEH COUNTIES, LIBERIA

(Final Report)

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JANUARY 2013

(Financial support from UNDP-GEF)

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EXECUTIVE SUMMARY

The Government of Liberia, with the support of the Global Environment Fund (GEF) and UNDP has launched a project on enhancing resilience to climate change by mainstreaming adaptation concerns into agriculture sector development. In this project, FAO is commissioned to support the implementation of Component 2 – *Innovative, sustainable and socially appropriate adaptive measures piloted at community level*.

In December 2012, FAO and the Ministry of Agriculture conducted a week-long needs assessment in Bong and Grand Gedeh Counties to kick start the GEF/Component 2 by defining climate risks facing the target communities to provide the basis for designing appropriate Farmer Field School (FFS) Curriculum and establishing the project baseline.

This brief report presents the outputs of the needs assessment for both Bong and Grand Gedeh Counties, covering the specific types of climate risks facing the communities as well as the extent of exposure and sensitivity of their livelihood assets to these risks along with the current coping strategies against the impacts of climate change. The report also presents the proposed climate change adaptation options for Bong and Grand Gedeh counties and the guideline towards developing and implementing a FFS methodology with the project logical framework to ensure effective monitoring and evaluation of adaptation activities and results.

1.0 BACKGROUND

The Government of Liberia (GoL), supported through the Global Environmental Fund (GEF) and UNDP is launching a project (2011-2015) to enhance the resilience to climate change by mainstreaming adaptation concerns into agricultural sector development in Liberia (LDCF).

The project is expected to i) focus on adaptation capacity and awareness raising of key agricultural technical stakeholders on climate change and adaptation, ii) pilot community adaptation strategies in two sites in Liberia. The Minister of Agriculture (MOA) offered a non-objection to use FAO experience for Component 2 to achieve appropriate adaptative measures piloted at the community level (Outcome2). The purpose is to use Farmers' Field Schools (FFS) model, tailored for agriculture adaptation to climate change in Liberia.

The Project Steering Committee (PSC) approved on 16 October 2012 the work plan/budget for the first year of the project (last quarter 2012). The 2012 Work plan includes a 1) baseline analysis on present current climate change adaptation strategies and coping mechanisms in Bong and Grand Gedeh Counties, and 2) develop a specific tailor made FFS curriculum for demonstration sites and target communities on both project counties. Both outputs will be submitted in January 2013 to the Steering Committee.

In November 2012, the FAO and MOA team carried out a scoping mission to Bong County to identify, review and discuss with local authorities the future project districts, including the most suitable project sites and communities for implementation of FFS model.

In December 2012, FAO and MOA launched a comprehensive needs assessment mission (N-A) to determine specific technical needs on each of the selected areas, and complete the baseline for the project. The N-A mission reviewed current climate risks, and assess from the community perspectives the degree to which agriculture production system is susceptible or unable to cope with the negative impacts of climate variability and change. Further, the N-A mission defined the parameters towards developing and implementing a FFS for climate change adaptation as well as indicators for effective project monitoring and evaluation.

2.0 OBJECTIVES

The aim of the N-A mission was to kick start GEF/Component 2 by defining climate risks facing the target communities, designing appropriate FFS curriculum for Bong and Grand Gedeh Counties and establish the project baseline.

As per the TOR, the N-A mission was organized to perform the following specific tasks:

1. Assess target county requirements to protect Liberia's agriculture sector from negative impact of climate change and variability, focusing specifically on adaptation issues;

2. Determine what type of climate technology for agriculture, forestry and land use is most effective to integrate under FFS programming, for each county;

3. Formulate with FAO-Liberia and MOA the 2013 FFS curriculum; and

4. Determine potential obstacles that can hinder adaptation adoption by farmers, and identify adequate location for project demonstration sites.

3.0 METHODOLOGY

The N-A mission team was comprised of Mr. Roland J. Lepor, the National Project Coordinator, Climate Change Adaptation Project, Ministry of Agriculture; Dr. Kennedy N. Igbokwe, Project Manager and International Consultant – Climate Change Adaptation, FAO Uganda, and Mr. Wakweya Tamiru, Monitoring and Evaluation Coordinator, FAO Liberia. The field mission and data compilation was conducted from December 9th – 16th, 2012.

As a starting point, the assessment team reviewed the scoping mission report which was conducted earlier in November 2012. The field assessment was conducted in Bong and Grand Gedeh Counties using focused group discussion and ocular visits to potential project communities. In Bong County, the team visited Belemue village in Panta District. While in Grand Gedeh, the focused group discussion and field visits were conducted in Zleh town, Tian town, Polar and Gaye town in Gharzon District. A component-based method was employed to analyze the vulnerability of community livelihood capital assets (Natural capital, Financial capital, Physical capital, Human capital and Social capital).

Using a simple guided checklist, the information collected from the communities and local stakeholders focused primarily on four steps: (1) reviewing and confirmation of ***climate risks***; (2) assessing the ***exposure*** of community and their livelihood capitals to climate risks; (3) assessing the ***sensitivity*** of community and their livelihood capitals to climate risks; and (4) assessing the current ***coping strategies*** to negative impacts of climate change.

During the field visit, discussions were also conducted with stakeholders in Cuttington University and the County Agriculture Coordinators in Bong and Grand Gedeh on the general emerging climate change issues and development of the farmer field school curriculum. In Grand Gedeh, meeting was also held with the County LISGIS expert. The field activities were followed by debriefing with FAO Representation staff and the Ministry of Agriculture.

4.0 THE FINDINGS

The results of the assessment are divided into ***four*** key parts:

The first part provides basic information on the climate context as well as the vulnerability assessments, current adaptive capacity/coping strategies of the target communities in Bong and Grand Gedeh Counties.

The second part presents a proposed adaptation options/ measures and potential obstacles that could impede community adaptation.

The third part presents parameters/guidelines towards developing a farmer field school curriculum.

The fourth part presents the proposed common project framework common to target communities in Bong and Grand Gedeh and the associated Log frame for monitoring and evaluation.

4.1 Needs Assessment for Bong County

4.1.1 The Climate Context

This section presents the target community understanding and perception about the negative impacts of climate change on the local production system.

Table 1: Impacts of climate variability and change

Climate Hazards	Effects/Impacts
Erratic rainfall/irregular rainfall pattern and drought	Limits the ability of farmers to properly plan for rice production and other crops as well as causing crop damage. Especially at the time of rainfall shortage, the livelihood of the people is threatened and contributing to food insecurity and poverty.
Increased temperature/heat wave	Causes low rice yield/productivity due to effects of heat wave during sensitive periods of planting, germination and maturing of grains.
	Contributes to decreasing water levels in swamps and other shallow water sources.
Increased episodes of heavy rain and flooding	Destruction of rice crop/paddies and vegetables.
	Increase in pests and diseases, for example Caterpillar outbreak in 2009 and 2011
	Increasing soil erosion and declining soil fertility.

Table 2: Perceived impact of climate change on agricultural production during the last 5 years

Crops	2007		2008		2009		2010		2011	
	Climate hazards	Effect on Production	Climate hazards	Effects on Production	Climate hazards	Effect on Production	Climate hazards	Effects on Production	Climate hazards	Effect on Production
Upland Rice	No information		No information		High temperature	Poor germination of upland rice & low harvest	No information		High temperature	Poor germination of upland rice & low harvest
Lowland/ Swamp rice	No information		High temperature	Reduced water levels in swamps leading to low yield	High temperature	Reduced water levels in swamps leading to low yield	High temperature	Reduced water levels in swamps leading to low yield	High temperature	Reduced water levels in swamps leading to low yield
Cocoa	Heavy rainfall/ flooding	Induced black-pod disease causing low production	No information		No information		No information		No information	
Rubber	No information		Heavy rainfall/ flooding	Induced black-thread disease on rubber cause low production	No information		No information		No information	

4.1.2 Vulnerability Assessments

This aims to assess (from the community perspectives) the degree to which the agriculture production system is susceptible or unable to cope with the negative impacts of climate variability and change. It involved specifically assessing the exposure and sensitivity of farmers and their agricultural livelihood resources to the climate hazards as well as the adaptive capacity to cope with the negative consequences of climate variability and change.

4.1.2.1 Assessing Exposure to Climate Risks

This section presents the number and types of livelihood capital assets that are likely to experience or be present or affected by the climate hazards. These include natural assets (Table 3 - land, crops, livestock, forests and water resources), financial assets (Table 4- income generating activities), human assets (Table 5 - productive skills), physical assets (Table 6 - infrastructures and equipment) and social assets (Table 7 - membership or belongingness to community organization).

Table 3: Perceived Exposure of Natural Capital Assets to Climate hazards in Belemue Village, Panta District

Natural Capital assets exposed to Climate hazards		Climate hazards			Remarks
		Erratic rainfall pattern and drought	**Increased temperature/heat wave**	**Increased episodes of heavy rain and flooding**	
Land Resources:					
Swamps/ Wetlands	Panta District	About 350 hectares swamp lands for rice production in Panta District (i.e. all of swamp areas in the district is exposed)	About 60-75% of all swamp rice areas (i.e. 240 ha) in Panta District is reported to be affected by increased temperature.	About 25% of all swamp land in Panta or 86 hectares was reported to be affected by increased rain and flooding.	The swamp rice production is cultivated by 500 farmers (400 women) in Belemue. The average swamp rice farm size is 0.50 ha per family.
	Belemue Village	250 ha (based on average land size estimates and number of farmers in Belemue)	About 169 ha of swamp land	About 62.5 ha of swamp land	
Uplands		About 1,518 hectares (i.e. all of upland area in the district)	About 1,518 hectares	Upland farms are not currently affected by flooding.	The average upland farm size is 1.012 ha per family.
Crops:					
Rice	Lowland rice	250 ha in Belemue	250 ha in Belemue	100 ha in Belemue	40% germination failure and 60% of upland rice failure attributed to increased temperature
	Upland rice	1,331 ha of upland rice	1,331 ha of upland rice	Not exposed to flooding.	
Cassava		187 ha	187 ha	Not exposed to flooding	1,500 Belemue farmers cultivate cassava with average plot size of 0.12 ha. Not a major crop
Vegetables	Lowland	375 swamp vegetable farmers	375 swamp vegetable farmers	No estimates provided	Only 25% of Belemue farmers grow vegetables in swampland
	Upland	1,125 upland vegetable farmers	1,125 upland vegetable farmers	Not exposed to flooding	
Plantain		3,000 plantain trees	3,000 plantain trees		
Livestock:					
Goat		2,250 goats	2,250 goats	Not exposed to flooding	50% of farmers have an average of 3 goats each. 500 goats were suspected to have died due dehydration in Feb/April 2012
Chicken		1,890 birds	1,890 birds		9% of farmers have an average of 12-15 birds. Many were reported to have died of dehydration.
Sheep		540 sheep	540 sheep		12% of farmers have an average of 3 sheep
Duck		360 ducks	360 ducks		8% of farmers have an average of 3 ducks
Pig		2250 pigs	2250 pigs		
Forest Resources:					
Famaria			Affected but size of affected area not known		
Dahomey					
Rubber			About 607 hectares is affected/exposed		Farmers reported evidence of germination failure and low

Natural Capital assets exposed to Climate hazards	Climate hazards			Remarks
	Erratic rainfall pattern and drought	Increased temperature/heat wave	Increased episodes of heavy rain and flooding	
		to high temperature		yield of latex due to heat
Oil Palm		About 810 hectares is affected/exposed to high temperature		Farmers reported oil palm tree not maturing and fruitful
Water Resources:				
Springs, streams and creeks	Foe creek (in Belemeu)	Foe creek	Foe creek	The creek dries up and floods frequently. When it floods it makes crossing difficult
Rivers	3 rivers in Panta District	3 rivers in Panta District	3 rivers in Panta District	The 3 rivers get flooded
Groundwater resources	11 hand pumps			In Belemue, 2 machine-drilled functional hand pumps accessible to community increasingly experiencing reduced water levels since last year; another 3 hand pumps owned by Church Mission in Belemue; total of 11 hand pumps in Belemue (7 of which not functional)

Table 4: Exposure of Financial Resources (Assets) to Climate hazards

Financial Resources/ Assets		Climate hazards			Remarks
		Erratic rainfall pattern and drought	Increased temperature/heat wave	Increased episodes of heavy rain and flooding	
Livestock:					
Goat		2,250 goats ($146,250)	2,250 goats ($146,250)	Not exposed	Selling price: US$ 65 per goat
Chicken		1,890 birds ($9,450)	1,890 birds ($9450)	Not exposed	Selling price: US$ 5 per bird
Sheep		540 sheep ($810,000)	540 sheep ($810,000)	Not exposed	Selling price: US$150 per sheep
Duck		360 ducks ($2,880)	360 ducks ($2,880)	Not exposed	Selling price: US$ 8 per duck
Pig		2,250 pigs ($135,000)	2,250 pigs ($135,000)	Not exposed	Selling price: US$ 60 per pig
Crops:					
Rice	Swamp rice	250 MT ($87,500)	250 MT ($87,500)	250 MT $87,500)	This represents the current level of production potentially exposed to the climate hazards. The price of rice is US$0.35 per kilogram
	Upland rice	665.5 MT ($232,925)	665.5 MT ($232,925)	Not exposed to flooding	
Vegetables	Bitterball	No information/estimates on the current level of production			Selling price: US$11.4 per 50 kilo bag
	Pepper				Selling price: US$17 per 50 kilo bag
	Okra				Selling price: US$ 11.4 per 50 kilo bag
Cocoa					Selling price: US$ 2.2 per kilo

Table 5: Exposure of Physical Resources (Assets) to Climate hazards

Resources	Climate hazards			Remarks
	Erratic rainfall pattern and drought	Increased temperature/heat wave	Increased episodes of heavy rain and flooding	
Bridges	Not applicable	Not applicable	6 bridges are exposed	3 out of 6 bridges damaged by flooding
Roads	Not applicable	Not applicable	One (1) major market road	This is always affected when there is heavy rain

Table 6: Exposure of Human Resources (Assets) to Climate hazards

Human Resources		Climate hazards			Remarks
		Erratic rainfall pattern and drought	Increased temperature/heat wave	Increased episodes of heavy rain and flooding	
Rice production capabilities	Swamp	500 swamp rice farmers	500 swamp farmers	500 swamp rice farmers	
	Upland	1,500 upland farmers	1,500 upland farmers	1,500 upland farmers	

Table 7: Exposure of Social Resources (Assets) to Climate hazards

Membership in organizations	Climate hazards			Remarks
	Erratic rainfall pattern and drought	Increased temperature/heat wave	Increased episodes of heavy rain and flooding	
PAFACO Farmer Union	500 members	500 members	500 members	Comprised of men and women
Leekpaylay Farmer Union	300 members	300 members	300 members	All women only

4.1.2.2 Sensitivity to Climate risk

This section presents the extent to which community livelihood capital assets are currently affected by the climate hazards. These include natural assets (Table 8: land, crops, livestock, forests and water resources), financial assets (Table 9: income generating activities), human assets (Table 10: productive skills), physical assets (Table 11: infrastructures and equipment) and social assets (Table 12: membership or belongingness to community organization).

Table 8: Community Perceived Sensitivity of Natural Resources (Assets) to Climate hazards

Extent to which natural resources/assets are influenced negatively by climate hazards identified in the climate context (0 = no influence, 5 = full influence)																		
Natural Resources/Assets	Climate hazards																	Notes on sensitivity to climate hazard impacts
	Erratic rainfall pattern and drought						Increased temperature/heat wave						Increased episodes of heavy rain and flooding					
	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	
Land Resources:																			
Swamps/Wetlands			x							x					x				Increased temperature/heat wave has moderate negative impact on the swamp productivity, but with much more effect on the uplands.
Uplands				x							x				x				
Crops:																			
Rice				x						x					x				Erratic rainfall pattern/drought and increased temperature have more negative impact on rice production. Both germination and crop failure reached 40% and 60%, respectively.
Cassava	x						x						x						
Cocoa	x									x					x				
Coffee	x								x				x						
Plantain (Banana Variety)	x								x				x						

Extent to which natural resources/assets are influenced negatively by climate hazards identified in the climate context (0 = no influence, 5 = full influence)																			
Natural Resources/Assets	**Climate hazards**																		**Notes on sensitivity to climate hazard impacts**
	Erratic rainfall pattern and drought						**Increased temperature/heat wave**						**Increased episodes of heavy rain and flooding**						
	0	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	
Livestock:																			Increased temperature/heat wave has negative impacts on goats and chickens. About 500 goats and scores of chicken were reported to have died in Feb/April, 2012
Goat	x										x		x						
Chicken		x									x		x						
Pig	x									x			x						
Duck	x								x				x						
Sheep	x									x			x						
Forest Resources:																			No current significant impact of any of the hazards on forest resources, except on the reported flooding effects on Dahomey and the germination failure and low yield of latex due to heat on rubber.
Famaria	x								x				x						
Dahomey	x								x						x				
Rubber		x							x				x						
Oil Palm		x							x				x						
Water Resources:																			Communities attribute low pumping rates to lowering of water tables caused by erratic rainfall pattern/drought and increased temperature/heat wave.
Springs, streams and creeks			x						x					x					
Rivers			x						x					x					
Groundwater				x						x			x						

Table 9: Sensitivity of Financial Capital Assets to Climate hazards

Extent to which financial resources/assets are influenced negatively by climate hazards identified in the climate context (0 = no influence, 5 = full influence)																			
Financial Resources /Assets	**Climate hazards**																		**Notes on climate hazards**
	Erratic rainfall pattern and drought						**Increased temperature/ heat wave**						**Increased episodes of heavy rain and flooding**						
	0	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	
Livestock:																			Farmers claimed that increased temperature/heat wave has high negative effects on goats and chicken. Estimated 500 goats died in Feb/April 2012 causing a financial loss of about US$ 32,500. Scores of chicken died during similar time (estimates to be re-verified).
Goat	x										x		x						
Pig	x									x			x						
Chicken	x										x		x						
Crops:																			Farmers claimed that increased temperature/heat wave has led to as much as 60% failure in upland rice production. In financial terms this is translates to a loss of about US$ 139,755. Also farmers claimed that flooding affects as much as 25% of the swamp rice production areas, with potential to cause a loss of about US$ 21,875
Rice				x						x					x				
Cassava	x							x					x						
Coffee	x										x		x						
Cocoa	x									x					x				
Plantain	x								x				x						

Table 10: Sensitivity of Physical Capital Assets to Climate hazards

Extent to which physical resources/assets are influenced negatively by climate hazards identified in the climate context (0 = no influence, 5 = full influence)																		
Financial Resources/ Assets	**Climate hazards**																	**Notes on climate hazards**
	Erratic rainfall pattern and drought						**Increased temperature/ heat wave**						**Increased episodes of heavy rain and flooding**					
	0	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	
Bridges	**x**						**x**								**x**				Heavy rain and floods have negative effects on rural infrastructures, especially the bridges where as much as 50% damage have been reported by the farmers.
Roads	**x**						**x**								**x**				

Table 11: Sensitivity of Human Capital Assets to Climate hazards

Extent to which human resources/assets are influenced negatively by climate hazards identified in the climate context (0 = no influence, 5 = full influence)																		
Human Resources	**Climate hazards**																	**Notes on climate hazards**
	Erratic rainfall pattern and drought						**Increased temperature/ heat wave**						**Increased episodes of heavy rain and flooding**					
	0	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	
Rice production capabilities																			Appropriate sensitivity level not clear for any of the climate change hazards. However exposure to scourge of heat and colds ailments associated with frequent rain could impede capability to work effectively in the field

Table 12: Sensitivity of Social Capital Assets to Climate hazards

Extent to which social resources/assets are influenced negatively by climate hazards identified in the climate context (0 = no influence, 5 = full influence)																		
Social Resources	**Climate hazards**																	**Notes on climate hazards**
	Erratic rainfall pattern and drought						**Increased temperature/ heat wave**						**Increased episodes of heavy rain and flooding**					
	0	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	
PAFACO Farmer Union																			Appropriate sensitivity level not determined. However, the existence of farmer organizations is a positive attribute that could quickly strengthen the institutional adaptive capacity of farmers to respond to the climate change risks.
Leekpaylay Farmer Union																			

4.1.3 Assessing Current Community Coping Strategies to Climate Change in Belemue, Panta District

This section presents the current short-term strategies of the target communities and its effectiveness to respond to the periodic climate hazards (Table 13). According to farmers the most effective coping strategy against risk of crop failure and low productivity due to water stress is planting of drought resistant rice variety (LAC 23 upland rice).

Table 13: Community Coping Strategies to Climate Change

Climate change hazards	Climate change risks	Current coping strategies	Effectiveness of coping strategies						Remarks
			0	1	2	3	4	5	
Erratic rainfall/ irregular rainfall pattern and drought	Crop failure and low productivity due to water stress	Delayed planting			x				Does not fully remedy the situation
		Planting resistant rice variety (LAC-23 upland rice)						x	Very effective in being resilience to climate change (about 50% farmers using it currently)
Increased temperature/ heat wave	Crop failure and low productivity of rice due to heat wave especially during sensitive stages of planting, germination and maturation of grains	Planting rice twice a year		x					Damages soil structure and labor intensive
		Diversification of crops			x				Most farmers prefer this practice
	Crop failure and low productivity due to increased pests and diseases	Weeding, fencing and use of scare crows				x			Common practice among farmers
Increased episodes of heavy rain and flooding	Crop failure and low productivity due to flooding	None as this is not a significant problem yet							
	Low crop productivity resulting from soil erosion and reduced fertility due to land degradation	Early planting in May in anticipation of rainfall; when rain comes, soil compact ability and firmness are bolstered by root-networks of crops				x			Late planting only increases vulnerability to soil erosion
	Low productivity due to increased pest and diseases	Weeding, fencing and use of scare crows				x			Common practice among farmers
Climate change hazards	**Climate change risks**	**Current coping strategies**	**Effectiveness of coping strategies**						**Remarks**
			0	**1**	**2**	**3**	**4**	**5**	
Vulnerabilities:									
Increased vulnerability due to limited alternatives sources of income and livelihoods		Petty trading		x					Not profitable or gainful
Increased vulnerability due to limited access to credit		Credit and saving clubs and *susu*			x				Credit clubs and *susu* have limited financial and technical capacity
Increased vulnerability due to high post harvest losses		Drying of pepper, smoking of meat, using cold shaded areas for storage of fresh vegetables	x						

4.2 Needs Assessment for Grand Gedeh County

4.2.1 The Climate Context

This section presents the target community understanding and perception about the negative impacts of climate change on the local production system.

Table 14: Impacts of climate variability and change

Climate Hazards	Effects/ Impacts
Erratic rainfall/irregular rainfall pattern and drought	Low production (rice, vegetable, cocoa) and crop loss; and delayed cultivation
	Reduced soil moisture (2011) and drying up of swamps, creeks and streams
	Shortage of sources of water for drinking, washing, etc; and hand pumps dry up (under ground water)
	Migration of wild animal (e.g. Hippo, Christmas bird, elephant, etc)
Increased temperature/heat wave	Micro organisms getting deeper into the soil (fertility of surface soil reduced) and loss of soil moisture
	Occurrence of disease (human & plants), for instance cough, rashes, etc and increase in rice blast, stem borer affect crops
	Stunted growth of crops and poor germination of crops and low production; premature ripeness of vegetables
	Loss in livestock (mainly chicken and goat)
Increased episodes of heavy rain and flooding	Damaging of dams, houses, bridges and roads flooded to the point of no-crossing
	Lowland farms destroyed and yield reduced
	Human diseases (diarrhea)
	Soil erosion

Table 15: Perceived impact of climate change on agricultural production during the last 5 years

Crops	2007		2008		2009		2010		2011	
	Climate hazards	Effect on Production	Climate hazards	Effects on Production	Climate hazards	Effect on Production	Climate hazards	Effects on Production	Climate hazards	Effect on Production
Upland Rice	Perceived as good year/normal year		Perceived as good year/ normal year		Perceived as good year/normal year		Drought and high temperature	Low crop yield	Drought with high temperature (worst in 5 years)	10-15% losses in rice production
Lowland/ Swamp rice	Perceived as good year/ normal year Yield = 600 bundles/acre (1.5 MT/acre)		Perceived as good year/ normal year Yield = 600 bundles /acre (1.5 MT/acre)		Perceived as good year/ normal year Yield = 600 bundles/acre (1.5 MT/acre)		Drought and high temperature	Low crop yield Likely yield loss of 10-15%	Drought with high temperature	Low crop yield. About 10-15% loss but a farmer reported yield loss of over 95%.

Note: *In 2011, there was significant period of drought and in 2012 a lot of rain was experienced. 1 bundle is equal to 2.5 kg of rice.*

4.2.2 Vulnerability Assessments

This aims to assess (from the community perspectives) the degree to which the agriculture production system is susceptible or unable to cope with the negative impacts of climate variability and change. It involved specifically assessing the exposure and sensitivity of farmers and their agricultural livelihood resources to the climate hazards as well as the adaptive capacity to cope with the negative consequences of climate variability and change.

4.2.2.1 Assessing Exposure to Climate Risks

This section presents the number and types of livelihood capital assets that are likely to experience or be present or affected by the climate hazards. These include natural assets (Table 16: land, crops, livestock, forests and water resources), financial assets (Table 17: income generating activities), human assets (Table 18: productive skills), physical assets (Table 19: infrastructures and equipment) and social assets (Table 20: membership or belongingness to community organization).

Table16: Perceived Exposure of Natural Capital Assets to Climate hazards in Zleh Town, Gbarzon District

Resources exposed to Climate hazards		Climate hazards			Remarks
		Erratic rainfall pattern and drought	Increased temperature/heat wave	Increased episodes of heavy rain and flooding	
Land Resources:					
Swamps/ Wetlands	Gbao District	80,000 ha are exposed	80,000 ha are exposed	80,000 ha are exposed	The upland farm areas in Grand Gedeh is more than double the size of the swamp farm lands
	Zleh Town	700 ha are exposed	700 ha are exposed	700 ha are exposed	The average swamp farm size is 4.65 ha. Some farmers can incur as much as 80-85% loss due to drought
Uplands Zleh Town		160 ha	160 ha are exposed	160 ha are exposed	The average upland farm size is 0.60 ha per family. Approximately 267 upland farmers in Zleh town.
Crops:					
Rice	Lowland rice	700 ha	700 ha	700 ha	10-15% loss of yield for upland rice during drought in 2011
	Upland rice	160	160	Not exposed to flooding	
Cassava		160 Exposed but resistant	160 Exposed but resistant	Not exposed to flooding	All the upland farmers grow cassava. The average farm size is 0.60 ha. Every famer make cassava farm as a second option and back up for rice failure – a sort of safety net measure
Vegetables		81 ha	Not exposed	Not exposed	The average vegetable size per farmer is 0.20 ha to 0.40 ha.
Plantain		108 ha	Not exposed	Not exposed	The average farm size grown to plantain is 0.40 ha.
Livestock:					
Goat (Zleh Town)		854 goats (estimates for Zleh town only)	854 goats (estimates for Zleh town only)	Not exposed to flooding	80% of the farmers have an average of 3-5 goats. This value was used in estimating number of goats owned by 267 upland and swamp farmers in Zleh Town.
Chicken (Zleh town)		3,810 birds	3,810 birds		95% of farmers have an average of 15 birds. About 40% were reported to have died of dehydration in 2011.
Sheep (Gbarzon District)		2,000-3,000 sheep	2,000-3,000 sheep		About 1,500 died in 2011
Duck(Gharzon District		1,500 ducks	1,500 ducks		50% died for lack of water in 2011
Forest Resources:					
Abura		Not applicable	Not applicable	Exposed	As much as 20% existing trees are affected
Nyanqun		Not applicable	Not applicable	Exposed	
Upaka		Not applicable	Not applicable	Exposed	
Water Resources:					
Springs, streams and creeks		3 creeks are exposed to cc risks	3 creeks are exposed to cc risks	3 creeks are exposed to cc risks	All creeks get flooded when it rains and also dries up during the dry season. As much 85% of the creeks can dry up during the dry season.
Rivers		2 rivers are exposed to climate	2 rivers are exposed to	2 rivers are exposed to climate	All the rivers get flooded when it rains, and about 90% are said to

Resources exposed to Climate hazards	Climate hazards			Remarks
	Erratic rainfall pattern and drought	Increased temperature/heat wave	Increased episodes of heavy rain and flooding	
	change risks (Cavalla & Cestos)	climate change risks (Cavalla & Cestos)	change risks (Cavalla & Cestos)	overflow their banks.
Groundwater resources	hand pumps	hand pumps	Not applicable	90% of shallow wells are reported to dry up during dry seasons

Table 17: Exposure of Financial Capital Assets to Climate hazards

Financial Resources/ Assets		Climate hazards			Remarks
		Erratic rainfall pattern and drought	Increased temperature/ heat wave	Increased episodes of heavy rain and flooding	
Livestock:					
Goat (Zleh town)		854 goats ($55,510)	854 goats ($55,510)	Not exposed	Selling price: US$ 65 per goat
Chicken (Zleh town)		3,810 birds ($19,050)	3,810 birds ($19,050)	Not exposed	Selling price: US$ 5 per bird
Sheep (Gbarzon District)		2,000-3,000 sheep	2,000-3,000 sheep	Not exposed	Selling price: US$ 150 per sheep
Duck (Gbarzon District)		1,500 ducks	1,500 ducks	Not exposed	Selling price: US$ 8 per duck
Crops:					
Rice (Zleh Town)	Swamp rice	700MT ($245,000)	700 MT ($245,000)	700 MT ($245,000)	This represents the current level of production potentially exposed to the climate hazards. The price of rice is $0.35 per kilogram
	Upland rice	80 MT ($28,000)	80 MT ($28,000)	Not exposed to flooding	
Vegetables		No information/estimates on the current level of production			
Plantain					
Charcoal selling					

Table 18: Exposure of Physical Capital Assets to Climate hazards

Resources	Climate hazards			Remarks
	Erratic rainfall pattern and drought	Increased temperature/heat wave	Increased episodes of heavy rain and flooding	
Irrigation facilities	Not applicable	Not applicable	Exposed	The N-A team visited one irrigation facility near Zleh town, which was damaged by flooding.
Bridges	Not applicable	Not applicable	2 bridges are exposed	Two bridges damaged by flooding
Roads	Not applicable	Not applicable	1 major market road	This is always affected when there is heavy rain

Table 19: Exposure of Human Resources (Assets) to Climate hazards

Human Resources		Climate hazards			Remarks
		Erratic rainfall pattern and drought	Increased temperature/heat wave	Increased episodes of heavy rain and flooding	
Rice production capabilities (Zleh Town)	Swamp	151 swamp rice farmers	151 swamp farmers	151 swamp rice farmers	This figures are derived by dividing 700 ha of swamp farm in Zleh Town by an average farm size of 4.65 ha per farmer
	Upland	267 upland farmers	267 upland farmers	267 upland farmers	This figures are derived by dividing 160 ha of upland farm in Zleh Town by an average farm size of 0.60 ha per farmer
Fishing capability		Quantity of fish not provided			Large amounts of fish are caught and sold.

Table 20: Exposure of Social Resources (Assets) to Climate hazards

Membership in organizations	Climate hazards			Remarks
	Erratic rainfall pattern and drought	Increased temperature/heat wave	Increased episodes of heavy rain and flooding	
AMENU Farmer group	1,875 members	1,875 members	1,875 members	Women comprised 43% of the membership
Women groups	300 members	300 members	300 members	There are seven women groups

4.2.2.2 Assessing sensitivity to climate risks

This section presents the extent to which community livelihood capital assets are currently affected by the climate hazards. These include Natural assets (Table 21: land, crops, livestock, forests and water resources), financial assets (Table 22:I income generating activities), human assets (Table 23: productive skills), physical assets (Table 24: infrastructures and equipment) and social assets (Table 25: membership or belongingness to community organization).

Table 21: Community Perceived Sensitivity of Natural Capital Asset to Climate hazards

Extent to which natural resources/assets are influenced negatively by climate hazards identified in the climate context (0 = no influence, 5 = full influence)																		
Natural Resources/Assets	Climate hazards																	Notes on climate hazard impacts
	Erratic rainfall pattern and drought						Increased temperature/heat wave						Increased episodes of heavy rain and flooding					
	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	
Land Resources:																			Flooding and erratic nature of rainfall significantly affects swamp and upland areas, respectively. Some farmers reported loss of rice plots to flooding. 100% of the swamp areas are affected with 15-20% for the uplands
Swamps/ Wetlands				x						x							x		
Uplands					x					x			x						
Crops:																			Erratic rainfall pattern/ drought and increased temperature have more negative impact on rice production. Across the board loss of 10-15% yield was reported in 2011 though some experienced over 95% loss
Rice					x						x					x			
Cassava	x						x						x						
Vegetables			x							x					x				
Plantain (Banana Variety)	x							x						x					

Extent to which natural resources/assets are influenced negatively by climate hazards identified in the climate context (0 = no influence, 5 = full influence)																			
Natural Resources/Assets	**Climate hazards**																		**Notes on climate hazard impacts**
	Erratic rainfall pattern and drought						**Increased temperature/heat wave**						**Increased episodes of heavy rain and flooding**						
	0	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	
Livestock:																			Increased temperature/heat wave has negative impacts on goats and chickens. About 40% of chicken and scores of goats and sheep were reported to have died in 2011.
Goat				**x**						**x**			**x**						
Chicken				**x**						**x**			**x**						
Sheep				**x**						**x**			**x**						
Duck				**x**						**x**			**x**						
Forest Resources:																			Heavy rain and flooding were mentioned as having affected about 20% of the trees.
Abura		**x**						**x**							**x**				
Nyankon		**x**						**x**							**x**				
Upaka		**x**						**x**							**x**				
Water Resources:																			Communities attribute low pumping rates and drying of wells to lowering of water tables caused by erratic rainfall pattern/drought and increased temperature/heat wave
Springs, streams and creeks				**x**						**x**							**x**		
Rivers			**x**						**x**				**x**						
Groundwater				**x**						**x**			**x**						

Table 22: Sensitivity of Financial Capital Assets to Climate hazards

Extent to which financial resources/assets are influenced negatively by climate hazards identified in the climate context (0 = no influence, 5 = full influence)																			
Financial Resources/ Assets	**Climate hazards**																		**Notes on climate hazards**
	Erratic rainfall pattern and drought						**Increased temperature/ heat wave**						**Increased episodes of heavy rain and flooding**						
	0	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	
Livestock:																			Farmers claimed that increased temperature/heat wave has negative effects on goats and chicken. Estimated 100 goats died in 2011causing a financial loss of about US$ 6,500. About 40% of chicken (1,524) died causing financial loss of US$ 7,620
Goat				**x**						**x**			**x**						
Chicken				**x**						**x**			**x**						
Sheep				**x**						**x**			**x**						About 50% of the sheep and ducks were reported to have died due to dehydration.
Duck				**x**						**x**			**x**						
Crops:																			Farmers claimed that increased temperature/heat wave has led to as much as 10-15% failure in upland rice production. In financial terms this is translates to a loss of about US$ 24,500-36,750 in Zleh town. Also farmers claimed that flooding caused as much as over 95% swamp rice yield production decline was reported for some people.
Rice				**x**							**x**					**x**			
Cassava	**x**						**x**						**x**						
Vegetable			**x**							**x**				**x**					
Plantain	**x**							**x**						**x**					

Table 23: Sensitivity of Physical Resources (Assets) to Climate hazards

Extent to which physical resources/assets are influenced negatively by climate hazards identified in the climate context (0 = no influence, 5 = full influence)																		
Financial Resources/ Assets	**Climate hazards**																	**Notes on climate hazards**
	Erratic rainfall pattern and drought						**Increased temperature/ heat wave**						**Increased episodes of heavy rain and flooding**					
	0	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	
Irrigation facilities																			
Bridges	**x**						**x**								**x**				Heavy rain and floods have negative effects on rural infrastructures, especially the bridges where as much as 50% damage have been reported by the farmers.
Roads	**x**						**x**								**x**				

Table 24: Sensitivity of Human Resources (Assets) to Climate hazards

Extent to which human resources/ assets are influenced negatively by climate hazards identified in the climate context (0 = no influence, 5 = full influence)																		
Human Resources	**Climate hazards**																	**Notes on climate hazards**
	Erratic rainfall pattern and drought						**Increased temperature/ heat wave**						**Increased episodes of heavy rain and flooding**					
	0	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	
Rice production capabilities																			Appropriate sensitivity level not clear for any of the climate change hazards. However exposure to scourge of heat and colds ailments associated with frequent rain could impede capability to work effectively in the field
Fishing capabilities																			

Table 25: Sensitivity of Social Resources (Assets) to Climate hazards

Extent to which social resources/assets are influenced negatively by climate hazards identified in the climate context (0 = no influence, 5 = full influence)																		
Social Resources	**Climate hazards**																	**Notes on climate hazards**
	Erratic rainfall pattern and drought						**Increased temperature/ heat wave**						**Increased episodes of heavy rain and flooding**					
	0	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**	
AMENU Farmer group																			Appropriate sensitivity level not determined. However, the existence of farmer organizations is a positive attribute that could quickly strengthen the institutional adaptive capacity of farmers to respond to the climate change risks.
Women groups																			

4.2.3 Assessing Current Community Coping Strategies to climate change in Zleh Town, Gharzon District

This section presents the current coping strategies that the communities are using to address the various climate risks they face, as well as the effectiveness of these strategies. As shown in the Table 26 below, the most effective coping strategy, according to farmers is increasing use of lowland farming to address the risk of crop failure due to water stress. This is followed by crop diversification and intercropping with cassava to address the impact of heat wave during sensitive stages of plant growth.

Table 26: Community coping strategies to climate change, Zleh Town

Climate change hazards	Climate change risks	Current coping strategies	Effectiveness of coping strategies						Remarks/ Notes
			0	1	2	3	4	5	
Erratic rainfall/ irregular rainfall pattern and drought	Crop failure and low productivity due to water stress	Planting resistant rice variety (LAC-23 upland rice)				x			Limited awareness
		Increased lowland farming						x	Currently the most assuring farms (80-85% farmers are into lowland farming in Zleh, Tian and Gaye towns
Increased temperature/ heat wave	Crop failure and low productivity of rice due to heat wave especially during sensitive stages of planting, germination and maturation of grains	Diversification and intercropping with cassava				x			Most farmers prefer rice, but cassava and others are helping. For example, Tian town reported 100% intercropping with cassava
	Crop failure and low productivity due to increased pests and diseases	IPM (Integrated Pest Management) system			x				Limited awareness
Increased episodes of heavy rain and flooding	Crop failure and low productivity due to flooding	Observation, reduced sand mining and shifting to upland production		x					Not really helping
	Low crop productivity resulting from soil erosion and reduced fertility due to land degradation	Crop rotation/ intercropping			x				Lack of extension services
	Low productivity due to increased pest and diseases	Use of IPM as mentioned above			x				Limited awareness
Vulnerabilities									
Increased vulnerability due to limited alternatives sources of income and livelihoods		Mining and hunting		x					Not profitable or gainful
Increased vulnerability due to limited access to credit		Assessing credit through ***susu***		x					Not helping due to high interest rates and short repayment duration. Currently only 25% of farmers have access to *susu*
Increased vulnerability due to high post harvest losses		Individual rice kitchen		x					Availability of shaded areas keep reducing;

Note: Scale of zero (0) means NOT effective.

5.0 PROPOSED ADAPTATION OPTIONS FOR BONG AND GRAND GEDEH COUNTIES

This section presents potential climate change adaption options applicable for both Bong and Grand Gedeh Counties. The adaptation measures are identified for each of the current climate risks facing the target communities.

Table 27: Proposed Common Climate Change adaptation Measures for Bong and Grand Gedeh Counties and the potential obstacles for adoption

Climate risks facing agriculture in Bong and Grand Gedeh Counties	Proposed Adaptation options and practices	Potential obstacle that can hinder adaptation by farmers
Crop failure and low productivity due to water stress	Promote drought resistant rice variety (Lac-23). This is currently used by 50% of farmers in Panta and Gharzon District. There is need to increase coverage to all farmers (100%)	Skepticism, lack of information and training
	Lowland/ Swamp rice production: ➢ Improve reliability of water supply in the swamp through establishment of water harvesting systems, like valley dams and valley tank/ reservoirs with appropriate water control measures. ➢ Promote ecosystem/watershed management approach to ensure that runoff from the surrounding upland areas are infiltrating and recharging the groundwater system upon which the swamp water for rice depends. ➢ Train and organize farmers into watershed or catchment development associations/committees	Limited knowledge, awareness and capacity to develop swamp farms
	Upland rice production: ➢ Reduce water stress by rainwater harvesting through small farmer reservoir systems, mini-ponds, trenches and terracing ➢ Maintenance of permanent soil cover through crop residue retention to increase soil organic matter and reduce water stress	Limited knowledge and awareness
Crop failure and low productivity due to flooding	➢ Reduce floods by developing water control and drainage systems ➢ Reduce floods by promoting ecosystem/watershed management approach to ensure that runoff from the surrounding upland areas are reduced by infiltrating and recharging the groundwater systems. ➢ Train and organize farmers into watershed or catchment development associations/committees	Limited knowledge and awareness
Low crop productivity resulting from soil erosion and reduced fertility due to land degradation	***Lowland/ Swamp rice production:*** ➢ System of Rice Intensification (SRI) introduced in the two sites via farmer validation methodologies including the use of legumes in rice cycle to help maintain fertility and reduce labor time needed for weeding *(mucuna*). ➢ Incorporation of stover into small animal husbandry systems as opposed to burning, after animal use can be returned to the land and enriched for improving soil cover and fertility. ***Upland production:*** ➢ Use of legumes in crop cycle, especially with maize to help maintain fertility and reduce labor time needed for weeding (*mucuna)* ➢ Support national program in identification and management of rice seed varieties, starting with the women of the pilot communities as the prelude to a national seed project ➢ Experiment with alternatives to slash and burn (for example, introducing conservation agriculture to reduce need for rotation; elimination of burning; mulching; incorporating national leguminous trees; intercropping; use of small ruminants; review seed selection and broadcasting practices and alternatives experimented with ➢ Introduce communal seed beds for maintenance of all varieties of key crops used on individual plots ➢ Promote soil and water conservation systems (gully plugs/ gabions, contour bunds, silt traps, check dams, mulching, buffer strips, etc) ➢ Promote integrated soil fertility management through such	Limited knowledge, training and awareness

Climate risks facing agriculture in Bong and Grand Gedeh Counties	Proposed Adaptation options and practices	Potential obstacle that can hinder adaptation by farmers
	practices such as: green manure legumes, N-fixing agro-forestry trees, composting and animal manure application. ➢ Promote Sloping Agriculture Technology (SALT) including agro-forestry	
Low productivity due to increased pest and diseases	➢ Promote crop varieties resistant to pests and diseases ➢ Train farmers on integrated pest management (IPM)	Limited knowledge
Addressing current vulnerabilities:		
Increased vulnerability due to limited alternative sources of income and livelihoods	Support the FFS on diversification of livelihoods opportunities, this may include the following activities, among others: ➢ Integrated rice-fish culture/production system ➢ Bee keeping for honey production ➢ Poultry production ➢ Food processing/value addition	Solvency of farmers Competition from other activities such as mining
Increased vulnerability due to limited access to credit	➢ Strengthening of savings/credit clubs (90% of farmers into savings and credit clubs), and strengthening CBOs and Co-ops. This will help in strengthening community management of their resource assets and livelihood diversification	Interest rates and payment periods Solvency of farmers Competition from other activities such as mining
Increased vulnerability due to high post-harvest losses	➢ Improve local post harvest/storage systems ➢ Enhanced access to markets ➢ Development of processing facilities	Infrastructure

6.0 GUIDELINE TOWARDS FORMULATING FFS CURRICULUM FOR CLIMATE CHANGE ADAPTATION IN LIBERIA[1]

The proposed FFS curriculum is designed to initiate discussion among FAO Liberia, the Ministry of Agriculture and Cuttington University towards developing an appropriate and tailored curriculum for Liberian farmers, and in particular for the implementation of GEF climate change adaptation project in Bong and Grand Gedeh Counties.

Following the development of FFS Approach by FAO in 1980s for rice-based farming systems in South East Asia and its successful adaptation for other crops across the world, there is now renewed and urgent interest for it to be used in farming communities affected by climate change. As a farmer training and learning methodology, it has a huge potential to empower communities to increase knowledge and skills for problem solving so that they can take self-initiatives in making adaptations decisions on climate change and climate variability. Since 2007, a number of experiences have been documented, particularly, in Asia where FFS have been tried for climate change adaptation. In the Philippines, the Local Government of Dumangas has implemented a Climate Field School project as an innovative disaster risk reduction and climate change adaptation strategy, where capacity of farmers were built to monitor changing weather and climate pattern and accordingly adjust their farming

[1] **Sources consulted:**

1. FAO Uganda (2010). Facilitators' Guide for Running a Farmer Field School
2. FAO Kenya (2002). Training Guide on the Farmers Field School Methodology: Approach and Procedures
3. Boer Rizizaldi, Kusunomo Tamkani and A.R Subbiah (Undated). Communicating Climate Forecast to Farmers Through Climate Field School: Indonesian Experience
4. Narteh L.T, C.M Soumare, S. Makhfousse, Batello and P. Kenmore (2010). Farmer Field Schools for Climate adaptation to enhance farmer's resilience.

practices. In Indonesia, the Climate Field School approach was implemented and found efficient and effective for communicating the information needed for adaptation to climate change. In Uganda, the Farmer Field School approach is being used currently to implement the country Global Climate Change Alliance project.

The curriculum being proposed for discussion in the context of Liberia draws inspiration from the experiences in the Philippines and Indonesia. The general content of the FFS process and curriculum development as presented here is consistent with the published FAO FFS Training guides and procedures in use in Uganda, Kenya and elsewhere. This brief outline, therefore, is meant to be only a discussion guide in developing a curriculum that would be suitable and appropriate for Liberia. A brief description of FFS Approach and concept is provided in Annex 3.

6.1 Why FFS approach for climate change adaptation

Successful farming activities under conditions of increasing climate variability are dependent on climate information. The changing rainfall pattern and planting dates in Liberia will continue to occur, with decreasing or increasing moisture depending on the extent of climate variability. Even times of adequate rainfall, Liberia has occasionally experienced periods of dry weather which interrupted plant growth and reduced productivity. These factors are major contributors to the vulnerability rural poor farmers. Therefore, new approaches, like, Climate Smart Agriculture are required to ensure and improve productivity in the face of changing climate and variability.

Assessments show that the capability of farmers to use climate forecast or even indigenous knowledge to anticipate weather events for planning is very limited. More so, the few available agricultural extension workers lack the ability to use or translate climate information for supporting farming activities. Yet their role as the main mediator for transferring new knowledge or technology to farmers is crucial. With the overall capacity and systematic mechanism at national and local levels for collecting and analyzing weather information for agricultural activities being very limited, transferring knowledge of climate to farmers may require time. Learning by doing through FFS may be one of the few effective options for transferring knowledge or climate information to Liberian farmers.

Thus the proposed FFS curriculum for climate change adaptation must be designed towards: (1) increasing farmer's knowledge on climate and ability to anticipate extreme climate events for their farming activities; (2) assisting farmers in observing climatic parameters and its use for supporting farming activities, and (3) assisting farmers how to translate the climate (forecast) information for supporting farming activities, in particular, planting decision and cropping strategy.

6.2 The process for developing FFS curriculum for climate change adaptation

The process of developing FFS curriculum for climate change adaptation can be divided into two phases.

The first phase known as pre-experiment phase or the *Phase of socialization* can be conducted over a minimum period of 12 weeks (i.e. 12 meetings in 4 months or one season). Though, ideally eight months or two planning seasons (24 meetings – i.e. 12 meetings in dry season and 12 meeting meetings in wet season) is highly recommended especially for long-term projects. This phase aims to increase farmer's knowledge on climate and use of climate (forecast) information for designing cropping strategy.

The second phase known as the experimentation phase is the *phase of institutionalization*. This is a phase for implementation of further activities in the form of actions done by farmers as FFS participants. This phase is carried out after the socialization or pre-experiment phase for two or more planting seasons, depending on the duration of the project. The phase aims to build farmers capacity on how to put into practice the knowledge they have acquired.

Important note: Before the beginning any of these phases, the agricultural extension workers and FFS facilitators from the target counties and districts must be selected for intensive training covering all key aspects of basic climatology (weather and climate information for decision making) including special topics. This intensive training can be designed for 4 weeks. Based on the knowledge obtained, the agricultural extension workers and FFS facilitators along with their trainers, farmers and other stakeholders will together develop the FFS curriculum.

Table 28 presents an example of FFS curriculum biased towards climate change adaptation. This example can be modified or tailored to meet the local needs in Liberia.

Table 28: FFS Curriculum Guide for Climate Change Adaptation

Period	Topic and Contents
PHASE 1: **Pre- experiment phase/ Phase of Socialization (12 weeks): Before the first rainy season starts** **Objective:** To increase farmer's knowledge on climate and use of climate (forecast) information for designing cropping strategy.	
Weeks 1 & 2	Farmer field school methodology ✓ Concepts and principles of farmer field schools ✓ Steps in establishing a farmer field school ✓ Organization and management
Week 3	Knowing about Elements of Weather and Climate ✓ To introduce elements of weather and climate ✓ To build ability to differentiate between weather and climate
Week 4	Process of Rain Formation ✓ To study the process of rainfall formation ✓ To develop better understanding on the importance of forest in retaining water
Week 5	Developing Understanding on Terminologies Used in Seasonal climate Forecast ✓ To develop capacity to understand the meaning of NORMAL, BELOW NORMAL, and ABOVE NORMAL classification of weather events ✓ To develop capacity to translate the seasonal climate forecast used by Meteorology Department to local condition considering the trend in rainfall data measured by the farmers
Week 6	Develop Understanding on Probability Concept (Forecast Contains Error) ✓ To develop better understanding of probability concept and skill of forecast in climate forecasting and its relation to decision making
Week 7	Introduction To Measuring Tools for Weather/Climate: Weather measurement, equipment and ways of calibrating data ✓ To introduce instruments used for measuring weather/climate elements ✓ To learn factors affecting the accuracy of data measured by non-standard instrument ✓ To learn how to calibrate data which is not measured using standard method.
Week 8	How to Use Climate Forecast Information for Setting Up Planting Strategies ✓ To develop better understanding on how climate extreme events will affect the crop (e.g. relationship between cropping rotation and planting time on level of damaged crops, etc,) ✓ To develop better capacity in using seasonal climate forecast in setting up cropping strategies (to avoid or minimize effect of drought, heat wave and floods)
Week 9	Learning about Water Balance Concept and Its Use to asses irrigation water requirement and flood risk ✓ To develop better understanding the meaning of rainfall deficit from evapotranspiration ✓ To develop better capacity on how to estimate irrigation water requirement and simple water balance

	✓ To assess risk of flood from water balance analysis
Week 10	Learning community-based adaptation planning ✓ To develop better understanding on how to conduct climate risks and vulnerability assessments ✓ To develop community-based CC adaptation plan at farm and catchment/ watershed level
Week 11	Participatory Technology Development ✓ To develop analytical skills to investigate into cause-effect relationship of problems in farming practices and design, implement and monitor local response for addressing them ✓ To learn how to learn
Week 12	Assessing the Economic Value of Climate Forecast information/climate change adaptation ✓ To develop better capacity to quantify the economic benefit of using climate forecast information and climate change adaptation
Exposure/field visit to a functioning weather station, research institutions, farmers, etc, to observe application of techniques covered	
PHASE 2: **Implementation/ Experimental phase or Institutionalization Phase (12-20 weeks) while study crops are growing (planting to harvesting, processing)** **Objective:** To build farmers capacity on how to practice climate knowledge/climate adaptation in their farming activities.	
Weeks 12-13	Agro-ecosystem analysis ✓ Principles and concepts ✓ Developing monitoring indicators
Weeks 14-15	Soil properties and functions ✓ Physical ✓ Chemical ✓ Biological
Weeks 16-17	Local indicators of soil quality ✓ Terms to describe soil processes and characteristics
Weeks 18-19	Land use planning (at watershed/ catchment level) ✓ Land suitability classification
Weeks 20-24	Agroforestry/ Tree planting for fuel wood ✓ Role in environment management ✓ Shrubs and trees for soil fertility improvement ✓ Tree nursery establishment and management ✓ Technologies (woodlots, improved fallows, etc.) ✓ Fruit tree establishment and management
Weeks 25-26	Crop husbandry/ **sustainable agriculture adaptation options** ✓ Pest and disease management ✓ Agronomic practices ✓ Agro-biodiversity
Weeks 27-32	Conservation agriculture principles and concepts/ **Soil and land management adaptation options** ✓ Tillage systems ✓ Cover crops ✓ Weed management ✓ Soil and water conservation ✓ Farm machinery & power/ Animal traction
	Water management adaptation options ✓ Water-conserving technologies ✓ Rainwater harvesting and capture
	Livestock adaptation options

	✓ Production adjustments ✓ Breeding strategies
Weeks 33-34	Support the FFS on diversification of livelihoods opportunities, this may include the following activities, among others: ➢ Integrated rice-fish culture/ production system ➢ Bee keeping for honey production ➢ Poultry production ➢ Food processing/ Value addition
Exposure/field visit to a functioning farmer field school, research station, individual farmers, etc., to see successful practices	
Post-experiment phase: After experimentation, and includes period after graduation	
Weeks 34-35	Adoption and adaptation of conservation agriculture ✓ Challenges to adoption/adaptation in farming systems ✓ Cost benefit analysis
Weeks 36-37	Networking and advocacy ✓ Importance of networking
Weeks 38-39	Farmer field school sustainability and up-scaling ✓ Revolving fund
Weeks 40-41	Market research ✓ Group marketing
Weeks 42-43	Graduation ✓ Review of what has been learned ✓ Challenges, learning process and way forward ✓ Graduation preparations
Exposure/field visit to a 2nd generation farmer field school to see success of adoption, adaptation, networking and sustainability	

6.3 Proposed FFS Sites

The following are the proposed sites for establishing FFS for climate change adaptation:

Bong County: (1) Foequelleh; (2) Belemue; (3) Garmu; and (4) Siaquelleh

Grand Gedeh: (1) Tian town; (2) Zleh town; (3) Gaye town; (4) Pouh Town

7.0 PROPOSED PROJECT FRAMEWORK/LOGICAL FRAMEWORK

This section presents proposed project logical framework (Table 29).

Table 29: The Project Logical Framework

Objectives		*Objective Indicators*	*Means of Verification*	*Assumptions*
Goal	**To Enhance Resilience of rural communities and Agriculture Production System in Bong and Grand Gedeh Counties to cope with Climate Change**	% increase in sustained agricultural productivity and income generation– productivity per unit land, productivity per unit water, productivity per animal/ livestock. % increase in value of livelihood capital assets % reduction in production risks, and vulnerability of community and ecosystem to CC risk % increase in local food security	Annual Reports by the Ministry of Agriculture and County Agriculture Offices	
Purpose/ Outcome	**To improve Adaptive capacity of communities and the agricultural production system through farmer field schools approach**	Proportion of communities who are knowledgeable on climate change adaptation Proportion of communities who have adopted and applying climate adaptation practices Degree/ extent the agriculture productions are rehabilitated or restored	Annual Monitoring & Evaluation reports of the County Agriculture Offices	Overall political and economic environment favorable to implementation of proposed climate change adaptation interventions
Output		***Output indicators***		
Output 1	**Baseline analysis of current climate change undertaken at two demonstration sites and community adaptation strategies and plans in place**	Baseline reports developed and shared to concerned stakeholders Community adaptation strategies and plans developed	MOA Reports and Project annual reports, County Agriculture annual reports	Existing linkages and partnerships among various participating stakeholders remains favorable
Activity		***Activity indicators***		
Activity 1.1	Conduct baseline survey per pilot community	Type and number of survey conducted	Project reports Baseline reports	
Activity 1.2	Document prevailing natural resources use strategies in pilot communities	Type and number of documentation with emphasis on gender	Project reports	

Objectives		*Objective Indicators*	*Means of Verification*	*Assumptions*
Activity 1.3	Develop analytical report on formal and informal institutional arrangements	Types and number of reports	Project reports	
Activity 1.4	Conduct vulnerability study and relevant report shared	Agricultural measures introduced to respond to climate-sensitive diseases (type and level)	Project reports Study report	
Activity 1.5	Review all current FFS curriculum	Type and number of FFS curriculum reviewed	Project reports	
Activity 1.6	Select and train eight FFS facilitator for 14 days	Number of FFS facilitators selected per specialty Number of FFS facilitators trained in FFS methodology and concept	Training reports Project reports	
Activity 1.7	Edit the FFS Facilitators' guidelines	Type of facilitator's guidelines edited	Project reports	
Output		***Output Indicators***		
Output 2	**Local community based adaptation strategies and plans implemented. At least four adaptation options and locally adapted innovations enhancing resilience to climate change tested in demonstration sites**	Number and types of climate change adaptation strategies/ plans implemented Number of climate change innovation techniques tested and adapted to the local condition.	M&E Reports Evidence of adaptation testing and demonstration	Farmers acceptance of proposed technologies and practices/ active participation
Activity		***Activity indicators***		
Activity 2.1	Identify and document local coping mechanisms	Type and number of coping mechanisms identified	Project report	
Activity 2.2	Test and adapt innovations to local circumstances	Type and number of innovations tested and adapted by local farmers, CBOs disaggregated by gender	Project report	
Activity 2.3	Implement key adaptive measures from the local adaptation strategies and action plans	Type and number of appropriate adaptation strategies and action plans implemented	Project report	
Activity 2.4	Project staff and extension services provide help/ facilitate farmers adoption of local adaptation strategies and plans	Type of technical/ extension services provided to farmers	Project reports, project documents	
Activity 2.5	identify location specifically suitable adaptation measures	Number of suitable / appropriate adaption measures identified		
Activity 2.6	Identify climate information needs of the farmers and convey to relevant stakeholders the needed climate and weather	Types of climate change information needs identified and shared with relevant stakeholders		

Objectives		*Objective Indicators*	*Means of Verification*	*Assumptions*
	information			
Output		***Output indicators***		
Output 3	**County agriculture plans in Bong and Grand Gedeh account for potential climate risks and incorporate building of climate change resilience as a key component**	Evidence of climate change mainstreaming in the Country agriculture plans/ strategy	Country agriculture sector plans and policy documents	
Activity 3.1	Integrate extension officers in project activities; negotiate time allocation in work plans provide budgetary support	Number of work hours extension workers dedicate to the project implementation at field levels (in pilot counties) and logistical support functional	Project monitoring reports Project reports	
Activity 3.2	Mainstream climate information and lessons learned on climate risk management and adaptation in county – level planning processes	Type and no of county planning documents and processes mainstreaming climate info and lessons learned CRM&A	Project reports	
Activity 3.3	Organize site visits for relevant county representative and other interested communities	No and type of site visits as well as type of county representatives attending / site visit report	Project reports	
Activity 3.4	Support the establishment of climate change adaptation interventions	Types and no of adaptation interventions and number of groups and individual farmers benefiting	Project M&E reports	
Activity 3.5	Establish sub county network out of meeting convened with all established FFS within the same sub county	Type and no of sub county networks established Number of community members in the network	Project M&E reports	
Activity 3.6	Develop sustainability strategies (savings mechanism and market linkages and financing opportunities)	Type and no of saving mechanisms developed as well as market linkages and financing mechanisms established	Project M&E Report	
Output		***Output indicators***		
Output 4	**Agricultural policies and donor investments are guided by adaptation learning at demonstration sites and integrate a land use and livelihood strategy that helps local farmers build critically needed climate change resilience**	Evidence of project learning integrated into Liberia Agricultural policies and donor investments		

Objectives		*Objective Indicators*	*Means of Verification*	*Assumptions*
Activity		***Activity Indicators***		
Activity 4.1	Conduct specific policy makers round table events and make tangible policy contribution	No of roundtable policy events conducted and of participants	Project reports	
Activity 4.2	Discuss the key findings from the demonstration sites	No of meetings organized to discuss findings	Project reports	
Activity 4.3	Promote community management of resources and livelihood diversification	Types of resource and livelihood diversification introduced	Project reports	
Activity 4.4	Strengthen farmers' organizations and marketing opportunities for farmers sustaining incentives to produce above subsistence levels through offering of enabling environment	Number of farmer organizations strengthened	Project reports	
Activity 4.5	Meeting with all the facilitators to review implementation process and identify requirement for implementation adjustments	No of reviews conducted	Project reports	
Activity 4.6	Evaluate the process, share experiences and discuss lessons learned in each session	No of evaluations conducted	Evaluation report Project report	
Activity 4.7	Meet with non participants in the targeted areas and from other villages to share experiences and display study and commercial plots	No of experience sharing visit conducted No of villages participated	Project reports	
Activity 4.8	Visit other FFS groups within the same sub counties and from other sub county networks	No of visits to other FFS groups No of people participated	Project reports	
Activity 4.9	Organize graduation day for all participants	No of graduation organized No of people participated	Project reports	
Activity 4.10	Identify implementing agencies to carry out further establishment of FFS	No of implementing agencies identified	Project reports	
Activity 4.11	Promote FFS concept within local community and central government, national and international NGOs, UN Agencies, Donors among others	No of key stakeholders aware of FFS concept	Project reports	

8.0 CONCLUSION AND RECOMMENDATIONS

This section highlights some key messages from the N-A mission that may require further attention and consideration in developing the final package of Climate Change Adaptation strategies for implementation:

1. Climate risks: The key climate hazards facing communities of Bong and Grand Gedeh Counties are: (1) erratic rainfall/irregular rainfall pattern and drought; (2) increased temperature/heat wave and (3) increased episodes of heavy rain and flooding. The major risk that farmers face from these hazards is the crop failure and low productivity due to combinations of: (a) water stress; (c) heat wave during sensitive stages of rice growth; (c) flooding; d) erosion and reduced soil fertility and (e) increased pest and diseases.

2. Exposure to climate change: The livelihood assets mostly affected by the climate hazards are the lowland/swamp and upland rice areas as well as livestock (such as goat, sheep, pig) and poultry. In Pant District of Bong County, as much as 350 ha and 1,518 ha of lowland/swamp and uplands areas, respectively, belonging to over 1,500 farmers experienced water stress brought by the erratic rainfall pattern and increased temperature, with the swamp area being vulnerable to flooding during intense rainfall. While in Grand Gedeh County, over 80,000 ha of lowland/swamp areas are at the risk of constant flooding every season. Equally, goats, sheep and pig as well as poultry have been affected by increased temperature/heat wave.

3. Sensitivity to climate change: Overall, rice is the most sensitive crop to climate change followed by cocoa. Goats, sheep and poultry are equally sensitive to climate change and have been impacted by the increased temperature/heat wave. In Bong County, both the germination and crop failures to water stress are 40% and 60%, respectively. In Grand Gedeh, some farmers have incurred as much as 80-85% loss of lowland rice crop due to flooding. For upland rice, some farmers have reported a loss as much as 10-15% due to water stress. The least sensitive crop is cassava, which farmers grow as a food security crop, incase rice fails.

4. Current coping strategies: The overall effectiveness of the current coping strategies used by farmers is low. Most farmers expressed preference for drought resistant rice variety (LAC 23 for uplands) as an effective adaptation strategy for reducing the effect of water stress on rice. The potential barriers to farmers coping strategies or application of other adaptation measures is lack of capacity and limited knowledge.

5. Water control and management: Drought/water stress and floods are two most direct impacts of climate variability and change facing farmers in Bong and Grand Gedeh Counties. Seasonal floods affect as much as 25% to 100% of lowland rice areas in both Counties, thereby making water management and control systems an important adaptation strategy for the farmers. The drought and floods problems must be dealt with in an integrated way. This means water management interventions for the lowland (swamps) and upland farm areas must be planned as one integrated ecosystem. Mitigating floods requires retarding the rate of run-off from the surrounding uplands or watersheds through conservation practices to increase infiltration of storm rainfall and surface detention of flood-runoff. The watershed or catchment approach is one of the most efficient ways to jointly deal with both drought and floods problems facing the farmers.

   The practical implication is that the proposed FFS groups in Bong and Grand Gedeh County must be organized on watershed/catchment basis in order to effectively deal with drought and flood issues affecting the lowland and upland rice cultivation. However, other livelihood strategies and group development initiatives can still be done as per FFS basis.

6. Climate information and advisory support to farmers: First of all, the available meteorological data are insufficient and unconsolidated in both Counties as well as in the Country. There is no operational agro-meteorological information system which can provide farmers with advice and warning during the cropping seasons. Farmers would like to know when the next rain would come and end for the planting season. And when it does come, they would like to know whether it would be enough or too much. If not enough, what can be done to address the short fall or the consequence of the short fall, and if too much, what can be done to take care of the excess water to minimize production loses. These are farmers concerns that must be factored in any future climate information and advisory services to support adaptation. Responding effectively to these concerns should require: (1) tools and resources available at County level, for example the rain gauges and E-station at CARI, must become operational. County MOA staff and farmers must use properly the rain gauge already distributed and for which they received training. This will be an indispensable tool for GEF project implementation of FFS. (2) collecting and analyzing weather information regularly, which could mean as much as providing weather summary; (3) collecting location specific and crop specific information containing description of prevailing weather, soil and crop condition and suggestions for taking appropriate measures to reduce production loses, and (4) using climate advisory as an early warning function to alert farmers on the implication of various weather events (such as extreme temperature, erratic rainfall, heavy rains, floods, etc).

7. Gender and climate change impact: Testimonies from the communities indicate that women are more vulnerable to the impacts of climate change because of the economic role they play and the numerous household tasks they perform. Therefore, women should be prioritized for any livelihood diversification opportunities being promoted by the project.

Annex 1: The FFS Approach and Concept

Broad Objectives
To bring farmers together to carry out collective and collaborative inquiry with the purpose of initiating community action in solving community problems

Specific Objectives
1. To empower farmers with knowledge and skills to make them experts in their own fields.
2. To sharpen the farmer's ability to make critical and informed decisions that render their farming profitable and sustainable.
3. To sensitize farmers in new ways of thinking and problem solving.
4. Help farmers learn how to organize themselves and their communities.

FFS also contribute to the following objective;

1. Shorten the time it takes to get research results from the stations to adoption in farmers' field by involving farmers' experimentation early in the technology development process.

2. Enhance the capacity of extension staff, working in collaboration with researchers, to serve as facilitators of farmers' experiential learning. Rather than prescribing blanket recommendation that cover a wide geographic area but may not be relevant to all farms within it, the methods train extensionist and researchers to work with farmers in testing, assessing and adapting a variety of options within their specific local conditions.

3. Increase the expertise of farmers to make informed decisions on what works best for them, based on their own observations of experimental plots in their Field schools and to explain their reasoning. No matter how good the researchers and extensions, recommendations must be tailored and adapted to local conditions, for which local expertise and involvement is required that only farmers themselves can supply.

4. Establish coherent farmer groups that facilitate the work of research and extension workers, providing the demand of a demand driven system.

Principles of Farmer Field Schools
In the field school, emphasis is laid on growing crops or raising livestock with the least disruption on the agro-ecosystem.

The training methodology is based on learning by doing, through discovery, comparison and a non-hierarchical relationship among the learners and trainers and is carried out almost entirely in the field**.**

The four major principles within the FFS process are:
a) Grow a healthy crop
b) Observe fields regularly
c) Conserve natural enemies of crop pests
d) Farmers understand ecology and become experts in their own field

Characteristics of the Farmer Field School Approach
Farmers as Experts: Farmers '*learn-by-doing'* i.e. they carry out for themselves the various activities related to the particular farming/forestry practice they want to study and learn about. This could be related to annual crops, or livestock/fodder production. The key thing is that farmers conduct their own field studies. Their training is based on comparison studies (of different treatments) and field studies that they, not the extension/research staff conduct. In so doing they become experts on the particular practice they are investigating.

The Field is the Learning Place: All learning is based in the field. The rice field, banana plantation, cassava field, or grazing area is where farmers learn. Working in small subgroups they collect data in the field, analyze the data, make action decisions based on the analyses of the data, and present their decisions to the other farmers in the field school for discussion, questioning and refinement.

Extension Workers as Facilitators Not Teachers: The role of the extension worker is very much that of a facilitator rather than a conventional teacher. Once the farmers know what it is they have to do, and what it is that they can observe in the field, the extension worker takes a back seat role, only offering help and guidance when asked to do so.

Presentations during group meetings are the work of the farmers not the extension worker, with the members of each working group assuming responsibility for presenting their findings in turn to their fellow farmers. The extension worker may take part in the subsequent discussion sessions but as a contributor, rather than leaders, in arriving at an agreed consensus on what action needs to be taken at that time.

Scientists/Subject Matter Specialists Work With Rather than Lecture Farmers: The role of scientists and subject matter specialists is to provide backstopping support to the members of the FFS and in so doing to learn to work in a consultative capacity with farmers. Instead of lecturing farmers their role is that of colleagues and advisers who can be consulted for advice on solving specific problems, and who can serve as a source of new ideas and/or information on locally unknown technologies.

The Curriculum is integrated: The curriculum is integrated. Crop husbandry, animal husbandry, horticulture, land husbandry are considered together with ecology, economics, sociology and education to form a holistic approach. Problems confronted in the field are the integrating principle.

Training Follows the Seasonal Cycle: Training is related to the seasonal cycle of the practice being investigated. For annual crops this would extend from land preparation to harvesting. For fodder production would include the dry season to evaluate the quantity and quality at a time of year when livestock feeds are commonly in short supply. For tree production, and conservation measures such as hedgerows and grass strips, training would need to continue over several years for farmers to see for themselves the full range of costs and benefits.

Regular Group Meetings: Farmers meet at agreed regular intervals. For annual crops such meetings may be every 1 or 2 weeks during the cropping season. For other farm/forestry management practices the time between each meeting would depend on what specific activities need to be done, or be related to critical periods of the year when there are key issues to observe and discuss in the field.

Learning Materials are Learner Generated: Farmers generate their own learning materials, from drawings of what they observe, to the field trials themselves. These materials are always consistent with local conditions, are less expensive to develop, are controlled by the learners and can thus be discussed by the learners with others. Learners know the meaning of the materials because they have created the materials. Even illiterate farmers can prepare and fuse simple diagrams to illustrate the points they want to make.

Group Dynamics/Team Building: Training includes communication skills building, problem solving, leadership and discussion methods. Farmers require these skills. Successful activities at the community level require that farmers can apply effective leadership skills and have the ability to communicate their findings to others.

FFS are conducted for the purpose of creating a learning environment in which farmers can master and apply specific land management skills. The emphasis is on empowering farmers to implement their own decisions in their own fields.

Annex 2: List of people consulted in Bong County during focused group discussions

A. Gbarnga, Bong County December 10, 2012

No.	Name	Title
1	T. Calvin Kollie	CBO
2	Isaac Yarkpawolo	Farmer
3	James Nyella	Local Co-op
4	Lorpu Sulonteh	Women Group
5	Samuel Tokpah	Elder
6	Moses Flomo	
7	Zubon Foster	Field Monitor
8	Papa Makor	M&E
9	John Kerkulah	CBO(Bellemue)
10	David Mulbah	Forquellah Farmer union
11	Nyama Dolo	Gbarnga siaquelleh
12	Tim Labella	CBO
13	John Nyekpea	Youth
14	James Flomo	Local Environmental (NGO)
15	Beatrice Saygbeh	Agriculture Student Union

B. Belemue, Bong County December 10, 2012

No.	Name	Title
1	J. Naagbor Payeline	PANFACO
2	Anthony G. Woah	“
3	Isaac Yarpawolo	“
4	Jacob Koyo	Farmer
5	Augustine Nuwelee	“
6	Jonathan Woah	“
7	Arison Woah	“
8	Isaac Woah	“
9	Morris Kpoequaryah	PANFACO
10	Lawrence Garteh	“
11	Mary Woah	Farmer/Women Group
12	Mary Woah	Farmer
13	Thou Mulbah	PANFACO
14	William George	“
15	Emmanuel Kollie	Farmer
16	Kolubao Mulbah	“
17	Johnson Paye	Pastor
18	Yorgboe Woah	Farmer
19	Nyanpu Woah	“
20	Thou Vulu	“
21	Emmanuel P. Kpolorpolunyan	“
22	Halary George	“
23	Ezekiel Dolo	“
24	Joseph Dolo	“
25	Peter Kpanah	“
26	Genesis P. Kollie	“
27	Wason Togbah	“

Annex 3: List of people consulted in Grand Gedeh County during focused group discussion

A. Zleh Town, Gbarzon District, Grand Gedeh County (Stakeholder consultation

No.	Name	Title	Agency/Organization	Phone no.
1	Roland J. Lepol	Coordinator	CCAAP/MOA	0886568654
2	Kennedy N. Igbokwe	Project Manager	FAO	+256 777 700 890
3	Wakweya Tamiru	M&E Coordinator	FAO	0776737564
4	A Jalarwo Karr	DAO	MOA	0886 738645
5	Rev. D W M Tarty sr.	General Chaplain	AMENU	0777450969
6	K Johnson Beyorplu		Community Office	0880963938
7	Josiah Y. Tarlue	Co-Chairman	AMENU	0880758757
8	T. Augustus Quarty	Board Member	AMENU	0880718649
9	Emmett Quiah	Land Agent		0880570722
10	Barlea Quedan	Intern	FAO	0886646117
11	Harry Dode	Driver		
12	Maxwell Juwor	CAC	MOA	0886533913
13	John B. Yarkpa	Field Tech.	UNFAO	0776737562
14	David Kyne	TC		
15	T. Dehday Beh	Project Manager	AEDE	0886699708
16	Philip B. Gauyon	Chairman	AMENU	0880526446
17	Rita N. kahn	Woman Leader		0880557933

B. Famers Consultation Gaye Town, Gbarzon District, Grand Gedeh County

No.	Name	Title
1	Jator S. Gaye	Farm manager
2	Sarah Carr	Farmer
3	Vero Carr	Farmer
4	Dorithy Peters	Women Co-op
5	Beatrice Karthy	“
6	Rita Gaye	“
7	Cecelia Sayee	“
8	Annie Jaryee	“
9	Cathrine Paye	“
10	Betty Worjolo	Famer and Women co-op
11	Esther Zaway	Farmer
12	Samuel Zaway	Women farmer
13	Faultor Quarly	Farmer
14	Princess Pouh	Women Co-op
15	Lucy chayee	“
16	Esther Zeh	“
17	Edith Johnson	“
18	Oretha Bakou	“
19	Rasetha Gaye	“
20	Marie Koublouh	“
21	Metty Zeh	“
22	Josiah Pouh	Farmer
23	Charles Zaway	“
24	Beatrice Zleh	“
25	Rebecca Gaye	Women group
26	Zean Sayee	Farmer
27	Jimmy Zeh	“

No.	Name	Title
28	Andrew Gaye	Farmer
29	Chayo Zimmy	“
30	Oretha Zaway	“
31	Rebecca Gaylah	Women Co-op
32	Jerry Gedeah	Farmer
33	Sedeke Saysay	“
34	Dickson R. Cholo	“
35	Harrison Zaway	“
36	Paye S. Gaye	“
37	Harry Dobo	“
38	Ellen Jayee	Women group

C. Famers Consultation Attendance Tian Town, Grand Gedeh County

No.	Name	Host Community/Refugee/Organizatin
1	Kennedy Igbokwe	FAO Uganda
2	T. Dehday Beh	Liberia/AEDE
3	Maxwell G.M Junior	Liberia/CAC
4	Wakweya Tamiru	FAO Liberia
5	T. Augustus Quaity	AMENU
6	Josiah Y. Tarlue	AMENU
7	Fahi Zeade’	Ivorian
8	Bio Gastor	Ivorian
9	Bloa sjahidjike Bevoit	Ivorian
10	Tasle koue’ Ferdinayol	Ivorian
11	Bloa Bevoit	Ivorian
12	Nioule’Gabriel	Ivorian
13	Pouo Richard	Ivorian
14	Zian Soe	Liberian
15	Mark Barjibo	Liberian
16	James Greah	Liberian
17	Anthony B. Parjibo	Liberian
18	Martha Gee	Liberian
19	Anthony Dickaye	Liberian
20	Mamadee Toure	Liberian
21	Toe Beh	Liberian
22	John Zarway	Liberian
23	William jolo	Liberian
24	Cooper Beh	Liberian
25	David Gaye	Liberian
26	Cecelia Nyangbe	Liberian
27	Betty Barijibo	Liberian
28	Esther Targblor	Liberian
29	Betty shartu	Liberian
30	Tode’ Guei Boris	Ivorian
31	Gnande Evariste	Ivorian
32	Bahiro Simeon	Ivorian
33	Ze’ Pierre	Ivorian
34	Pehe’ Michel	Ivorian
35	Diai Sidonie	Ivorian
36	John B. Yarkpa	FAO Liberia