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A Climate Change and Natural Hazards Vulnerability Assessment and Adaptation Plan for Akwidaa and Ezile Bay, Ahanta West District

Christopher Cripps, Elizabeth Effah, Justice Inkoom, Emmanuel Ntiri, Pamela Rubinoff, Hilary Stevens

Hɛn Mpoano

THE UNIVERSITY OF RHODE ISLAND GRADUATE SCHOOL OF OCEANOGRAPHY
COASTAL RESOURCES CENTER
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For more information on the Integrated Coastal and Fisheries Governance project, contact: Coastal Resources Center, University of Rhode Island, Narragansett Bay Campus, 220 South Ferry Road, Narragansett, Rhode Island 02882, USA. Brian Crawford, Director International Programs at brian@crc.uri.edu; Tel: 401-874-6224; Fax: 401-874-6920.

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Cover Photo: *Community members in a mapping activity*

Cover Photo Credit: *Coastal Resources Center – Ghana*

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I. Introduction to Vulnerability Assessment and Adaptation Planning for Coastal Communities

Purpose

Hen Mpoano activities in coastal management and climate change adaptation

This report builds on several activities of the Hen Mpoano program in the Western Region to provide tools for District officials. Over the past two years, several activities have engaged both the community and the District in participatory assessments (2010 Rapid Assessment of Coastal Communities in the Western Region: Summary of Findings for Ahanta West District, March 2010), capacity building related to spatial planning (2011 GIS training), livelihoods (fisheries profile) and climate change assessment (Regional vulnerability) and training (UCC Climate Change course in 2011 and 2012).

The purpose of this initiative is to draft a model process and collect local input for incorporating vulnerabilities and resilience into coastal planning. This supports the overarching Hen Mpoano goal of enhanced governance in the Western Region. In particular, our goal is to enhance the capacity of District officials and community leaders to incorporate issues related to coastal resources management and governance into developing their planning efforts, and to insure that natural hazards and vulnerabilities are accounted for and integrated within their strategies.

The Akwidaa workshop contributes to this, by providing:

- A draft process for incorporating coastal vulnerability into the planning process. This will be used in Dixcove and then finalized to add to the methods for use in the region.
- A draft Coastal Resilience Plan which will start to make Akwidaa more resilient.

This report is organized in five parts. Section I provides an overview of the planning context and the town's physical landscape. Section II outlines the characteristics of the community, its vision for the future and expected climate and natural hazards impacts. Section III presents a vulnerability assessment based on this information, focusing on the adaptive capacity in key facets including economic, social, governance and physical. Section IV presents a set of short and longer term actions to improve adaptive capacity and strengthen overall resilience. Section V combines these proposals into a set of actions for the immediate term as well as consideration in Ahanta West District Mid-Term Development Plan and spatial planning framework.

Context for community level climate change and natural hazards planning

At the national level, the only current plan (2012 National Infrastructure Plan) designates the coast as a services and tourism zone. The Western Region Spatial Development Framework (WRSDF 2012) designates key settlements for Ahanta West and identifies the coast between the Ankobra River and Butre estuaries as an area of landscape and amenity value where oil and mining related industrial development should be avoided. The WRSDF plan outlines several sectors for Ahanta West, including Agriculture, Industrial, Forest, Fishing, Livestock and Tourism. While adjacent communities have proposed development (for example, tourism in Princess Town, Dixcove, and Busua), Akwidaa does not have any proposed plans. As for services, these are unlikely to be provided until far into the future.

The Korean International Cooperation Agency (KOICA) developed a proposal with the District between 2010 - 2012, with the goal of looking at tourism hubs and services in the region. The coast between Cape Three Points and Dixcove, with Akwidaa at its center, was not targeted for tourism development or a major fishing port, although "Yachting" was designated in one section of their report.

Currently, the Ahanta West District is the subject of a Sub-regional Spatial Plan of the six coastal districts (2012), and has a Medium Term Development Plan (2010-2013) and District Spatial Development Framework, all of which reinforce the Korean view that this town is unlikely to be the subject of any major development in the near future.

National Policy and Program Areas (Ghana National Climate Change Policy, Ministry of Environment Science and Technology, 2012)
•Energy and Infrastructure
•Natural Resources Management
•Agriculture & Food Security
•Disaster Preparedness & Response

Key Themes
•Governance & Coordination
•Capacity Building
•Science, Technology and Innovation
•Finance

A plan was developed in 1964 to layout New Town. However, from the beginning it was largely ignored. The geographic reference points are incorrect (placing New Town in the sea), but the District's first assemblyman contended that the town's chief was mostly responsible. Some of the infrastructure developed so far in New Town does line up with that plan, but it is clear that it needs to be updated. Regarding the wider area of Akwidaa, the coast has become populated with at least seven low-capital, "eco-tourist" resorts. In early 2001, 700 acres of land to the west of Akwidaa towns were sold for private development, but to date nothing has materialized. There is also a development scheme published on line (http://akwidaa.com/) that neither the community members nor the District were aware of called 'The Akwidaa Development Project', which emanates from a business man in California, USA, named Keith Anfinson.

Methodology

CRC methods were used for this assessment. The Adapting to Coastal Climate Change guidebook (2009) and the latest USAID guidance emphasizing working with community vision and development goals were combined to determine the climate change impacts and the options for mainstreaming adaptation. Actions were evaluated by using Physical, Organization, Social and Economic aspects to help ensure that the strategies are robust and build adaptive capacities in different aspects of the community system

Data was collected from targeted interviews with experts and community leaders, workshops with community members, and review of maps, historic data and satellite images. This data was compared with previously collected vulnerability data as well and other findings to yield a comprehensive picture of the community development issues and climate change vulnerability.

Summary of the Assessment and Action Plan

Akwidaa is a small community divided into Old Town, located on a sandy area at the mouth of Ezile River, and New Town, located inland on higher ground. The community began the process of moving inland to a safer area decades ago, but some people remain in the highly exposed Old Town. Fishing is the main occupation in Akwidaa, and the boat landing site is in Old Town. The community is already quite marginalized, with few amenities, no electricity,

and ongoing problems with flooding and coastal erosion. Climate change impacts are likely to bring further difficulty to the residents of Old Town, particularly in the form of flooding from rising seas, eroding coastlines, and intense rainfall overfilling the river and wetlands.

The vulnerability assessment for Akwidaa confirms that it is vulnerable to impacts of climate change and natural disasters. Primarily as a result of its location in a low-lying area adjacent to a wetland and river mouth, it is highly exposed. It also has a high level of susceptibility due to weak economy. The adaptive capacity is the lowest of any community in Ahanta West.

Through working with the community, Hen Mpoano developed a number of actions that would improve the vulnerability of the community through enhancement of leadership, broadening and strengthening the economy, and providing amenities and services that would improve conditions for all members of society. These actions are listed by themes of governance actions, physical actions, and social and economic actions.

Figure 1. Akwidaa with (A) Physical features highlighted, and (B) physical processes on the shoreline indicated.

II. Background on Akwidaa and Ezile Bay

Key Features of Akwidaa and Ezile Bay

Akwidaa is a small coastal community, settled for over 4 centuries, in the Ahanta West District. The community's culture and character is influenced by its physical location and the geography of hills and valleys; the Gulf of Guinea shoreline of rocky headlands, coves and barrier beaches; and the Ezile River, with its wetlands, lagoon and river delta. It borders Cape Three Points to the west and Anachiem to the east. Much of this region was once under control of the supreme chief who designated land for the community. As a result of leadership changes, much of the land in the larger Akwidaa region is currently being sold to external interests.

Akwidaa's core is divided into Old Town and New Town separated by the Ezile lagoon. Plans were initiated by the District in 1959 to develop New Town. While these plans have not played out as designed, New Town has more amenities such as health center, market, Chief's palace, teachers' bungalow, several churches, one primary and one junior high school. The two main roads are untarred and in bad condition, due to high rainfall and no formal drainage. Recently electric lines are in the process of being installed for both Old and New Town.

Old Town amenities are few. They have a community center and Pentecost Church, lorry station, and an informal market area. Fishing boats and activity is on the lagoon side of both towns, although the fish landing is on the New Town side of the lagoon.

New Town has been built up through migration of people from Old Town, where the shoreline erosion and flooding has impacted many houses over the last 30 years. As a result, people have been acquiring land in the New Town to put up new homes. Apparently, Old Town residents were given the opportunity (land and cement) to move to New Town, but most people did not go. While the majority of houses at the old town are mud houses, New Town development is primarily cement blocks with aluminum roofing sheets and situated on higher ground.

Vision for the future of the community

A visioning exercise provided the participants with an opportunity to look collectively to the future. While many of the specific elements differed between the different plans or pictures depicted, there were several overarching principles that help to define their vision of the future.

- Healthy community with improved quality of life and education for all
- Diversified livelihoods and food security
- Sustainable management and utilization of natural resources of the land and sea
- Safe and resilient community to natural disasters
- Effective governance, leadership and collaboration at all levels

Figure 2: Community members of Akwidaa on a mapping exercise as part of the visioning process

Climate Context

There is already evidence of the manifestations of climate change in Ghana, such as increasing temperatures; rainfall variability, including unpredictable extreme events; sea-level rise; increasing greenhouse gas emissions and loss of carbon sinks. These impacts affect various facets of Ghana's socio-economic structure, especially with its high reliance on sectors that are particularly sensitive to climate change – agriculture, forestry and energy production. The Government of Ghana recognizes that climate change must be mainstreamed into policies and sectoral activities to achieve sustainable growth. The vision outlined in the National Climate Change Policy (NCCP) is:

To ensure a climate resilient and climate compatible economy while achieving sustainable development through equitable low carbon economic growth for Ghana.

The National Climate Change Policy provides strategic direction and co-ordinates issues of climate change in Ghana. The three objectives of the Policy are (1) effective adaptation, (2) social development and (3) mitigation. To address the adaptation issues in Ghana, four thematic areas have been identified. These are (1) energy and infrastructure, (2) natural resources management, (3) agriculture and food security and (4) disaster preparedness and response. (NCCP, 2012)

Current trends in Climate

Since 1960, the average mean annual air temperature has increased 1° C nationwide and on the coast, approximately 0.9 ° C. The frequency of hot days and nights has increased, mostly September to November. The sea temperature has recorded a slight increase over the same period of time. Ghana's precipitation is highly variable year to year, and there is no evidence that extreme events have increased or decreased. However, the long term trend in Ghana shows a slight decrease in precipitation, with the coastal areas seeing more of a decrease than inland areas. Over the past 40 years, sea level has risen approximately 8 cm.

Future Climate Projections

Modeling for future projections has been limited, but shows some continuing trends. The projected mean annual temperature is likely to see 1.5 - 3° C increase by 2060s. The precipitation is highly variable, and it is likely that the country will experience increased variability in the future. In terms of sea level rise, the global projection shows acceleration. In Ghana, the sea level projections indicate a rise of 13 cm – 56 cm by 2090.

Sea Level Rise effects on the shore and built coast

Erosion has plagued the Western Region for decades, inundating communities and altering the shoreline, particularly around river mouths. Sea level rise is compounding this ongoing problem and is likely to increase in coming years. In the Western Region, sea level rise will have a number of impacts, accelerating erosion, coastal flooding, threating the functioning of piers, docks and seawalls, shifting estuaries to higher salinity levels, contaminating coastal fresh water wells, and intruding on coastal river water supply intakes. In addition to the potential economic effects of sea level rise and accelerated erosion, extensive coastal wetlands in the Western Region will be impacted by sea level rise. As the rising ocean erodes the shoreline, these wetlands will be transformed from closed to open lagoons, with a loss of vital habitat and biodiversity in the process. Many coastal communities are reporting that their wells are being contaminated by salt water. This problem can result from the intrusion of salt water as a result of coastal erosion as well as overdrawing the wells.

Coastal fisheries

Marine fisheries depend to a large extent upon the Central West African Upwelling, which has a seasonality tied to atmospheric and ocean circulation, making its productivity variable and difficult to predict but favoring small pelagic species. "Changes in sea temperature could affect primary (phytoplankton) and secondary (zooplankton) production which in turn could dramatically increase or decrease the abundance of pelagic fishes and their predators" (Stanturf et al., 2011)

Coastal landscapes and livelihoods

Climate impacts on agriculture and the landscapes of the coastal districts of the Western Region are expected to change in the next decades as a result of temperature and precipitation in addition to other factors that are fragmenting the mosaic of land cover. For example, cocoa is expected to largely disappear as a cash crop in the coastal districts.

Key Coastal Issues in Akwidaa and Ezile Bay

The coastal communities of the Western Region face numerous challenges to their health, well-being. Many of these issues have origins that are not related to climate, but are impacted and exacerbated by climate change. This dynamic complicates the development process and can blur the lines of cause and effect in attempts to improve the quality of life for people of the community. For this reason, it is vital to ensure that development projects always incorporate climate change into their designs. The most urgent issues in Akwidaa are included here with the climate-related and non-climate related stressors delineated.

Fisheries

Currently, fishing is major livelihood in Akwidaa, where 60% of men and 60% of women in the community are involved in fish processing. They have 250 canoes (180 motorized and 70 using paddles), however, many fishers have noted that fish catch has declined, the quality of

fish has gone down, and they are travelling to longer distance to get fish. The fish harvest and the gears utilized change with the season.

Key Issues:

- Decline in harvest due to overfishing and unauthorized/unsustainable methods (e.g. light fishing, dynamite, and undersized net). Increased prices due to decline in catch
- Poor fish quality and consequently poor life span of processed fish
- Negative perception about premix issues: Inadequate supply and black marketing.
- Conflicts between local and migrant fishers, among local fishers themselves, between fishers and trawl vessels, and between fishers and fishmongers.
- Nonexistence/ weak local institutions for managing the fishery
- Destruction of mangroves impacts fishery nurseries

Climate stressors

Increasing temperature stresses fish. Sea level rise can impact mangroves by drowning them. Changes in freshwater flow may affect the types and health of mangroves and habitat. Increased rainfall may increase pollution and sedimentation to the river.

Non-climate stresses

Harvesting mangroves for firewood for smoking fish reduces fish nurseries. Overharvesting of fish and use of illegal practices, lack of enforcement of regulations and customary practices all impact the fishery. Land clearing together with high rains causes sedimentation of the river, affecting water quality. The lack of formal sanitation programs results in solid and liquid waste disposal adjacent to the coast and river, reducing water quality.

Agriculture

Agriculture is a key income generation livelihood, especially during the lean fishing season. 30% of women and 30% men are involved in agriculture. The prime crops are maize, cassava, palm nuts, tomatoes. Due to widespread disease of coconut plants in 1960, the traditional coconut farming switched to rubber production. Oil palm and rubber have become the major cash crops. The Norwegian Palm Limited (NORPALM) and the Ghana Rubber Estates Limited (GREL) produce edible and industrial oil palm and industrial rubber respectively in the District. Akpeteshie palm wine distilling is also an important agro-based activity in the district. Income for families and food security is impacted by climate and non-climate stressors.

Key issues:

- Declining community livelihoods from competing land use
- Change in agriculture to oil palm and rubber, together with poor soil conditions, limits lands for food crops.

Climate stressors

Long term rise in temperature and the increased variability of rainfall affect agriculture. The crops are climate sensitive and are destroyed during heavy rainfall and during high temperatures. Crops can dry out as a result of periods of low or no rainfall and reduced water supply. Increased temperatures will also reduce the time that crops can be stored without refrigeration. Heavy rains lead to erosion and flooding so the top soil is washed away.

Non-climate stresses

The storage facilities are limited and perishable foods can be lost. Land tenure issues are a concern, in that many people do not own land. When land is owned by individuals and families, before it is sold, they must inform the chief and a percentage of funds is given to the chief. However, this does not always happen. In addition, expansion of rubber plantations has limited space for agriculture of food crops. Soil quality is poor and they do not have sufficient funds for fertilizer. Unsustainable practices such as burning wood for charcoal and burning land for cultivation threaten the soil health. Farming practices are inefficient due to high cost of farming equipment. Tourism impacts farming because land is released to foreigners to build hotels and guest houses whiles there is no enough land to cultivate.

Rapid development and land use change

The discovery of oil in Ahanta West District, with its proximity to the capital of the Western Region, has increased the potential for industrial and other related development. Consequently there has been a rush for lands by investors and speculators, as well as pressure on the coastline for development of hospitality industry. Changes in agriculture in the region such as the demand for cash crops over subsistence farming, have also changed land use patterns in recent years.

Key Issues

- There is no current plan or strategy for Akwidaa.
- Land is being sold without thought on community benefits
- Development efforts are not coordinated or communicated well. District and local leaders are not aware of all of the development proposals.

Climate stressors

Climate change will affect what crops can thrive in the region, and will there control how agricultural lands can be used. Climate impacts on other uses such as tourism and oil and gas development are less clear-cut.

Non-climate stresses

Without an established chief in place, many customs of land tenure are in limbo. This in compounded by increasing demand for land for infrastructure for tourism and oil and gas development.

Roads are in poor condition, are not tarred or designed with drains affecting access to and from the community. The bridge is of basic construction and weakens when boats run into it. A road bridge is needed. Houses are built of varied materials and designs, many of which are not storm resistant. Sanitation measures are almost non-existant. Houses are being built and sited in chaotic fashion without regard to the plan.

LOCAL PLANS AND THE AKWIDAA WORKSHOP

The Akwidaa Workshop was attended by community members and staff of the District Assembly Physical Planning Department. The attendants could see that a revised Local Plan for the area and in particular for New Town was needed. The District Planning and other staff who attended agreed to begin to prepare such a plan the following week. Community members understood the importance of requesting such a plan, and taking part in its preparation, with their elected Assemblyman and other staff in the District including the Community Development Officer, who attended the workshop.

District Physical Planning staff said that this was the first time they had engaged directly with a community at local level, and were motivated by the experience to follow the process through. This would entail drawing up a Local Plan in full consultation with stakeholders; the District Assembly Statutory Planning Committee approving the plan; the District Assembly ensuring that applications were made for development permits prior to starting work; arranging that development was monitored to ensure compliance.

The attendants could see the impact that these, measures would have on the health and well-being of the community. However, the resourcing of the process, in terms of allocation of staff time and costs including transport, was not considered.

The role of a Local Plan as one of the tools for tackling vulnerability and increasing resilience was understood. However the full process of preparing a Local Plan, which is not only a spatial plan but also a schedule of actions, costs and sources of funds (including those identified below) was also not able to be encompassed by the workshop. The resourcing of this not only rests with the District Assembly but could include input from private developers (there are to date seven "eco-tourism" businesses within the catchment of Akwidaa) and other stakeholders including development partners.

Coastal Erosion

The shorelines around Akwidaa are particularly dynamic due to the influence of the river mouth and the rock outcrops that impact local currents. The Old Town community developed in a highly exposed location at the outflow of the river, and as a result it is vulnerable to frequent flooding and ongoing erosion. This erosion is made worse by sea level rise, which will eventually make the low-lying Old Town area uninhabitable. Over the last ten years, about a hundred houses in Old Town have been inundated. Erosion has compelled many residents to acquire building sites at New Town, even though they cannot afford to start putting up new buildings. While many feel that Old Town should be relocated, there is also reluctance to abandon it.

Key Issues

- Infrastructure is damaged by rising water levels
- Saltwater intrusion is impacting fresh water supplies
- Lack of improved roads and bridges between Old Town and other areas hamper relocation efforts
- There is a lack of leadership and resources to implement planned relocation

Climate stressors

Ongoing erosion caused by wave energy on the coast is being worsened by sea level rise and it is predicted to worsen in the future. Additionally, changes in rainfall patterns will cause changes in river outflow, which is also likely to make riparian and coastal flooding more severe.

Non-climate stresses

Unregulated sand winning takes place on the beach, which reduces the amount of material available to protect low-lying areas from flooding. It appears as though there is beach erosion east of the town which could impact the road access to Old Town. It should be noted that this road access, from Dixcove, is the only access to Old Town as there is no road bridge to New Town. To get to New Town by road from Old Town entails a journey of some 40 km back through Dixcove, returning on the road to Cape Three Points.

Community well-being and health

Access to services is very limited, including health facilities, education, water and sanitation.

Key Issues

- Lack of access to electricity. New Town and Old Town are being connected to the electric grid. Many people use generators, tourist areas combine solar power and generator use.
- Poor sanitary facilities and lack of basic amenities. There is only one toilet facility, which is poorly maintained and inadequate. Residents use the beach and forested areas. Solid waste is managed by Zoomlion which employs 20 people. Garbage is dumped on the beach in Old Town and in bush areas in New Town.
- There are four boreholes and two wells but two of the boreholes are not functioning and sometimes salty and not potable. There is no provision of piped water.
- The main road in New Town is severely eroded and is dangerous during rainy season. A road bridge connecting Old and New Towns is strongly desired.
- Falling standard of education and poor parenting
- Social problems due to oil and gas development. Potential opportunity for people to work in the growing leisure, hospitality and oil-related services sectors if the training provision and linkages were made.

Climate stressors

Changes in rainfall patterns are expected to further affect the water quantity and quality. With increased sea level rise and flooding, it will be difficult to secure clean water in Old Town. Increased flooding may affect safety for evacuation. Stagnant water breeds mosquitoes which carry malaria and other diseases.

Non-climate stresses

While Akwidaa residents have access to a clinic, the facilities are inadequate, poorly maintained, and understaffed. People must to travel to Agona or other towns for treatment in emergencies.

Governance Related Issues

Akwidaa is governed by both traditional leaders and a Unit Committee within the Ahanta West District. They have representation to the District Assembly.

Key Issues:

- Chieftaincy disputes. Leadership is weak, with disputes going back to 2006 when the Chief died. This affects enforcement of traditional customs, District and National laws, prevents orderly land use allocation and potential relocation plans.
- Non-existent and/or weak local institutions for managing the fishery
- Community perception of inadequate government representation and attention
- Collaboration of planning and decision making between local and District leaders is limited.

III. Vulnerability Assessment

Definition/approach

The vulnerability of a community to climate change and natural hazards is a function of potential impacts and adaptive capacity. It can vary considerably from place to place because exposures differ and sensitivities vary on the impact side, and adaptive capacity of communities, households and sectors can also be quite different even within the same location. These variables also interact with each other. Over time, higher adaptive capacity will lead people to reduce the sensitivity of their activities to changes, as well as take actions to lower their exposure. Although there is no agreed-upon formula for computing precise vulnerability "scores", common sense leads us to appreciate that children, elders and the sick are more sensitive, and that communities with low adaptive capacity are going to be more harmed by even modest changes in flooding, sea level, rain fall patterns, and shifts in fisheries due to sea surface temperature changes.

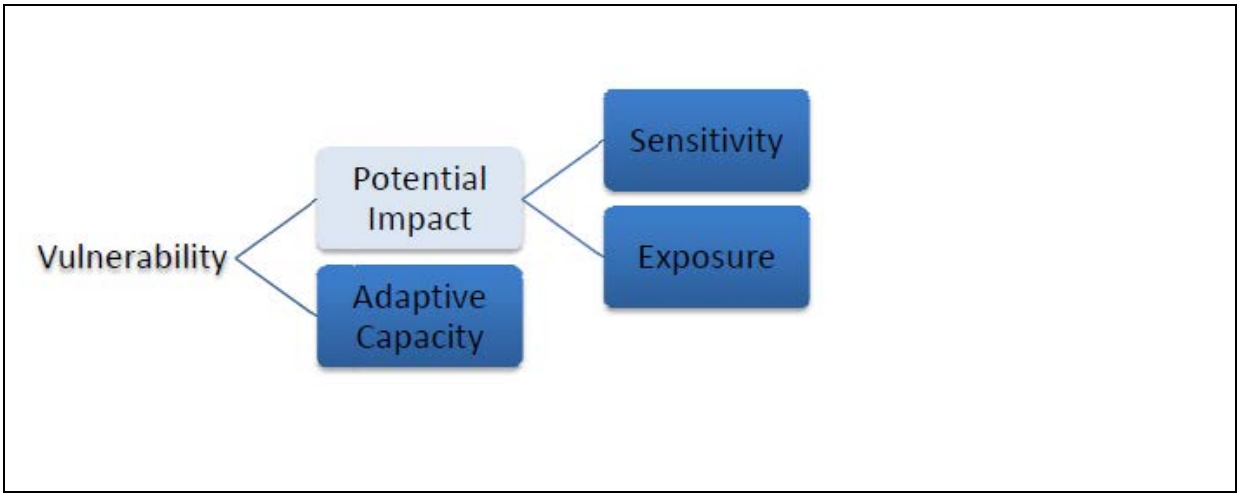

Figure 3 Vulnerability Components

The challenges and stresses facing Akwidaa have been documented in Hen Mpoano's 2010 community assessment and the 2012 rapid vulnerability assessment provided information regarding the high vulnerability of Akwidaa, based on the information regarding different capacities assessed in a regional rapid assessment.

DEFINITIONS

Adaptive capacity: potential, capability, or ability of built, natural, and human systems to adapt to impacts of climate change and variability with minimal potential damage or cost.

Exposure: the extent to which a system comes into contact with climate hazards or specific climate impacts.

Potential Impact: Exposure and Sensitivity combined will tell you how big the potential impact might be or to what degree the community could experience negative impacts from climate change. The greater the exposure and/or sensitivity the great the potential impact may be.

Resilience: ecological and social capacity to cope with, adjust to and recover from external stresses and disturbances. It is the flip side of vulnerability. Therefore, if you increase resilience of a community or resources, you will decrease their vulnerability.

Sensitivity: the degree to which a built, natural, or human system is negatively affected by changes in climate conditions (for example temperature and precipitation) or specific climate change impacts (for example sea level rise, increased water temperature).

Vulnerability: is the degree to which a human or natural system is susceptible to, or unable to cope with, adverse effects of climate change. Vulnerability is a function of exposure, sensitivity to climate impacts and related adaptive capacity.

CTI Workbook LEAP

Table 1 summarizes the findings of the 2012 rapid adaptive capacity assessment that led to selecting Akwidaa as a high priority location for a vulnerability assessment. Within Ahanta West, Akwidaa had the lowest adaptive capacity score and the highest number (7) of different types of climate and natural hazard stresses.

Table 1: Results of the 2012 Adaptive Capacity Assessment for Akwidaa

COMMUNITY NAME	THEMATIC AREA	TOPIC AREA	RANKING FIGURE	RANKING DETAIL
AKWIDAA	Governance & Leadership	Leadership & Local Organisation	2	EXIST BUT FAIRLY STRONG
		Security & Order	1	SOMEWHAT SAFE BUT LITTLE COMPLIANCE WITH LAWS/NORMS
	Coastal Resources Management	Resource Condition	1	FAIR
		Land Use	1	FAIR
	Natural Hazards & Risks	Public Awareness	1	AVERAGE LEVEL OF AWARENESS
		Emergency preparedness	0	UNPREPARED
	Economy & Society	Livelihood & Rural Economy	1	GETTING WORSE OVER TIME
		Marginalized	1	POORLY

During the 2013 workshop that launched the preparation of this assessment and plan, community leaders and District Planner summarized the potential impacts and Adaptive Capacity for Fisheries, Agriculture/tourism, Flooding and Erosion, Governance and Leadership. This provided an opportunity to get into more detailed assessment of adaptive capacities for different sectors.

Adaptive Capacity of key sectors

Fisheries

Because fishing is a primary source of income in Akwidaa, the health of this sector impacts the entire community. The fishermen, fish mongers and their families feel the impacts first, and they underpin the entire economy of the town. Fishermen and fish mongers typically diversify their income through farming and petty trading as well as investing in land when possible. There are minimal resources for the community to cope with climate change impacts to the fisheries. Some information is disseminated via radio and the District Assembly has a Fisheries Commission but it is not very effective.

The fishing community has some traditional forms of self-governance such as restricting fishing on Tuesdays at sea and Wednesdays in the lagoon. However, there are other problems such use of illegal and unsustainable methods, which are causing a decline in the health of the fishery. Enforcement of regulations on these methods has proven ineffective.

Several alternative industries have been suggested as means to enhance the local economy. Salt production, aquaculture in coastal lagoons and tourism all have potential but as yet have not taken off. Overall, the adaptive capacity of the fisheries sector is poor and in need of improvement.

Community and economic infrastructure

The infrastructure of the town is vital to its continued development, but in general it is in poor condition. The marginalized members of the community such as the elderly or disabled are most impacted by the poor sanitation and transportation systems, but the whole town feels its effects. In the process of relocating to New Town, new infrastructure can be built to support the community and to better withstand the impacts of climate change. Currently practices such as using garbage as revetments to prevent are an example of maladaptation to climate change and poor infrastructure.

The current adaptive capacity of this sector in Akwidaa is very poor and desperately in need of support. In order to improve the economic and community infrastructure, Akwidaa needs education and capacity building among residents. Government intervention such as support for the education system, and infrastructure such as drainage, bridges and roads, will provide better opportunities for the community members to improve their situations.

Agriculture

Many community members in Akwidaa practice farming as a primary or secondary means of livelihood. Those farmers and their families are directly impacted by the health of the agricultural sector. The food security in town is driven by local farming as well. Trading is seen as a good alternative to relying on local farming production for income.

Despite a long history of subsistence agriculture in the area, there are not strong traditional mechanisms for management of the sector or handling impacts of climate change. Recent reliance on fertilizers has boosted harvests but also caused a dependence on expensive inputs and raised concerns about water quality.

The agricultural sector also has a poor adaptive capacity and is in need of improvement. Some suggestions such as value-added production including making cassava into gari and palm nuts into palm oil show promise of providing livelihood and generating products with strong local demand.

IV. Adaptation and Community Plans of Action

When identifying actions to build adaptive capacity, it is useful to look at a framework for managing a system, where four capacities - Physical, Organizational, Social and Economic – combine to help a community adapt. Workshop participants identified potential actions based on their key themes of their vision. These have not been prioritized, nor vetted with the community at large. However, they provide a starting point.

The potential physical, organizational, social and economic actions identified by the group will greatly benefit from strong leadership and governance.

Potential actions to support Effective Governance, Leadership, and Collaboration

• Potential actions to support Effective Governance, Leadership, and • Collaboration at All Levels
• Enstoolment of chiefs • Enforce customary practices • Increase political will • Build capacity and conduct training – transparency, accountability, gender equity, conflict resolution • Collaborate with chief fishermen in the Western Region • Increase collaboration between the community and the District

Potential Physical Actions to Support Akwidaa's Vision

• Potential Physical Actions to Support Akwidaa's Vision • **Responsible Entity:**C=Community; DA=District Assembly; CREMA= community resource management area; MOFA= Ministry of Food and agriculture
• Healthy community with improved quality of life and education for all • Toilet facilities (C, DA) • Hospital with staff and equipment (C, DA) • Reservoir for water (C, DA) • Refuse bins, proper dumping, recycle site (C, DA, Zoomlion)
• Diversified livelihoods & food security • Processing Plants - Fish, Cassava, Oil palm (C) • Cold Storage (C, DA) • Fish ponds/farming (C, Fish Com) • Markets (DA) • Improved roads (DA) • Dam for irrigation (MOFA)

• Sustainable management and utilization of natural resources • Wetlands restoration & carbon capture • Landing site (C + Chief Fisher) • Improve fish catch (C + Chief Fisher) • Community farm (C + CREMA) • Increased agriculture yield (MOFA)
• Safe and resilient Infrastructure • Build houses on stilts • Shoreline structures • Relocate Old Town • Install culverts, drainage • Natural buffers • Relocate sand &rock quarries • For all of the above items (Community, District Engineer, DA)

Social, Economic and Capacity Building Actions to Support Akwidaa's Vision

• Social Actions
• Increase education/awareness of issues such as Mangrove conservation, fishing net mesh size regulations, public health, natural hazards • Promote environmental culture and new norms • Encourage economic activities for residents 18 years or older • Implement Training - Building houses differently for masters, Coping skills for disasters, Fish, Farm and Agroforestry good practices • Early warning system for storms & disasters
• Organizational Actions
• Create/revise by-laws regarding raffia, bamboo, sanitation, natural buffers, sand wining, building code • Increase law enforcement with community police, enforce fines, and encourage customary practices • Strengthen fisheries associations, pilot co-management project • Create community committees such as agriculture farmers association, community health and sanitation committee, Disaster response units
• Economic Actions
• Training on business skills • Establish Funding Mechanisms such as community fund, emergency fund, Carbon

sequestration income (wetlands, forest)

- Develop value-added agriculture and fisheries products
- Levy taxes on public toilets, refuse collection, charcoal burning, fuel wood cutters, tourism
- Identify insurance options such as health and natural hazards

V. The way forward – next steps.

Some of the actions that were developed in this process are site-specific, while others would benefit many towns in the district, and as such would best be conducted at a larger scale. Likewise, some of the actions can be done in a short term schedule and with smaller budget, while others will require a larger investment of time and resources. Some recommendations for the community to pursue and suggested partnerships are described here.

SHORT TERM

Initiate contact with appropriate District office regarding infrastructure improvement

Acknowledge need for resolution to cheiftancy issue and begin negotiation and/or mediation

Enforce traditional practices and norms of environmental stewardship

Enforce student attendance

MEDIUM TERM With District In Annual Mid-Term Development Plan update

Codify good practices. The following are some examples that were discussed in the workshop:

- Cage aquaculture in the mangrove areas
- Setbacks from eroding beach and river
- Conservation zones in mangroves and back barrier dunes
- Buffer zone on barrier beach, setback from high tide
- Recreation and tourism area identified for vulnerable areas (both mangrove, forest, and beach)
- Relocation of community houses, activities, and infrastructure away from highly vulnerable areas
- Building codes for new buildings that would be enforced at the District and local levels.
- Training for masters who build houses
- Culverts along roads to divert drainage of heavy rains
- Well borehole location and depth to reduce impacts of salt water intrusion

Enhance process and organizations. The following approaches are examples:

- Participatory planning – process to collaborate between District and Community leaders and stakeholders

- Integration of professionals linking the District Physical Planners, Community Development officer, NADMO
- Inclusion of Coastal and Marine Committee members into planning and community engagement – helps to understand the issues and actions, and helps to link the Assembly to the community
- Vision-based planning - Integrate climate change into the vision or goals of community or sector. Important to understand what is the desired future and how climate affects the different components of that vision

REFERENCES

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ANNEXES

Assessing Vulnerability and Adaptation Strategies: Informing Coastal Planning and Development Process in Akwidaa and Ahanta West District

Session Plan

Overarching Goals:

To enhance capacities of District officials and Community Leaders to incorporate coastal vulnerabilities into planning process.

Develop a draft model process and local plan input for incorporating vulnerabilities and resilience into coastal planning.

Outputs:

- Draft process for incorporating coastal vulnerability into planning process. This will be used in Dix Cove and Anlo Beach and then finalize the methods for use in the region.
- Draft Coastal Resilience Plan for Akwidaa which will start to make the coastal community more resilient (less vulnerable) in the short, medium and long term.

Objectives:

By the end of the week, the Hen Mpoano team and the Participants will have:

1. Engaged in stakeholder consultation (local community, District officials from Ahanta West, selected planners from other Districts/ Western Region Coordinating Council) in participatory activities to gain understanding and buy-in for the local plan and resilience activities
2. Understand where hazards, climate adaptation and livelihoods resilience fits within the Local Plan and the community vision for future development
3. Carry out a practical application of the training provided by Town and Country Planning on GIS, building upon existing layers of information and collecting new data, relevant to the Local Plan
4. Assessed hazard and climate change impacts on existing settlement and current development proposals through a participatory approach
5. Proposed potential actions (eg. Governance, structural improvements, capacity building) for reducing impacts for the future of the settlement and its fish landing activities
6. Prioritized next steps for stakeholders
7. Outlined a process for integrating coastal vulnerability into local planning efforts
8. Draft proposed Coastal Resilience Plan for Akwidaa

MONDAY
1. Briefing for District officials and workshop participants (planners and community leaders)
2. **Ice breake**r – who are we, what are we here for? 3. **Develop Vision for Akwidaa: Principles for a Resilient Community -** Individuals/pairs drew a vision of the future. These were shared, and resulted in common principles and specific needs for the community
4. **Identify the Natural Hazards and theAssets they Affect -** How do natural hazards affect the vision and the important assets? What are the key assets and what hazards affect them? What are the key issues? What are the key things to know and understand?
TUESDAY
1. Prioritize Data Collection for resilient community. Identify gaps in information **and prep for the field collection -** Groups discuss methods, determine which gaps they can fill, and which information needs to be validated. Plan how they will collect data.
2. Field Activities • Characterizing/mapping natural hazards and exposure (erosion, flooding from sea/river, frequency of flooding, temperature related concerns) of key assets in Old Town and new town? • Explore the "planning area", understand the sphere of influence, interview people. What is important to the community? How have things changed over time? • Identify and map the natural/cultural resources they depend on? Where are they located? Are there risks or opportunities? Changes over time? How are they currently managing them? **3.** Process and summarize field information
WEDNESDAY
1. Report back to other groups on information gathered– critical analysis **2. Synthesize information into Adaptive Capacities** – Using the LEAP Toolkit worksheet on Vulnerability, each group summarized Impacts and Adaptive Capacity for Fisheries, Agriculture/tourism, Flooding and Erosion, Governance and Leadership. (Note, we wanted to dig deeper into AC from Governance/leadership, CRM, Economy/Livelihood, Risks/Hazards.)
THURSDAY
1. Integrating Information for Planning and decision making - Refine elements of future visions taking into consideration vulnerabilities and adaptation (implicit) A. **Actions to increase Adaptive Capacity.** POSE (Physical, Organizational, Social, Economic) framework defined for Erosion/Flooding, Livelihoods (fish, agri, tourism), NRM (wetlands, fish, forest), healthy community B. **"Planning for Real"** - Building upon the vision, needs, issues (climate, non-climate) design layout.
FRIDAY
1. Debriefing Session with the Community Leaders- Presentation and discussion on next steps