

Community-Based Initiatives/Strategies for Adapting to Annual Floods and Heavy Windstorms along the Black and White Volta Rivers of the Northern Region of Ghana

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Project Summary

Background: Climate change is manifested in the Northern Region of Ghana in annual floods and windstorms. These cause significant damage to human and animal life and property. For example, in 2010, floods affected 16 of the 20 districts in the region, destroying 369 communities, five people's lives, 2,586 houses, and 21,550 hectares of farmland. Six districts experienced windstorms that destroyed 6,451 hectares of farmland and left 16,175 people homeless. In 2011, 16 of the 20 districts were affected by windstorms that destroyed property and left 20,927 people homeless. This research project was carried out in Central Gonja District of the Northern Region of Ghana. The objectives were to investigate how communities along the Black and White Volta Rivers respond and adapt to annual floods and windstorms and how these affect their lives and livelihoods. The project also aimed to build the capacity of the communities to rely on modern early warning strategies to enhance their preparedness and response to the effects of climate change and related disasters.

Methods: The research team sampled 100 respondents from 10 communities, five each along the Black and White Volta Rivers, for interviews using semi-structured questionnaires. Ten focus group discussions were held, one in each community, and key informant interviews were conducted with lead institutions in the district.

Results: The study found that floods are no longer an annual but a perennial problem. This has been exacerbated by the damming of the Bui River for hydroelectric generation, affecting fishing, the main livelihood of the majority of the people. For an alternative, they resort to charcoal burning, which has dire consequences for the livelihoods of future generations. Destructive windstorms continue to be an annual problem. The communities rely on various indigenous early warning signs, in addition to modern early warning alerts from the Ghana Metrological Agency (GMET) on the radio and television, to help them prepare their coping mechanisms and adaptation strategies.

Conclusions: The people of the area are well aware of but not resilient to climate-related floods and windstorms. They lose both domestic property and farm produce, with minimal support from government and development partners. The communities have indigenous ways to predict floods and windstorms, but these are not always accurate and their ways of adapting to disasters are not sustainable. To strengthen their resilience to address the impacts of climate change, the Central Gonja District Assembly should implement a district-wide climate change action plan and liaise with the Ghana Red Cross Society and GMET to build the capacity of the National Disaster Management Organization (NADMO) to predict and respond to disasters. The District Assembly should train youth in climate-resilient construction, support farmers to plant climate-resilient crop varieties, and help communities strengthen the foundations of buildings to withstand floods. Although the communities prefer to stay in the area, the government should roll out alternative livelihood and farm input support schemes to encourage them to relocate to safer areas.

1 Introduction

Climate change is manifested in the Northern Region of Ghana in annual floods and windstorms that cause significant damage to human and animal life and property. Central Gonja District is vulnerable to flooding because of its location on the Black and White Volta Rivers, which are tributaries of Volta Lake, the largest man-made lake in the world. The rivers run through the district and cause flooding when they overflow their banks. In 2010, floods affected 16 of the region's 20 districts, destroying 369 communities, five lives, 2,586 houses, and 21,550 hectares of farmland. Six districts experienced windstorms that destroyed 6,451 hectares of farmland and left 16,175 people homeless. In 2011, 16 of the 20 districts were affected by windstorms that destroyed property and rendered about 20,927 people homeless. The construction of the Bui hydroelectric dam, which feeds into the Volta Lake through the two rivers, has brought yet another problem. Though the dam has helped reduce floods in the area, the lower water level downstream has led to a dwindling fish catch. To ameliorate the effect of the low fish catch, fisher folk resort to charcoal burning, which if not curbed with worsen land degradation.

This research project investigated how communities along the Black and White Volta Rivers respond and adapt to annual floods and windstorms, how they predict the occurrence of these disasters, how effective their predictions are, and how the disasters affect their lives and livelihoods. The study also aimed to build the capacity of the communities to use modern

early warning strategies to enhance their preparedness and response to the effects of climate change and related disasters.

2 Project Outputs and Outcomes

Table 1 shows the outputs and outcomes of the project, including tangible and less tangible deliverables.

Table 1. Project outputs and outcomes

S/N	Output	Outcome	Deliverable
1	Plan inception meeting.	Introduction of project to stakeholders in target communities	Inception report submitted
2	Develop research instruments.	Questionnaires, interviews guides, focus group discussion guides	Research tools
3	Recruit research assistants.	Training of field assistants	Commencement of data collection
4	Conduct interviews.	Collection of field data	Raw data
5	Design data entry template.	Data entry	Data analysis
6	Write report.	Draft report	Draft report
7	Prepare interim report.	Interim report	Interim report
8	Prepare for report validation.	Validation workshop	Validated report
9	Prepare final report	Final report	Final report
10	Prepare for presentation of report.	Final read-through of report	Presentation of final report to donors
11	Prepare report for publication.	Submission of paper to journal	Publication of paper

3 How Did You Go about Achieving Your Outputs/Outcomes?

At the start of the project, the team visited the District Assembly, the political governance seat of the district, to introduce the project and ask for its support and participation. The Assembly organized another meeting with traditional authorities, other government

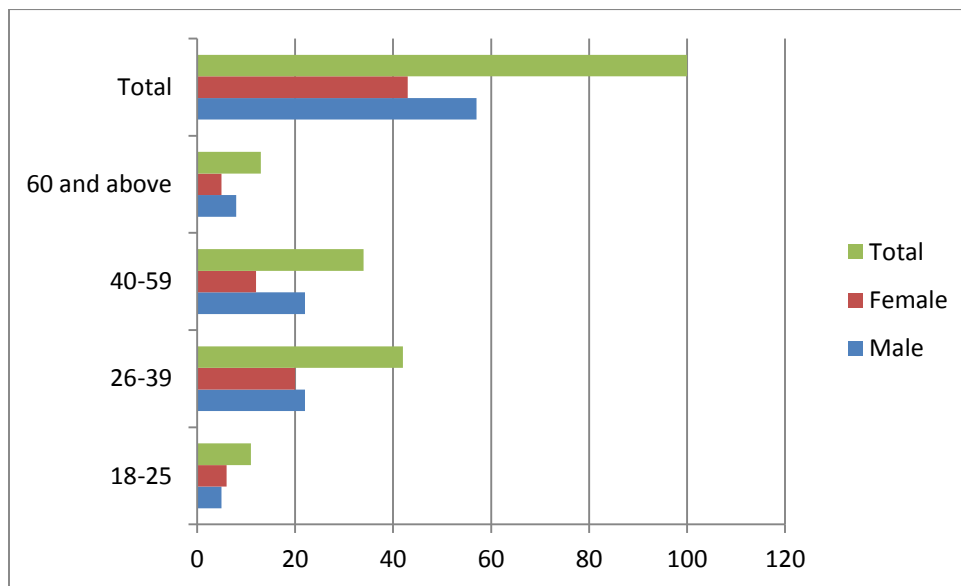
agencies whose work is related to disaster risk reduction, and community leaders to introduce the project to them. These stakeholders wholeheartedly accepted the project and pledged their support and participation. The success of the project was achieved through a bottom-up approach in which community members and other stakeholders participated actively and everyone's views and concerns were respected.

4 What Did You Learn?

Age and Sex Distribution

Figure 1 shows that the majority of the respondents, both male and female, were between the ages of 26 and 39 years (22 male and 20 female, representing 42%), followed by the age group 40 to 59 years (22 male and 12 female, representing 34%), 60 years and above (8 male and 5 females representing 13%), and 18 to 25 years (5 male and 6 female., representing 11%).

Figure 1. Age and sex distribution of respondents

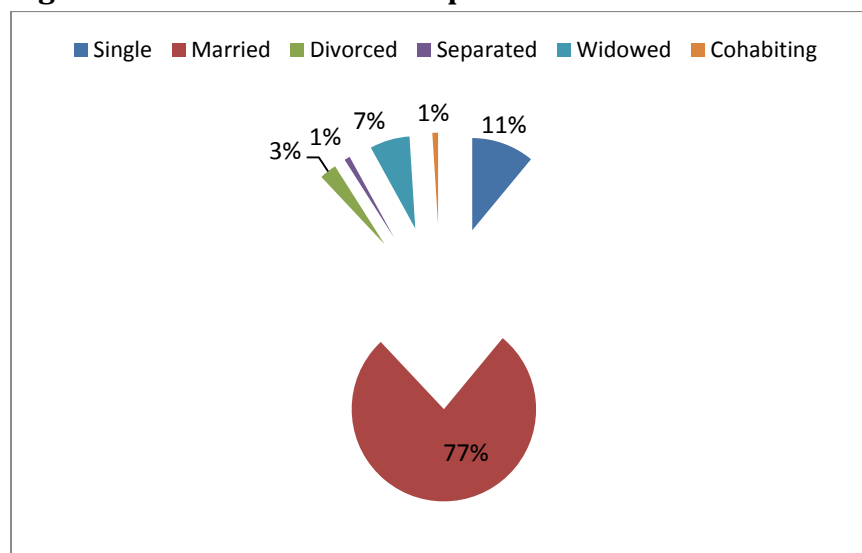


Source: Field survey, 2014

Marital Status of Respondents

Most of the respondents. (77%) were married, 11% were single, 7% were widowed, 3% were divorced, 1% were separated, and another 1% were cohabiting (figure 2). Marriage in the study area is a status symbol, indicating maturity and the authority to speak on serious issues on behalf of the family. The family is the unit most affected by floods and windstorms because in some cases, houses and foodstuffs are lost, and the survival of the family depends on the family head.

Figure 2. Marital Status of Respondents



Source: Field survey, 2014

Educational Level of Respondents

Table 2 shows that out of 100 households interviewed, 71% had no formal education, 16% had basic education, 8% had tertiary education, and 5% had secondary or vocational education. These statistics should worry the district authorities as well as development partners because it affects community members' understanding and appreciation of climate change issues and ultimately their preparedness and response to climate change-related disasters.

Table 2. Level of education of respondents

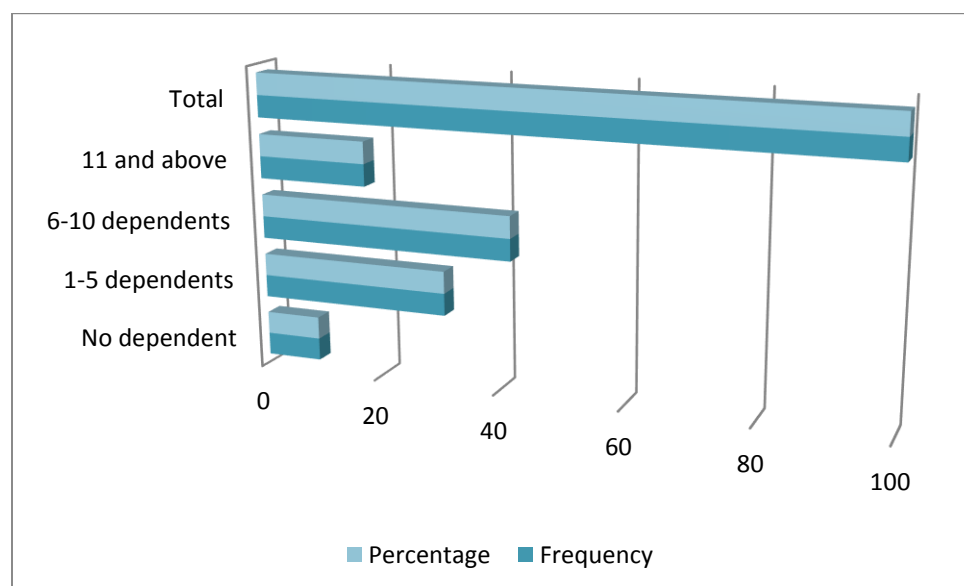
Level of education	No. of responses	Percentage
No formal education	71	71.0
Basic	16	16.0
Secondary/vocational	5	5.0
Tertiary	8	8.0
Total	100	100.0

Source: Field survey, 2014

Number of Dependents per Respondent

The study found a high dependency in communities fringing the Black and White Volta Rivers. Figure 3 shows that 42% of the 100 respondents interviewed had between six and 10 dependents, 31% had between one and five dependents, 18% had 11 dependents or more, and 9% had no dependents. The large number of dependents coupled with the low level of education should be of a grave concern for communities that derive most of their livelihoods from weather/climate- related activities such as farming and fishing.

Figure 3. Number of dependents per respondent



Source: Field survey, 2014

Occupation of Respondents

Table 3 shows that fishing and farming are the dominant occupations in the area. Of the 100 respondents interviewed, 46% said fishing was their main occupation, while 21% identified themselves as farmers. The next most common occupation in the area was trading, which was reported by about 20% of the respondents. This is understandable, because people who fish and farm need money to take their product to urban centers for sale. The least common occupations in the area were government work (5%) and artisanship (4%). This analysis confirms the Central Gonja District Assembly's decision to select these communities as disaster prone and climate vulnerable.

Table 3. Major occupations of respondents

Occupation	No of responses	Percentage
Farming	21	21.0
Fishing	46	46.0
Trading	20	20.0

Government/NGO work	5	5.0
Artisanship	4	4.0
No specific work	4	4.0
Total	100	100.0

Source: Field survey, 2014

Knowledge and Understanding of Climate Change

The level of people's understanding of climate change is important for the study because, when they know what the phenomenon is, people will devise strategies to overcome or minimize its negative effects or to prepare adequately for it. The knowledge and understanding of local people about contemporary and topical issues such as climate change are sometimes underestimated. The study revealed that a large proportion of the local people have a fair understanding of what climate change is all about : 56% understood it as a change in the weather over time, 8% understood it as a change in temperature and rainfall, 4% understood it as an increase in heat and wind in town, another 4% as a change in the rainfall pattern and occurrence of floods, 2% as a continuous change in weather accompanied by diseases such as cerebral spinal meningitis (CSM), 1% as a change in the seasons, and another 1% as the loss of trees. A sizable proportion (24%) said they did not know what climate change is (table 4).

Table 4. Respondents' understanding of climate change

Definition	No of responses (n=100)	Percentage
Change in weather over time	56	56.0
Change in temperature and rainfall	8	8.0
Increase in heat and wind in town	4	4.0
Change in the rainfall pattern and occurrence of floods	4	4.0
Continuous change in weather accompanied by diseases such as CSM	2	2.0
Change in the seasons compared to previous years	1	1.0
Loss of trees	1	1.0
Don't know	24	24.0

Source: Field survey, 2014

The study asked respondents whether the climate is changing, and about 98% said yes (table 5).

Table 5. Respondents' opinions on whether the climate is changing

Response	No of responses (n=100)	Percentage
Yes	98	98.0
No	2	2.0
Total	100	100.0

Source: Field survey, 2014

Effects of Climate Change

Respondents' views on the effects of climate change in the area were not different from the effects reported in the literature. Of 169 responses to the question, 42% posited that climate change results in drought, 40% that it results in floods, 38% that it results in poor crop yields, 34% that it results in destructive windstorms, 8% that it results in the proliferation of disease vectors and a high incidence of diseases, and 7% that it results in pest invasions (table 6).

Table 6. Effects of climate change

Effect	No of responses (n=100)	Percentage
Drought	42	42.0
Floods	40	40.0
Poor crop yield	38	38.0
Destructive windstorms	34	34.0
Proliferation of disease vectors/high incidence of diseases	8	8.0
Pest invasion	7	7.0

Source: Field survey, 2014



Floods in Buiepe, Northern Region, 2010 (EPA Monitoring, 2010, unpublished)



Project team presenting the report at a validation workshop

Adaptation to Climate Change by Communities

It has become apparent that the climate has changed and continues to change, with negative impacts on the livelihoods of millions of people across the world. Adaptation has become unavoidable if communities are to continue to meet their aspirations. This study explored communities strategies to adapt to the impacts of climate variability/ change. Of 135 people who responded to the question, 54% said they did early cropping, 41% said they planted early maturing varieties, 19% said they used composting, 14% said they did mulching, 4% said they practiced no burning, 2% said they used no tillage or zero tillage, and 1% said they used other measures such as farming in valleys, livelihood diversification, and seasonal migration (table 7).

Table 7. Adaptation to climate change

Adaptation measure	No of responses (n=100)	Percentage
Early cropping	54	54.0
Planting early maturing varieties	41	41.0
Composting	19	19.0
Mulching	14	14.0
Zero tillage	4	4.0
No burning	2	2.0
Other	1	1.0

Source: Field survey, 2014

Occurrence of Floods

Floods are widely recognized as one of the critical impacts of climate change throughout the world. This study explored the prevalence of floods in communities along the two Volta Rivers. Flooding in these communities had been an annual occurrence for the past decade until the Bui hydroelectric dam was built a few years ago. Flooding now occurs anytime the Bagre Dam in Burkina Faso is opened. Table 7 shows that 51% of the respondents indicated that they experienced flooding every 2 years, 17% experienced it every year, and another 17% every 3 years. The varied responses on the frequency of flooding notwithstanding, flooding is clearly a problem in the area.

Table 1. Frequency of Floods

Frequency	No of responses (n=100)	Percentage
Every year	17	17.0

Every 2 years	51	51.0
Every 3 years	17	17.0
Every 4 years	5	5.0
Every 5 years	10	10.0
Total	100	100.0

Source: Field survey, 2014

Effects of Floods

Respondents were asked about the effects of floods on their lives and livelihoods. About 67% said they had lost their farm produce as a result of floods, 64% said that they had lost their homes, 26% reported disease outbreaks, 16% said they had suffered hunger and famine, 10% complained of loss of investments and livelihoods, 7% indicated that they had become poorer, 8% said their drinking water sources were usually contaminated, and 4% said their villages were usually cut off from the rest of the district as a result of flooding (table 8).

Every year during the rainy season we experience flood, during which our community is disconnected from the rest of Central Gonja District. During this time teachers do not come to teach our children, and our wives are not able to go to the market. During this time the only way to get to the urban towns of Yapei and Buipe is by boat, and not many people are comfortable using that means of transport, especially around that season, due to the high risk involved. (Community member)

Table 2. Effects of floods

Effect	No of responses (n=100)	Percentage
Loss of farm produce	67	67.0
Hunger	16	16.0
Destruction of homes	64	64.0
Loss of investment and livelihoods	10	10.0
Poverty	7	7.0
Disease	26	26.0
Contamination of water	8	8.0
Un-motorable roads (village cut off from other communities)	4	4.0

Source: Field survey, 2014

Communities' Response to Floods

As described in the previous sections, floods are a common occurrence in the Black and White Volta communities, with varied effects on the people and their livelihoods. The study therefore sought to find out from the communities how they usually responded to flood disasters. Surprisingly, the responses indicated that the communities are currently less resilient to floods. As shown in table 9, 81% of the respondents indicated that they moved away from their communities to live with families or friends when floods occurred, 23% said that they borrowed food and building materials from friends to survive and rebuild their homes, 11% said they sought divine intervention, 4% indicated that they sometimes abandoned their farms entirely and waited for the next season, 3% said they used sachet water when their water became contaminated, and 1% indicated that they hurriedly harvested whichever crop was ready to avoid total loss to the floods.

Table 3. Community response to floods

Response	No of responses (n=100)	Percentage
Run away from our homes to live with family and friends.	81	81.0
Try to harvest our farm produce if it is ready for harvesting.	1	1.0
Entirely abandon the farms and wait for the next season.	4	4.0
Use sachet water.	3	3.0
Borrow food and building materials from friends.	23	23.0
Create drains to contain and direct the water away.	1	1.0
Seek God's intervention.	11	11.0

Source: Field survey, 2014

Indigenous Knowledge about Floods

The people of the area have their own ways of predicting the occurrence of floods. Of the 100 respondents contacted, 66% indicated that they had good indigenous knowledge systems for predicting droughts, while only 4% said they were not aware of any such systems. The rest did not respond to the question. Table 10 summarizes the indigenous knowledge of signs of impending floods: 14% of the respondents mentioned the nature of the rains at the beginning of the season, 12% mentioned the level of water in the river at the beginning of the rainy season, 8% mentioned the cry of a particular bird called the river bird, 5% mentioned the movement of snails and the direction they move, 2% mentioned a python

climbing as a sign of impending flood, and another 2% said they consulted the gods for information on future rains.

Table 4. Indigenous knowledge systems/signs for predicting floods

Sign	No of responses (n=100)	Percentage
Nature of the rain	14	14.0
Level of water in the river	12	12.0
The behavior of a river bird (it cries in a particular way as a warning)	8	8.0
Python climbing a tree	2	2.0
Movement of snails	5	5.0
Consultation with gods	2	2.0

Source: Field survey, 2014

Community Response to Early Warning Signs of Floods

In disaster management, early warning signs are critical enablers for effective preparation and for building resilience. In this study, the communities do not usually sit down unconcerned after seeing the signs of flooding. Table 11 shows that most (26%) respondents said they usually prepared for temporary relocation when they observed signs of floods. Other respondents said they tried to secure their property ahead of the floods (2%), invested less in the farm (2%), planted early in order to harvest early before the floods (2%), and prayed to God for guidance (2%).

Table 5. Community response to signs of floods

Response to signs	No of responses (n=100)	Percentage
Prepare for relocation in case of a flood.	26	26.0
Secure property ahead of a flood.	2	2.0
Invest less in the farm.	2	2.0
Plant early in order to harvest before the flood.	2	2.0
Pray to God for guidance.	2	2.0

Source: Field survey, 2014

Given the frequent floods in the study area and their impacts, the study sought to find out whether community members would consider permanent relocation as an option. Table 12 shows that about 89% thought permanent relocation was an option, and about 11% thought it was not an option worthy of consideration. The few who were against the idea of relocating from their current settlement said it was because that was where their livelihoods were found. The fisher folk said they could not move away from the river where they fished.

Table 6. Willingness to relocate from flood-prone areas

Response	No of responses (n=100)	Percentage	Reason
Yes	89	89.0	The floods affect our lives, but we do not move because of factors such as cost of land and our livelihoods.
No	11	11.0	My source of livelihood is here.

Source: Field survey, 2014

Other Sources of Information about Floods

Besides indigenous knowledge systems for predicting floods, the study sought to find out where else communities got information about the impending floods (table 13). Apart from indigenous knowledge systems and signs of floods, respondents got information from the radio (65%), television (13%), community meetings (7%), chiefs through town criers (5%), and friends (11%). People said they listened to the weather forecasts on television and radio, but their main source was the radio, as most of the communities visited did not have electricity.

Table 7: Other sources of information regarding floods

Source	No of responses (n=100)	Percentage
Radio	80	80.0
TV	17	17.0
Community meetings	9	9.0
From the chief through town crier	6	6.0
From friends	14	14.0

Source: Field survey, 2014

Responses about how communities respond to the flood forecasts or warnings were similar to their responses about how they responded to indigenous early warning signs. Table 14 shows that 79% said they immediately start preparing nearby higher ground while waiting for the floods, 11% said they adopt a wait and see attitude, 7% said they relocate or move to higher ground and return when the floods subside, and another 7% said they pray for God's protection (a sign of helplessness).

Table 8. Community response to information about floods from other sources

Response	No of responses (n=100)	Percentage
Wait and see	11	11.0
Relocate	7	7.0
Start to prepare new places for any eventuality	79	79.0
Pray to God for protection	7	7.0

Source: Field survey, 2014

Community Adaptation to Floods

Table 15 shows the coping mechanisms that communities adopt in flood situations. Of the 100 people interviewed, 78% indicated that they relocate temporarily and return after a flood, 19% that they rely on support from family and friends outside the area to either house them or keep their valuables, 9% that they look to God, 7% that they seek assistance from the District Assembly, and 1% that they use sachet water for drinking and cooking when their water sources is contaminated by floods.

Table 9. Community coping/adaptation strategies for floods

Strategy	No of responses (n=100)	Percentage
Rely on support from family and friends	19	19.0
Seek Assembly support	7	7.0
Look to God	9	9.0
Relocate temporarily	78	78.0
Use sachet water	1	1.0

Source: Field survey, 2014

Usually when disasters such as floods occur, philanthropic and relief organizations step in to offer assistance. The study asked the communities which organizations usually came to their aid during floods. Most said they did not usually get support from any institution or organization (table 16). This conforms to the analysis in table 15, which shows that most

communities relocate temporarily with support from family and friends to cope with floods. Community members reported that when floods occurred, organizations such as NADMO write down their names for relief items but do not follow up with much support. Besides the Assembly and NADMO, other organizations that usually support flood victims were reported as NGOs, WFP, UNICEF, and the Ghana Red Cross Society.

Table 10. Organizations that support flood victims

Strategy	No of responses (n=100)	Percentage

Source: Field survey, 2014

The type of aid offered by the above institutions is usually material, in the form of building materials, bedding, clothing, cooking utensils, food, drugs, and drinking water. As shown in table 17, these organizations do little in terms of capacity building to boost the resilience of communities against future flood disasters.

Table 11. Type of aid offered to flood victims

Type of aid	No of responses	Percentage
Material aid	47	85.0
Information on how to detect signs	8	15.0
Total	55	100.0

Source: Field survey, 2014

Interventions Needed at the Community Level to Address Floods

According to members of the communities along the two Volta Rivers in Central Gonja District, their best efforts are not good enough to prevent the floods from taking their toll. They recommended several interventions to help them. The most frequently mentioned were support with flood-resistant building materials (55%), relocation to new settlements (39%), and training on modern methods of farming and adaptation measures (17%) (table 18). Those who asked for building materials depend on the water for their livelihoods and are not ready to move away from the riverbanks. Hence they want to strengthen the foundations of their homes to make them more resistant to strong flood currents.

Table 12. Recommended Interventions to boost community resilience

Intervention	No of responses	Percentage
Support with special building materials that are resistant to floods	55	55.0
Relocation to a new settlement	39	39.0
Training on modern ways of farming and adaptation measures	17	17.0
Capacity building from NADMO to predict and to respond to disasters	13	13.0
Tree plantations	11	7
Boats with engines	9	9.0
Agricultural support scheme to enable people to move away from flood-prone farmland	8	8.0
Support with crop varieties that are flood tolerant and early maturing	7	7.0

Source: Field survey, 2014

People have various reasons for not wanting to relocate from flood-prone farmland on the riverbanks. Farmland on the river banks is fertile and gives better yields than land in the highlands, which is poor in nutrients. Fertilizers are expensive, and peasants and subsistence farmers do not have money to buy them. When the floods do not come or come late, they get bumper harvests, but when they come early, they lose their crops. Also, most people who live close to the two rivers in Yapei and Buiepe are migrant fisher folk who prefer to live close to the river because they fish at night. Those who might want to relocate are unable to because they are migrant farmers and do not have the money to buy fertile land on higher ground.

Occurrence of Destructive Windstorms

Floods and windstorms are common climate variability-related disasters across Ghana, particularly in the three northern regions. This study attempted to find out the frequency of destructive windstorms in the area. Over one-half (61%) of the respondents said that heavy windstorms occur every year, 20% said they occur every 2 years, and 14% said they occur every 3 years (table 19).

Table 13. Frequency of heavy windstorms

Frequency	No of responses (n=100)	Percentage
Every year	61	61.0

Every 2 years	20	20.0
Every 3 years	14	14.0
Every 4 years	4	4.0
Every 5 years	1	1.0

Effects of Heavy Windstorms

Asked about the effects of heavy annual windstorms along the Black and White Volta Rivers, 91% of the respondents said they usually lose their domestic property to the storms, while 62% said they lose their farm produce. Other effects mentioned by the respondents include hunger, poverty, loss of life, and loss of livelihood/investments (table 20).

Table 14. Effects of heavy windstorms

Effect	No of responses (n=100)	Percentage
Destruction of farm produce	62	62.0
Destruction of domestic property	91	91.0
Hunger	6	6.0
Poverty	5	5.0
Loss of life	4	4.0
Destruction of fishing equipment	2	2.0

Source: Field survey, 2014

Community Response to Destructive Windstorms

As with floods, the communities along the two rivers have little resilience in the face of destructive windstorms. The communities' ways of responding to windstorm disasters (table 3.21) can best be described as unsustainable. Most (67%) said that when the storms strike they move out to stay with family or friends, re-roof their homes, and return to occupy them. They rely on relief items donated by NADMO and other organizations, if available, or buy building materials themselves, sometimes on credit. About 15% indicated that they look to God for help.

Table 15. Community response to destructive windstorms

Response to destructive windstorms	No of responses (n=100)	Percentage
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Move out, re-roof, and return afterward.	67	67.0
Move out to stay with family and friends.	14	14.0
Replace building materials on credit.	5	5.0
Take relief items from NADMO and philanthropists.	8	8.0
Look to God for help (divine intervention).	15	15.0

Source: Field survey, 2014

Indigenous Signs for Predicting Heavy Windstorms

Few respondents (21%) are aware of local signs to predict heavy windstorms (table 22).

Table 16. Knowledge of indigenous systems for predicting heavy windstorms

Response	No of responses (n=100)	Percentage
Yes	21	21.0
No	79	79.0
Total	100	100.0

Source: Field survey, 2014

Of the 22 respondents who mentioned indigenous knowledge systems to predict heavy and destructive windstorms, 11 mentioned the movement, intensity, and direction of wind; 10 mentioned the color and nature of clouds before the rain; and one said people rely on warnings from mallams and others such as soothsayers.

Table 17. Indigenous knowledge systems for predicting heavy windstorms

Knowledge system	No of responses (n=100)	Percentage
Movement of wind and the direction of wind	11	50.0
Color and nature of cloud that precedes rain	10	45.0
Warning from mallams and spiritualists	1	5.0
Total	22	100.0

Source: Field survey, 2014

The majority (81%) of the respondents said they are not able to predict floods and windstorms accurately (table 24). They therefore requested training on early warning systems and signs for accurate prediction of these hazards.

Table 18. Communities' ability to predict floods and windstorms accurately

Response	No of responses (n=100)	Percentage
Yes	19	19.0
No	81	81.0

Source: Field survey, 2014

Interventions Needed at Community Level to Address Heavy Windstorms

Asked what could be done to make communities more resilient to windstorm disasters, the responses were tree planting (57%) and assistance with building materials (44%), training youth in construction (18%), capacity building of NADMO (8%), permanent resettlement of affected people (8%), and support to plant wind-resistant crop varieties (6%) (table 25).

Table 19. Recommended interventions by communities affected by windstorms

Intervention	No of responses (n=100)	Percentage
Support with building materials to strengthen buildings	44	44.0
Support with wind-resistant crop varieties	6	6.0
Training of youth in construction	18	18.0
Capacity building of NADMO and other agencies to predict and respond effectively to wind disasters	8	8.0
Permanent resettlement of affected people	8	8.0
Massive tree planting in communities	57	57.0

Source: Field survey, 2014

5 Immediate Impact

Conducting research in all disciplines is a key mandate of ICIER. This project helped the institute extend its reach to rural areas and the area of climate change and increased the knowledge of the team and institute.

The knowledge of the communities has also increased, now that they know that some of the disasters they have experienced are a result of their own actions or inaction. Even though farming close to river may appear profitable because of the mineral deposits in the soil, the long-term implications of siltation could affect the farmers negatively. The research also taught them not to disregard any event in their lives as irrelevant, for example, indigenous knowledge systems (about which the respondents had to be prompted). The communities learned through the project that they have a role to play in minimizing the impact of future disasters by observing events around them.

Members of the communities and institutions also said that for the first time, the results of research was carried out with them as research subjects were brought back to them for validation. Their willingness to return to Buipe after their first visit for the validation was evidence of their interest and appreciation. This activity changed their perception that they are normally used by intellectuals for private gain.

The project made monitoring and evaluation an ongoing process and not an event. Through this process, the following lessons were learned:

1. Entering a community by involving all relevant stakeholders, passing through the necessary structures, and observing the necessary protocols and procedures gives a project the largest chance of succeeding. In communities where both the Assembly members and the District NADMO Office collaborated to arrange meetings for the project, the level of cooperation from the community members was higher than in communities where either the NADMO Office alone or the Assembly members alone helped arrange meetings.
2. Communities along the two rivers have more confidence in their Assembly members than in the District NADMO Office, because the Assembly members know that it was the community members who elected them into office and they will one day need their votes again and usually work in their interest. In contrast, the NADMO Office staff are appointed, and people will receive a project taken into the community with only the approval of NADMO with some level of skepticism.
3. Though the communities are poor and vulnerable to climate change and its impacts and are willing to engage in projects/interventions that will boost their resilience to climate change impacts, they have little confidence in NADMO as an organization. Almost every community complained that NADMO wrote down their names for relief items when disaster occurred, but little or nothing actually reached them at the end of the day. As a result, communities compare every organization or project on disasters to NADMO, treating it with little confidence. Any projects emanating from this research should be a multistakeholder intervention in which Assembly members and communities play an active role.
4. Almost everything went as planned except for the timing of the data collection, which did not take into consideration the nature and location of the communities. The communities live close to the riverbanks, and rain cuts them off when the road

becomes unmotorable. Data collection therefore had to be conducted ahead of schedule.

6 Future Impact

The institute will track the disaster situation in the study area through annual visits and interviews with the communities. If funding is available, a post-research intervention project could be implemented to test and evaluate some of the interventions recommended by the communities and other stakeholders.

7 Conclusions

The communities have their own ways of predicting floods and windstorms and adapting to these disasters, but these measures are not sustainable, and predictions based on indigenous methods are not always accurate. The communities need training in how to prepare for floods and strong windstorms and strengthen the foundations of their homes to withstand their effects—loss of domestic property and farm produce. Currently they receive minimal support from government and its development partners.

To boost the resilience of communities along the two Volta Rivers in Central Gonja District to effectively address the impacts of climate change (floods and heavy windstorms), the following actions are recommended for the Central Gonja District Assembly:

1. Develop and implement a district-wide climate change action plan.
2. Liaise with the Ghana Red Cross Society and GMET to build the capacities of the district directorate of NADMO to effectively predict and respond to disasters.
3. Roll out alternative livelihood and farm input support schemes to encourage communities to relocate from their current life-threatening settlements.
4. Organize training for the youth of the area in climate-resilient building and construction technologies.
5. Train and support farmers in planting climate-resilient crop varieties and using climate-resilient farming methods.
6. Support communities to strengthen the foundation of their buildings to be able to withstand floods.

8 Implications for the Future

To build on the work of the project, a development project to build the capacity of local people along the riverbanks can be instituted to give them expertise to build strong foundations for their buildings to withstand floods. Respondents recognized that the felling of trees accounts for the destructive effect of the strong winds. An environmental project on re-afforestation could be started to facilitate tree planting. A third project that can be developed is an income generation project for women to discourage their over-reliance on fish for food and livelihood.

The project engaged the participation of the local District Assembly, government system, traditional authorities, traditional governance system, and opinion leaders in the research to ensure local ownership and continuity of the project after the funding ends. To strengthen collaboration with the National Red Cross Society, the ICEIR could enter into a formal partnership for further research on related issues and collaborate on capacity building for local communities.

9 Publication

ICIER will package the results of the study for publishing in an international journal for knowledge sharing and possible networking with communities in a similar situation elsewhere.

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