Coastal Erosion and Coastal Livelihood Activities in Ghana. A Case of Ada-Foahin the Greater Accra Region of Ghana

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Abstract: **The purpose of this study was to examine the effects of coastal erosion and shoreline retreat on the livelihood activities of residents in the Ada-Foah area. To answer this research question, interview data were gathered from 30 participants comprising a sample of 20 residents of Ada-Foah, VRA, CDDF, NADMO, the District Assembly, the CRS, the Department of Wildlife, assemblymen, and chiefs, in connection with the major livelihood activities in the study area and how these have been impacted by erosion. From the data gathered, the major livelihood activities of the people in the study area were found to include: fishing, fish mongering, farming, salt mining, trading, and investment. Part of the data for answering this question was also obtained through field observation. The result of the study showed that coastal erosion has led to the loss of viable livelihood activities in the Ada-Foah areas creating survival problems for the coastal residents.**

Keywords: **coastal erosion. Livelihood, sustainability, dugout canoe, landing beach**

I. INTRODUCTION

Coastal erosion is one of the most prevalent global environmental problems affecting many coastal communities around the world, causing damage to life and property as well as the coastal livelihood (Tripathy&Sunakars, 1999). As observed by Abbot (1999) the world's coastlines are suffering major impact not only from tsunamis but also from smaller storms and everyday coastal processes (Abbot, 1999). According to the World Meteorological Organization (WMO), 2003, Atlantic hurricane season saw the development of sixteen (16) named storms which are well above 1944 and 1996 average of 9.6 with a marked increase since the mid-1990s. In 2003, Sri Lanka was hit by a cyclone that caused severe flooding, resulting in the loss of at least 250 lives (Larson & Simons, 2005).

The West Africa coastline has also shown the result of coastal erosion including the Maldives, Benin, Ghana, Lome in Togo, Nigeria (Gilbert, 1982). In Ghana, for instance, coastal erosion has affected several communities with significant social and economic impacts. In most of these coastal communities, there is a diverse economic resource base including fishing and farming which provide livelihood opportunities for the residents. There are sandy beaches, coconut groves, lagoons, swamps, and mangrove areas which also support tourism in these communities. All these, individually or in combination, provide great livelihood opportunities for the large number of people living in them. In most cases, governments generate revenues from the tax placed on the activities of these coastal dwellers, thereby, contributing significantly to national GDP. In the Ada-Foah area, all these activities have been grossly affected by coastal erosion subjecting the dwellers to abject poverty.

The concept of livelihood

According to the McMillan English Dictionary (2002) livelihood is something such as your work that provides the money you need to live. Carney (1998a:4) presented a definition of livelihoods that are widely accepted as: "… livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living". Livelihood, therefore, refers to the capabilities, assets, and strategies that people use to make a living. This includes income and employment, access to markets, goods and services, and primary production of food. Livelihood revolves around all the positive activities which bring about an improvement in the quality of life of the people (Odumah & Gyimah, 2002).

The term livelihood, however, attempts to capture not just what people do to make a living, but the available resources that provide them with the capability to build sound and sustainable living (Allison & Ellis 2001). This implies that people's livelihoods are not made up of simply a group of activities that they carry out to earn income and access the food that they require for their sustenance, not just any nefarious activity that one undertakes to earn a living but such activities that must be legal and generally accepted by the society. Hence, those activities that generate income or secure food supplies must be shaped and influenced by a complex set of factors if people's choices and strategies for ensuring a livelihood for themselves and their families are to be fully understood (Davis, 1996). According to Sen (1997:1959),the human capability is "…the ability of human beings to lead lives they have reason to value and to enhance the substantive choice they have".

In line with this, some of the earlier approaches in livelihood studies regarded poor people as passive victims (Pomeroy, Ratner, Hall, Pimoljinda & Vivekanan, 2006). And indicated that, the study of livelihoods is actor-oriented, place-focused,

and context-specific (Kirkby, O'Keefe & Howorth, 2001). Other studies have worked from a vulnerability and social security perspective; several have focused on disturbances and local vulnerabilities (Blaikie, 1995; Adger, Huq, Brown, Conway &Hulme, 2001). Investigations into change processes and adaptation have included short-term (Davies, 1996) and long-term responses (Singh & Gilman, 1999). Livelihoods, therefore, need to be classified and understood as dynamic - subject to shocks, changes, and seasonal effects– particularly when they depend heavily on access to natural resources.

Classification of livelihoods

Bird and Shepard (2003) are of the view that the regionally varying environmental, cultural, technical, political and market conditions add spatial details to more generalized ways of classifying the world's productive work. One approach to that characterization is to view livelihood activities as ranged along a continuum of both increasing complexity of product or services and increasing distance from the natural environment. Seen from that perspective, the range of livelihood activities is divided into sectors that include specific industries or business activities. An industry is a group of business activities, such as the farming industry, fishing industry, manufacturing industry, tourism industry only to mention a few (Bradshow, 1997).

Becon and Carter (1991) therefore suggest that the various livelihood activities may be conveniently grouped into primary, secondary, and tertiary sectors. The primary sector is concerned with what is produced from natural sources. The mining industry extracts minerals from rocks; the fishing industry catches fish from the oceans and rivers. Though, some of the primary products can be consumed in their raw state, most of them require further processing and so become raw materials for the secondary sector. The secondary activities change the raw material provided by the primary activities into commodities more useful to man and by so doing increase their value. Some of these activities include manufacturing, construction, and generation of powers. The tertiary sector is concerned with the distribution and consumption of goods and services and is often called the service sector (Becon & Carter, 1991).

There is yet the fourth sector referred to as the quaternary sector, identified separately from the tertiary sector. This specializes in the assembling, transmission, and processing of information and controlling business by such means classifications have made it possible for individuals to concentrate and ensure the sustainability of their livelihoods (Negash&Niehof, 2004).The livelihood activities in the coastal communities in the Ada-Foah area and other communities in Ghana are mostly found to fall within the primary sector with few traces of those within the secondary sector which is greatly affected by the menace of coastal erosion.

Sustainable livelihoods

A livelihood is sustainable when the poor are capable of coping with stresses and shocks as a result of any unforeseeable occurrences (Berkes, Colding, & Folke, 2003). Livelihoods are also sustainable when they provide benefits without undermining the natural resource base on which they rely (DFID, 2006a and 2006b; UNDP, 2006; World Bank, 2005). However, few livelihood studies have pursued the agenda of how livelihoods can cope with and recover from stresses and shocks, and the resilience analysis that this would entail (Berkes et al. 2003). Stresses and shocks that impinge upon livelihoods are the results of interactions between global forces and local contexts (de Haan, 2000; de Haan & Zoomers, 2003; Armitage & Johnson, 2006).

The central concern of a sustainable livelihood approach is poverty reduction, and to develop strategies for poverty eradication (Kay, 2006; Mitlin, 2002). This approach is a comprehensive and effective means of organizing the management of assets - the natural resources, human, social, political, and financial capital - that poor people access to make a living (Assby, 2003). The approach advocates linking poverty with the state of the environment and improved environmental management as a critical step in the process of reducing poverty and enhancing sustainable growth in communities (Ellis, 2000). It guaranteed access and entitlement to a range of assets and opportunities that are essential to achieving human well-being (Carney, 1998b). This implies tackling a wide range of environmental, social, and economic challenges and widening the potentials available to people to develop their well-being and to participate actively in society. Notions surrounding well-being, therefore, may offer a culturally appropriate representation for resilience for rural livelihoods from a local perspective (Carpenter, Westley, & Turner, 2005).

People are more likely to be food secured and protected when they have a solid asset base to sustain their livelihoods. People are most likely to be safe, educated, and healthy when their families have secure livelihoods. For example, parents can afford to pay for basic needs and services for their children and provide access to sufficient, nutritious food all the year when they have sustained livelihoods. Such livelihoods are not limited to, for example, a particular level of income, paid labour, or ability to have most household food scarcity but must include opportunities for investment and a reliable and accountable governance system (Cramer & Pontara, 1998). The sustenance of many people's basic human assets – their ability to work and their health – clearly depends on being able to access adequate food (Scoones, 1998). To sustain this supply of food, individuals or households can take several approaches. They can directly make use of natural resources that will enable them to provide food or they can "convert" their produce or labour into earnings that they can convert into food.

In the light of this, Allison and Ellis (2001) posit that a sustainable livelihood is an approach to poverty reduction in

low-income countries, as applied to understand the strategies of artisanal fish folks when confronted by the fluctuating fisheries resources. Based on this and other empirical research recommendations, it may be argued that sustainable livelihood does matter if an emphasis on poverty reduction is to be taken seriously (Glavovic & Boonzaier, 2007). However, sustainability of livelihoods goes beyond a simply material assessment of wealth by involving both household structure variables and evaluation of the household's management strategies (Narayan, Chambers, Shah, &Petesch, 2000). Essentially the most sustainable households are inevitably large and complex and exploited mutually reinforcing attributes of well-organized, abundant labor and long history of primary investment, the profit from which have been invested in other alternatives or job opportunities. Following the strong advocacy for sustainable livelihoods approaches in development from the 1990s (Chambers & Conway, 1992) and later (Scones, 1998; Carney, 1998b, 2002), many development agencies started to advocate sustainable livelihoods approaches as central to their programming, and even organizational structures.

Coastal livelihoods

Several studies have sought to understand the relationship between coastal communities, their livelihoods, sustainable development, and the environment (Chuenpagdee & Bundy, 2005; Bouahom, Douangsavanh & Rigg, 2004). Many studies have documented how these communities have organized themselves to maintain the harmony of the coastal ecosystem, while at the same time drawing sustenance from it (Mensah, Koranteng, Bortey &Yeboah, 2006; Kurien, 2003; Leival&Castilla, 2001; McGoodwin, 2001). This implies that, as the coastal communities organized to maintain the coastal ecosystem, they make their day-to-day livelihoods from the coastal environment which contains marine and terrestrial ecosystems with a high level of primary productivity.

For instance, the coastal sea is the most Biologically Productive Zone (BPZ) of the marine environment because of its high level of biological diversity, including coral reefs, marine mammals, and economically important fisheries (Stegeman& Solow, 2002). The location of land and houses close to the shore, where fishers have easy access to the sea, is a major physical asset and is a right they enjoy, although property rights in the coastal zone are relatively ill-defined (Damodaran, 2006; Ramachandran, Enserink & Balchand, 2005; Kurien, 2003). However, this could also be a setback as oftentimes the artisanal fishers develop fishing methods and fishing gears tailored to catch particular species within their home or fishing ground (Kura, Revenga, Hoshino & Mock, 2004).

Abbot (1999) in his work on Natural Disaster opines that the coastal environment provides human society with material resources to maintain their living system and build their environments. Such resources are beneficial for many human activities and their availability is basic to the economic development of the coastal people. The coastal environment indeed contains diverse economic resources base including Lagoons, Sandy beaches, and rocky shores which support tourism and provide livelihood opportunities to communities as well as contribute to the national GDP. In view of this, Hinckley (1976) also maintains that the nature of coastal areas, like sandy beaches, are of value for determining the type of activities that go on which includes recreation, production, and conservation to sustain the livelihoods of many coastal dwellers from time immemorial.Taking into account the discussions above, the term "coastal livelihoods" can be interpreted in several ways (Scoones, 1998). On the one hand, they are livelihood strategies that include some form of dependence on the use of marine ecosystems or the products that derive from those ecosystems.

However, an even larger group of people are "indirect" users of these resources and depend on the exploitation of coastal or marine resources to provide raw materials for their processing, trading, and other activities. These include fish processors and traders, the operators of cold storages and ice factories, traders whose goods are transported by sea, the operators of aquaculture enterprises that make use of shrimp and fish fry, builders who make use of sand and coral for their business, sellers and traders in salt, charcoal makers who use mangroves from coastal forests (Adger, et al., 2003). Although many of these actors may not even live in coastal areas they can all be regarded as having a "stake" in the exploitation of coastal and marine ecosystems for their survival.

A large majority of coastal populations are therefore dependent on fishing for their livelihoods. More than fifty million fishers in Asia, Africa, and Latin America are artisanal, meaning that they are engaged in small-scale fisheries (Berkes, 2001). This sector, however, accounts for nearly fifty percent of the global fish production from capture fisheries (FAO, 2005). According to Berkes et al. (2001), the total number of fishers (coastal marine and freshwater) is over 51 million in the world, amongst which 99 percent are small-scale fishers, and 95 percent are from developing countries. As such, the world's Coastal Marine Resources and Services (WCMRS) are valued at the US $ 21 trillion (McGinn, 2002).

To lend support to this, Sachs (2005) contends that a high proportion of the coastal productive land which provides the opportunity for livelihood activities among the coastal communities is subject to coastal erosion and shoreline retreat in varying degrees. Coastal erosion really poses a clear threat to future livelihood which serves as the main resource of food supply to individuals in households. Even the maintenance of the present levels of livelihood will be difficult in some areas as a result of coastal erosion (Sachs, 2005

The coastal area is recognized as a zone subject to intensive human use (Islam, 2008). Presently, these areas are being used for agriculture, livestock rearing, fishing, shrimp culture, and salt production among other economic endeavors (Agrawala, Ota, Ahmed, Smith & Aalst M van, 2003). Coastal areas also comprise sites of export processing zones (EPZ), airports,

land ports, harbours, and tourism. Moreover, being both 'World Heritage Sites' and 'ecologically critical areas' (such as Sundarban, the world's largest mangrove ecosystem and coral ecosystem). Unfortunately, however, these areas are highly vulnerable to both natural and man-made hazards and disasters like coastal flooding, cyclones, storm surges, salinity, arsenic contamination, pollution, and coastal erosion (MOWR, 2006). Coastal erosion has grabbed the attention of environmentalists (Islam, 2008; MoWR, 2006; Agrawala *et al*., 2003).

Lately, the problem of coastal erosion in the area has become more alarming than ever. The land is creeping in at a rapid rate leading to the destruction of livelihood activities. The problem of coastal erosion has affected many viable livelihood chances which would enable the people to contribute meaningfully towards the development of the area that has been foreclosed, leading to the low standard of living. Coastal erosion however altered the coastal environment, leading to a shortage of food, water, and other resources, giving rise to livelihood problems (Galles & Levine, 1999).

II. RESEARCH METHODOLOGY

The study employed a qualitative case study design. Agyedu, Donkor, and Obeng (1999) see case studies as a single entity or a phenomenon bounded by time and activity which requires the collection of detailed information by the use of varied data collection procedures. The use of a case study to probe an area of interest in depth is particularly appropriate as described by Patton (1987). The qualitative approach was found appropriate for the study because it allowed for the construction of the reality about the detailed understanding of the feelings, beliefs, experiences, and perceptions of respondents on how coastal erosion affects the livelihoods of residents in selected communities in Ada-Foah in the Greater Accra region of Ghana.

In line with the objective of this study, interview data were gathered from 30 participants comprising a sample of 20 residents of Ada-Foah, VRA, CDDF, NADMO, the District Assembly, the Department of Wildlife, assemblymen, and chiefs. The data collected were transcribed, coded, and reorganized into categories to allow themes to emerge for reporting. A member checking and thick description were used to ensure the trustworthiness of the study.

Ethical considerations

As this study utilized human participants, and in the interest of maintaining the integrity of the research, the researcher made every effort to ensure that certain ethical issues were strictly addressed in respect of the privacy as well as the security of the participants. These issues were identified in advance so as prevent problems that could arise during the research process. Thus, before commencing with the research, permission was obtained from each participant, who participated in the study. The names of the participants were secured. All data collected from the participants were kept in a secure location.

The results of the study

The analysis of the data gathered for this study through a combination of interviewsand observation revealed the major livelihood activities of the residents of the coastal communities of Ada-Foah have been adversely affected by the phenomenon of coastal erosion and shoreline retreat. These included fishing, fish mongering, crab hunting, farming, salt mining, trading, and tourism.

Fishing

Fishing is one of the most important livelihood activities which involve the greater majority of people living in the Ada-Foah area. Fishing is done on a small scale basis and the fishermen work in groups ranging from five to thirty depending on the type involved. Some of the different types of fishing activities in Ada-Foah include the seine netting, locally called *Adlai*, the set nets which are *babayola*, *tinglafo*, *akpotokui*, *ashio*, *dogbledo*, and the ring nets which are *Ali* and *watsa*. The seine net is the most common type consists of a net bag and two net wings to each of which a long rope is attached. The seine is set from the beach using a dugout canoe and dragged to land by two groups of men, women, and children pulling in each of the two drag ropes. The fishing activities in the area serve as a source of employment, income, food, and recreation for the residents.

However, the fishing industry in Ada-Foah appears to be under threat from coastal erosion and shoreline retreat. An interview with one of the fishermen at *Azizanya* who was once a net owner revealed that almost all the sites for seine netting which is the most popular fishing type in Ada-Foah have been taken over by the sea. "I sold my net because of that," he said. Again, another fisherman said coastal erosion and shoreline retreat have exposed a lot of obstacles made up of remains of buildings, ships, tree stumps, old wells which disturb fishing activities. He explained that these materials do not enable us to have an adequate fishing zone to do any meaningful and effective fishing. "The worse is Aunty B, one of the oldest ships in the sea at *Azizanya*," he said.

At *Lolonyakope*, a fisherman who is also a boat owner took me to his boat and showed me how a broken house left in the sea had damaged his net. He said, "for a month now we've not been fishing . . . I do not think generations after us would have a place to settle and fish if these houses here are going to be eroded into the sea" (Interview with respondents).

Plate 4.3 shows the photo of the researcher interacting with some participants at *Totopey* in one of such destroyed houses poised to end up in the sea.

Photograph of a destroyed building almost in the sea

Source: fieldwork.
Source: Fieldwork(2010).

Plate 4.3 shows an example of houses that were washed into the sea, constituting a threat to fishing activities in the Ada-Foah community. In the middle is the researcher surrounded by some fishermen at Totopey.

An interview with the chief fisherman at *Otrokper* has indicated that coastal erosion and shoreline retreat has exposed the beach at *Ada-Foah* to all sorts of debris and plastic waste material which affects fishing activities in the area. He took me to a collection of plastic waste and seaweeds locally called *akpɔdi* and *wosuma*, pointed at it, and said: "This has torn my net only yesterday and all the fish escaped". Again another fisherman at *Otrokper* said as a result of shoreline retreat, the original fishing zone became far from the reach of the fishermen. Yet another fisherman mending his net at the time, further explain that the shallow nature of the sea generates powerful waves which cause damage to boats, outboard motors, and other fishing gears.

Again, an interview with the chief fisherman at *Totopey* has shown that the streams and the lagoons which constituted alternative fishing grounds, apart from the sea, for about 85% of residents in *Ada-Foah* were taken over by the sea. In *Dangme*, he said, "Songorlatɛji pa nɛwagbee lo ngɛ mi pe pa fɛɛ pa se wo ɔ je le". This means "our first lagoon called "Songorlatɛ" is where we get more fish than any other lagoon or stream but had been eroded by the sea". Further interactions revealed that coastal erosion is currently pushing the beach sand landward into the second lagoon (*Songor*) making it narrower and shallower than ever, rendering it unproductive for its ability to produce fish for residents. One respondent from *Azizanya* showing some money to me said: Look, I even have money without getting fish to buy in this town. Very wonderful," he exclaimed.

Another interview with the young fisherman at *Otrokper* revealed that the beach which has been supporting all fishing activities had been washed away by the sea. Pointing at some boats he said: "Hmmm….you see… that place used to be our landing beach," The chief linguist who also took part in the discussions said, "next year by this time, we do not think you will come and meet us here". Plate 4.4 shows how the landing beach had been washed away by erosion in the Ada-Foah area. In plate 4.4 the fishing boats were landed much closer to the houses along the beach as a result of the landing beach lost to the sea.

Plate 4.4 Erosion effect on landing beach at *Otrokper, Ada-Foah*
Source: Fieldwork (2010).

The fishing industry, the largest livelihood opportunity in the *Ada-Foah* area, which employs about 80% of the people, has almost died out as parents no longer encouraging their younger generation to take up fishing as a major economic activity. Even the youth were no longer interested in acquiring the skills since fishing is not providing them any constant income. This has resulted in the youth indulging in certain crimes such as excessive drinking and smoking, illegal sexual practice, pilfering, just to mention a few.

Fish Mongering

The data gathered for the study indicates that fish mongering is another major livelihood activity that engages about 90% of women living in the coastal communities in the *Ada-Foah* area. Fish mongering is an opportunity that provides a source of income for the coastal women out of which they meet their needs, support the family's income as well as pay for their children's school fees.

Despite these benefits, fish mongering in the *Ada-Foah* community has been facing a lot of threats from coastal erosion and shoreline retreat. In an interview with a fishmonger at *Lolonyakope* who has been in the industry for decades and was working on a piece of land meant for drying fish at the time of the interview said, *Maami!! wamumunya ta, wanɔfɛɛnɔ* ta. Meaning "my brother, we are fed up, we lost everything". She went out with me, pointed at a distance, and

said "that is where I used to have my shed with many smokers". Pointing at the sea again she said: "that our enemy, the sea, is responsible for all these. It claimed everything," (Interview with respondents).

In another interview with Mamatula, a fishmonger at *Azizanya* and a boat owner as well, compared fish mongering activities to the past. She just looked at me, smiled and nodded her head twice, and said:

> *"Oh!!!... No! There is nothing good about fish mongering today to compare with the past in all respects. We need not have any huge capital before we start our business. We get the materials needed without buying them. We get our stock of fish with ease. But what do we see happening today? All these materials had been washed away by the sea" (Interview with the respondent- December 12, 2009).*

At *Otrokper* another fishmonger told me she just returned from the market and was too tired to listen to me. But with some persuasion, I asked her to describe some of the challenges that she faces in the fishing industry. Here she said: The land on which I smoke my fish has been swept away, all the gears I used in fish smoking is scattered with some destroyed each time there is flood (Interview with the respondent- February 8, 2010).

The queen mother of the 'Fishmongers Association' at *Lolonyakope* added that those fishermen from other places like *Teshie, Tsorkor* in Accra and parts of Volta Region who used to migrate to the place during the season to add to the labour and contribute to the fishing activities in the area had stopped coming as the fishing activities were not as lucrative as before. "We used to make more money from the fishermen that came from *Teshie* and *Nungua* during the fishing season than we used to make from our men".

Esinye, a fishmonger of *Totopey* standing by only two baskets of fish ready to live for the market at the time I entered her house told me the inadequate catch of fish by our men of late as a result of coastal erosion has particularly affected those of us who were closely involved in the fishing economy. She said:

I sell fish, shrimp, and oysters in the market and can earn up to GH¢50.00 a day from this, which greatly benefits my family. Now it is difficult for fish-sellers in *Ada-Foah* markets to earn even GH¢5.00 a day because there is so little fish left to sell as a result of erosion" (Interview with the respondent- March 3, 2010).

From the above responses, I realized the fish mongering industry has almost died out as a result of coastal erosion and shoreline retreat. Parents are no longer passing on their fishing skills to the younger generation to become economically independent to contribute meaningfully to the development of the area. Even the youth are no longer interested in acquiring the skills since fishing is not providing them any constant income. This has resulted in the youth indulging in certain obnoxious crimes such as excessive drinking and smoking, illegal sexual practice, pilfering just to mention a few.

Carpentry activities

Analysis of data gathered for this study has shown that carpentry is another livelihood opportunity affected by the phenomenon of coastal erosion and shoreline retreat in the Ada-Foah community. Although there are some other carpentry activities in the Ada-Foah area the main ones are boat building and boat repairs. The vibrant fishing activities in the Ada-Foah area had necessitated a high demand for boats. This had created a lucrative livelihood opportunity for some carpenters in the area.

These carpentry activities have however been threatened by coastal erosion and shoreline retreat. An interview with an old carpenter whose main work is boat making at Lolonyakope indicated that as fishing in the area has gone down as a result of coastal erosion, the high demand for boat and boat repair activities has drastically dwindled. "We virtually don't have any work to do," he said. At Otrokper, one carpenter took me close to the beach, pointing at a place he said:

"This is where my shop used to be, this is virtually the home of all boat building and repairs. Since the sea has evaded this site I have no place to work again". (Interview with respondents- March 3, 2010).

Crab hunting

Apart from fishing, the analysis of the data has shown that crabbing is also a form of livelihood opportunity in Ada-Foah, which is done in mangroves, wetlands areas, and water bodies. Crab hunting serves as a source of food for residents and an income source for several people in Ada-Foah, especially school goers.

Crab Hunting in the Ada-Foah area has, however, been affected by shoreline retreat. An interview with the assemblyman at Azizanya revealed that men and women, the youth,h, and school children are engaged in this activity. "We all did it before" he screamed. He then went on to say "crabbing was what I did to take care of myself in school". Another respondent from Lolonyakope who was once engaged in crabbing activities told me "I sold my crabs to those customers from Accra, Tema, and Kpong for a better price". A further probe revealed that the various land space, the mangroves, wetlands, and the water bodies that provided the opportunity for crabbing have been swept away by the sea.

Farming

The analysis of the data gathered through a combination of interviews, observation has revealed that farming is also one of the livelihood opportunities in the Ada-Foah community. The farming activities include crops, coconut and palm plantation, and animal rearing. This is done to provide food as well as generation of income to 70% of the people in the Ada-

Foah area. People engaged in farming activities during the lean fishing season while some also combined farming with fishing. Animals reared by farmers include goats, sheep, fowls, ducks, etc. which were normally sold in the off fishing season and during Christmas periods to generate some income to sustain many families.

However, this important livelihood opportunity appears to be threatened by coastal erosion and shoreline retreat. An interview with a farmer at Otrokper who was feeding some farm animals at the time of visit said "the major challenge facing animal rearing is coastal erosion". He explained that the pasture used to feed their animals has become part of the sea. The various materials used to provide housing for these animals were no longer available. Housing for these animals was sometimes pulled down by flood during stormy waves with some displaced and others killed.

An interview with another farmer at Lolonyakope who has just returned from the farm revealed that coastal erosion has washed away the greater portion of the land used for vegetable cultivation in the Ada-Foah area. He said: "Most of the fertile lands were swept away by the sea. What is left is too small to support my family".

In another interview, a coconut plantation farmer at Azizanya indicated that most of the plantations have been washed away by the sea. The land space which is supposed to be used for further plantation has also been taken over by the sea. He said: It was the plantation that supported me to pay my children'sschool fees and to sustainmy family. But as a result of coastal erosion and shoreline retreat, I cannot now boast of anything" (Interview with respondents- January 15, 2021).

Coconut plantations damaged by regular flooding and erosion at kpoji, Ada-Foah
Source: Fieldwork (2010).

It is seen clearly from Plate 4.5 that coastal erosion had affected coconut plantations in the area. There were a lot of trees that were cut by owners for other purposes instead of leaving them to be engulfed by the sea. The picture also shows a lot of coconut trees inland which are yet to be taken over by the sea, an indication that a lot had already been taken.

I however observed the problems of animal rearing were overestimated since some of the residents still keep some of these animals. I also observed that in some of the communities the farmlands were not taken over by coastal erosion but rather used for relocation of the settlements affected by coastal erosion.

Salt mining

Analysis of the data gathered through a combination of interviews, observation, and documentary sources have again indicated that salt mining is another popular and vibrant livelihood activity for residents in the Ada-Foah. Salt mining in the Ada-Foah area engages fishermen, farmers, boat owners, traditional authorities, private cooperative groups, government workers as well as school children. There are individual small miners, cooperative groups as well as operators of the District Salt Project who are economically engaged in the mining activities. Salt mining activity normally takes place during the dry season when serious fishing activities were over. The salt mining industry provides direct employment as well as income to the residents.

Despite these benefits, the salt mining industry appears to have been threatened by the menace of coastal erosion and shoreline retreat. An interview with Kwesibi the chief linguist at Totopey, who is a salt miner, showed that the first lagoon locally known as Songorlatɛ had been washed away by the sea. He sadly nodded his head and suddenly pointed at the sea and said "that is our problem, what can we do to stop it?" he asked. He further commented that as the shoreline retreats the sea is gradually pushing the beach sand to fill the lagoon making it narrower than before whin is itself affecting the quantity of salt that the lagoon could produce. Another respondent who is a toll collector at the lagoon site told me: "Heaps of salt-preserved in anticipating for better future prices were washed away or dissolved by floods anytime there is a storm". Plate 4.6 shows the picture of people within and outside the area who were involved in salt mining activity for their livelihoods.

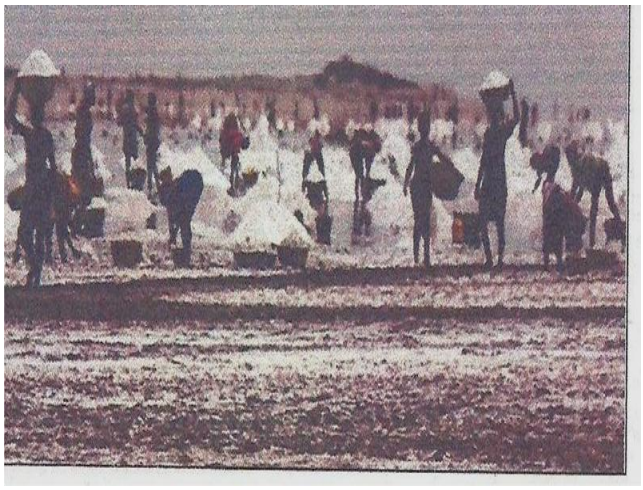

Plate 4.6: Salt Mining at Totopey, a Coastal Settlement of Ada-Foah.
Source: Alkyon, 1998 and Ecorem, 2008.

Plate 4.6 shows heaps of salt and the various strategies used in salt mining activities. There is only a small piece of land left between the lagoon and the sea as can be seen from the photograph in Plate 4.2.4.

Trading

Data analysis for this study has also revealed that trading is also one of the oldest livelihood activities in the Ada-Foah community which is done alongside several other activities to generate income. Trading activity in the Ada-Foah area has involved the residents as well as Europeans who were resident at the coast. An interview with a trader at Otrokper has revealed that there were local warehouses, marketing centers, stores promoting trade activities in the Ada-Foah area. He said: "A mini harbor ever existed in one of the suburbs called Kpodji which was the hub of all trade activities with one common big market long before the construction of Tema and Takoradi harbors respectively". Another trader said I owned a local drinking bar and a restaurant to provide residents a place of relaxation and to enjoy themselves after the hard day's work, especially on Tuesdays when the fisher folks did not fish". At Lolonyakope, a woman trader who has been trading in various commodities for about 30 years took me along to a place close to the sea and said: "This is where I used to have my shop… Since my shop had been destroyed by the sea, I don't have any permanent place to sell".

III. CONCLUSION

In Ada-Foah and its surrounding communities, coastal erosion and shoreline retreat does not only cause damage to the coastal property and infrastructure but also create a lot of livelihood problems for residents. The fishing industry, the largest livelihood opportunity in the Ada-Foah area, which employs about 80% of the people, has almost died out as a result of coastal erosion and shoreline retreat. There is also the loss of arable lands close to the coast, decline in tourism and recreational facilities, loss of roads, electricity systems that used to support livelihood activities in the area. the loss of natural ecosystems such as mangroves, marshlands, wetlands, and swamps has deepened the problem of livelihood activities in the Ada-Foah area. The problem of coastal erosion in the Ada-Foah area has led to profound changes with employment disruption, economic hardship, poor living conditions, and the disruption of public services such as education and preventive health care in the Ada-Foah area.

IV. RECOMMENDATIONS

- The study recommends resettlement of residents who have limited land space to retreat or relocate to higher ground areas especially when all other options have been exhausted. Government should assist residents to acquire new sites and provide new basic infrastructure and services such as roads, drainage, potable water, waste treatment plants, community halls, electricity, schools, and health facilities. If possible, residents should be given some amount of money each as a starter capital at the new site
- This study also recommends diversification of livelihood sources to include activities supported by the local environment. For example, the Government in collaboration with NGOs and private individuals should invest to commercialize the salt mining activities in the area thereby creating more job opportunities for residents. There is a lot of tourism potential endowed by the local environment which needs to be identified, developed, open, and well managed by the local government to bring about diversification of livelihood opportunities. Residents must be assisted in cash or kind by the government to resort to fish farming by constructing fish ponds to cultivate and harvest their fish instead of traditional sea fishing.
- Again, this study recommends education and training for young men and women to acquire new skills, such as carpentry, masonry, plumbing, tailoring and dressmaking, dressmaking, bead making, among others. This will enable residents to have more options for diversification rather than relying on national fishing and farming as the only livelihood opportunities.

Areas for further research

Given the limitations of the study, any future research should incorporate an infrastructure survey of the affected communities tobetter understand infrastructure lost to coastal erosion within the Ada-Foah community. Future studies should also explore diversification as a potential coping strategy and make recommendations for the development of this potential.

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