

# Community-Led adaptation to Climate Change among coastal communities in Ghana: The case of Dansoman in the Greater Accra region.



## Original Research Article

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## ABSTRACT

Community-led adaptation often require conceptual development and innovative ways that are feasible and locally designed with inputs from key stakeholders. Developing prudent adaptation measures for local communities are time consuming and require in-depth analysis due to complex nature of climate change, encompassing several sectors, differing views and external facilitators. In our quest to achieve Millennium Sustainable Development Goal (SDG 13), there is the need to place communities and towns, mainly those in acute and highly vulnerable regions center stage. It is key in determining which critical and actual areas stem communities, hence, employing bottom-up approach in realizing global goals of regulating climate change. The main aim of the study was to find out self-protective measures, initiated by the local assembly, private entities and individual households in the area. The study adapted both qualitative and quantitative research strategies in collection, analyzing and presentation of results. Response from informants constituting officials from various institutions and vulnerable groups in the area were subjected to descriptive analytical statistics based on informants' knowledge and experience in the area.

Results show majority of adaptation measures, initiated by proponents in the area are short-term (reactive) measures and does not have the efficacy and capacity to deal with large scale climate events of bigger, magnitudes and intensity. The study serves as baseline-print on potential impacts of climate change in Dansoman along with community-led adaptation mechanisms. Further research could be conducted on cost of adaptation and effectiveness of initiated adaptation strategies in the area.

**KEYWORD:** Community-Led, adaptation, vulnerability, Dansoman, Accra, SDG 13, self-protective, Ablekuma-West, potential impacts, reactive, anticipatory.

## I. INTRODUCTION

Climate change presents several multi-sectoral challenges that need to be tackled through a holistic, sector driven and interdisciplinary approaches. Climate change as a global phenomenon is exacerbating in recent years due to structural transformation of raw economies to manufacturing economies. Current industrialization trend has given more room for alteration of prevailing climate over the past few decades. Potential impacts and policy-options are essential in regulating this global phenomenon. Ghana is signatory to a number of global interventions on climate change and other disasters. For instance, the United Nations Framework Convention on Climate Change (UNFCCC), expects national governments integrate climate change issues into national development frameworks and plans. Similarly, Ghana signed for the Hyogo Framework for Action (HFA) 2005-2015 and Sendai Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters. The frameworks aimed at reducing casualties as well as socio-economic and environmental losses resulting from disasters, in a sustainable manner (MEST, 2013).

Ghana's initiative towards integrating climate change adaptation into policies and strategies commenced little over twenty-three (23) years ago under the Netherlands Climate Change Study Assistance Program (Würtenberger et al, 2011). This support and many others including UNDP Supported Climate Change-Dare Program led to the formulation of the National Climate Change Adaptation Strategy (2011), streamlining climate change adaptation into Ghana's Shared Growth and Development Agenda 2010-2013 and 2014-2017. The National Climate Change Adaptation Strategy was transformed into a National Climate Change Policy in 2014 to guide the processes leading to streamlining climate into national policies, strategies and programs. Before a national policy framework is approved as a working document, it is ensured that issues of Climate Change (CC) and Disaster Risk Reductions (DRR) are prominently featured. More importantly, CC/DRR issues have to be accepted as a national priority and a *sine qua non* to sustainable development (Afororpe, 2016). Consequently, third world countries (least developed countries) in Africa, central and south-eastern Asia and other parts of the world, have the least capacity to cope or adapt to natural stress, shocks and disturbances emanating from climate change. Countries and social groups' degree of vulnerability maybe attributed to some key climate determinants, thus, exposure and sensitivity factors such as; geographical location, social class, alternative livelihood sources, infrastructure, strength of institutions and availability of climate information, policy frameworks amongst others. The study aimed at spelling out some current and future impacts along with adaptation mechanism, already initiated by individual households, private entities and local assembly. Bridging this study gap in the study area tends to answer "what", "how" and "why" bottom-line questions related to climate vulnerability in the area. This in essence, informs decision and serve as a baseline study for further research on quantitative assessments, linked to cost of adaptation and cost-benefit analysis of adaptation mechanisms against other socio-economic decisions.

### 1.1 objectives of the study

The study aims at determining adaptive measures initiated by the local assembly, private entities and individual households in reducing climate vulnerability in the study area.

## II. MATERIALS AND METHODS

The study employed a mixture of qualitative and quantitative approach in its collection and analyzing of data. Descriptive and exploratory based research strategies were adopted for this single case study as they were deemed somewhat reliable in answering questions like "why" and "how". Qualitative techniques like; questionnaires, interviewing and observations based on respondents' experience, knowledge and personal assessment, through active participation were employed. In

addition, the study does not measure vulnerability but resorted to officials and vulnerable groups' knowledge, observations and assessment on climate impacts and adaptation.

### 2.1 Sampling Size and procedure

Two different set of questionnaires were administered among local residents and some officials in the area. Out of this total (60), fifty (50) were being administered among local residents with the remainder, 10 being administered to officials. These officials are elites, working in different institutions relevant in providing the needed information in achieving the objective of the study. Target group were classified as vulnerable groups based on their occupation, social stratification (status), gender and geographical location. The sample size entailed the elite who work within various institutions like; Environmental Protection Agency (EPA), National Disaster and Management Organization (NADMO), Accra Metropolitan Assembly (AMA), Ablekuma West District Assembly, fishery Unions and co-operatives, Premix Fuel Dealers Association in Dansoman, Dansoman house of chiefs/Traditional council and non-governmental institutions like; Institute of Green Growth Solutions. Other members on sampling representation were members of pressure groups, fishermen and farmers, educational staff, fish mongers, residents living along the coast of Dansoman, traders and so on. Purposive, random and probabilistic sampling methodologies were employed.

### 2.2 Data analysis

The study employed quantitative tools like; Microsoft excel worksheet and Statistical Package for Social Sciences (SPSS) in analyzing and presenting results. Household and institutional survey using open-ended and semi-structured questionnaire were administered in collecting data. A period of 50 minutes to an hour was used for each respondent when a questionnaire was administered to a respondent.

### 2.3 Scope of study

The study area, Dansoman, is a local administrative town in Accra metropolis. It is categorized under Ablekuma-West constituency within Accra Metropolitan Assembly (AMA). Dansoman is approximately 7 km from the central business center of the capital. Dansoman is dominated by a working class, characterized by business and commerce as well as agricultural activities mainly; fishing and farming in its coastal belt. The area is being considered as one of the most diverse areas in Accra in terms of household income and ethnicity (AMA, 2014). The population of the area is estimated to be 56,267 people (AMA, 2014). The housing structure in Dansoman is a mix of detached and semi-detached houses and apartments. Dansoman is experiencing rapid growth in terms of urbanization like other major areas in Accra. The area is highly characterized by lower levels of formal infrastructure and a higher degree of informality. The coast of Dansoman has a number of informal urban settlers, constituting squatters and higher density of hood slums. The coastal zone in Dansoman is characterized by a gently sloping shoreline and a sandy beach.

In terms of ethnic group composition, the Gas who are natives from the Greater Accra region are highly dominant in the area followed by Akan's as well as other natives hailing from different regions. Occupants within the study area have legal possession of land under the Land act along with increasing urban dwellers and hood slums along the coast due to housing deficit in Ghana, high cost of rent and purchasing of lands. Majority of residents along the coast of Dansoman without legal rights in residing in such areas claim to have resided in the area for lengthy period bearing "traditional rights" of ownership as their great grandparents resided in the area. The area is governed by two administrative authorities. The area was selected for the study based on its geographical location or proximity to the sea, recent evidence and trend of climate events in some unit areas like; Gbegbeyise, Glefe, Panbros and Mpoase, limited climate information and policy framework in Dansoman.



**2.3.1 The Traditional Authority**

The traditional system of governance deals with local issues pertaining to land tenure systems, customs, social norms and values which constitute; culture and traditions. The traditional authority mainly constitutes the paramount chief of the area, sub-chiefs who are often known as “elders”, linguists, maidens, palace guards, gong-beaters (information carriers/town criers) and other locals who are of service to the royal lineage. The elders and other palace staff members hail from various households within the community where the chief rules. Sub-chiefs or elders who assist the chief in daily administration of the area are often key representatives from both nuclear and extended families in the area. These representatives are knowledgeable, well-experienced, have public trust and attained some level of social class, hence, aids in information flow from the top to the bottom of the traditional hierarchy system in planning and decision-making of the area. This system was highly dominant in the 1950s when the dual system was practiced (central government dealt directly with the traditional system) for development of most areas in Ghana.

**2.3.2 The Political Authority (Local Government system)**

Political authority on the other hand plays the role of central government through decentralization in day to day administration at the local level. Local areas in Ghana are categorized under Metropolitan, Municipal and District Assemblies depending on the size of population and resources available in the area. The political authority which is also known as the local assembly or government constitutes the District Chief Executive (DCE) who is a central government appointee, district coordinator, presiding and assembly members who are being elected by the local people, representing various unit areas. Other members are; member-of-parliament elected and serves as people’s representative at the national parliament house as well as independent civil servants without any political affiliation assigned with some specific duties. This authority is meant to ensure law and order, formulate, implement and enforce various policies and action plans, aimed at enhancing people’s welfare. This system gained more popularity in 1980s till date as various local assemblies were vested with power to manage resources effectively for the development at the local level. This system became popular when the dual hierarchy system was fading out. People lost trust and confidence in the traditional system. The reasons attributed to these were corruption and traditional authorities siding with the central government and not serving as mouthpiece of the people they represent. Despite these bottlenecks in some special cases, these two authorities complement each other in most cases on daily administration of activities in the area. Integration of these two authorities have led to the avoidance of several conflicts which may have emanated and hampered the development of most areas.

**Figure 1: Satellite image of the study area**



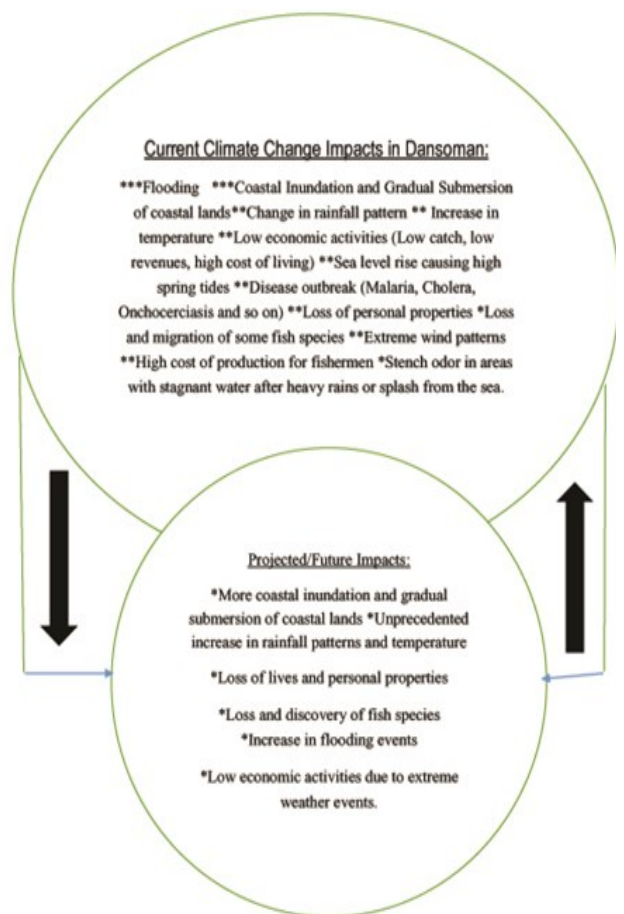
Source: Google Earth Satellite data, 2017.

**III. RESULTS AND DISCUSSION**

**3.1 Potential impacts of climate change in Dansoman**

Dansoman has relatively an open coast that enables considerably strong unimpeded swell waves to reach the coast. Using the coast of Dansoman as a single case study area was apt due to increasing trends and evidence of climate change events, namely; flooding, spring tides, sea level rise causing coastal erosion, disease break-out, inundation and gradual submersion in the area. Dansoman is one of the most populous areas within the Accra Metropolis, with several livelihoods dependent on fishing and agricultural activities both directly and indirectly. Dansoman is one of the most vulnerable areas to climate hazards in the Greater Accra region of Ghana, hence, the need in carrying out this study. Data collected shows, local residents and officials within the study area describing a number of climate change impacts the area has experience or may occur in future.

**Figure 1.1 Current and potential impacts of climate change in Dansoman**



Source: Field survey, 2017.

Respondents view and assessment of climate change impacts in the study area.

\*\*\*Impact most predominant \*\*Impact is more predominant \*Impact is dominant

Figure 1.1 shows existing climate change events occurrence in Dansoman. The figure also presents potential impacts based on respondents’ experience and assessment in the area. Impacts with multiple asterisks (\*\*\*) shows which impacts or events are dominant or frequently occur in the area and the ones which occurs seldom.

**3.2 Local adaptation strategies in Dansoman.**

One main research question that this study sought to find out was if Ablekuma West District Assembly which has Dansoman as one of its unit areas, have a local climate change adaptation policy framework. An official interviewed at the Ablekuma West district assembly, who happens to be safety and project unit officer emphasized that: “Our area does not have any formalized local climate change adaptation policy framework as a guideline to tackle the issue of climate change in the area”. She further stressed on the fact that, they were still in the process of formulating a local adaptation strategy after recent climate change events occurrence in the area despite some major interventions had been made.

A number of assembly members at Gbegbeyise, Mpoase, Panbros and Glefe unit areas within Dansoman claimed, few adaptation projects initiated in the area by the local assembly were interventions, initiated to bring relief to residents who experienced coastal inundation and gradual submersion, flooding, disease break-outs and low productivity among fishing folks. They highlighted the fact that, Dansoman and other areas under Ablekuma West district assembly will soon have a climate change policy to avert the adverse impacts of climate change in the area.

**Table 1.0 Local residents’ view on local adaptation strategies initiated by the local assembly or any private entity**

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
<b>Yes</b>	37	74.0	74.0	74.0
<b>No</b>	7	14.0	14.0	88.0
<b>I don’t Know</b>	6	12.0	12.0	100.0
<b>Total</b>	50	100.0	100.0	

Source: Field survey, 2017.

Table 1.0 shows the distribution of respondents, mainly local residents, who were asked about climate change adaptation strategies initiated by the local assembly in the area. Out of the total, 74% representing 37 respondents asserted that they knew some adaptation strategies initiated by the assembly. 14% out of the total respondents said they do not know about any adaptation strategy initiated by the assembly or any private entity in the area. The remaining 6% representing 6 respondents said they do not know if the assembly had such measures in place or not.

**Table 1.1 Officials’ view on local adaptation strategies initiated by the local assembly or any private entity**

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
<b>Yes</b>	10	100.0	100.0	100.0
<b>Total</b>	10	100.0	100.0	

Source: Field survey, 2017.

The table above (table 1.1) shows officials in some institutions, interviewed in the study area on if the assembly had initiated some adaptation strategies in Dansoman. Frequency for the above distribution, thus, 100% representing 10 respondents show officials attesting to the local assembly and other private entities initiating some adaptation strategies.

**3.2.1 Reactive and anticipatory measures**

**3.2.1.1 Short-term (reactive) measures**

Reactive measures in this study can be attributed to short term measures which people develop after the occurrence of a climate change hazard or have the notion of possible climate hazard bound to occur in a short run. Example of short (reactive) adaptation measures deduced from this study are; national sanitation day events, individual household self-protective measures like; digging canal systems, sand, stone and stone barriers which is maintained periodically prior and after an event occurrence (figure 1.2). In some instances; people develop these systems only during periods perceived to be rainy or wet seasons and hence, when an area is often faced with floods, have locals developing these barriers which are not often very cost intensive like large scale adaptation projects for an entire community or nation initiated by central government or an international donor. Local residents per this perceived notion annually develop short term adaptation measures to avoid possible floods and other climate related impacts.

**3.2.1.2 Long (Anticipatory) term measures**

Long (Anticipatory) term measures are often linked to proactive measures meant to tackle impacts of climate change that are perceived to occur in the long run or future. In other cases, if an area is being faced with a major event or phenomenon which persist over a period of time, long term solutions or measures are being developed to regulate or tackle such issue which consistently occur in such area. Anticipatory measures according to the no-regret strategy concept are often huge or done on large scale, capital intensive (costly) and requires time with broader participation and effective planning. Examples of few long term measures initiated in the study area and elsewhere are; sea defense mechanisms (Plate 1.0), awareness and capacity building programs for general public and institutional personnel or civil servants, coastal zoning and development, storage facilities to prevent post-harvest losses, construction and expansion of socio-economic infrastructure like; schools, health facilities, research centers and so on. Anticipatory measures delves into manageable the unavoidable in the long term.

**3.2.2 Sea defense systems**

**Plate 1.0 Sea defense system along the coast of Dansoman**



Source: Field survey, 2017.

**Plate 1.0** shows sea defense system along the coast of Dansoman. This mechanism was developed against findings, highlighted in figure above (**figure 1.1**), on some impacts of climate change events in Dansoman. Among such dominant impacts are; coastal erosion, inundation and gradual submersion of land resulting from high spring tides (sea level rise) and extreme weather patterns which affects personal properties and people’s livelihoods.

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**Plate 1.1 Sea defense under extension along the coast of Dansoman**



**Table 1.2. Some adaptation strategies initiated by the central government through Ablekuma West District Assembly and other private entities in Dansoman.**

	Local Assembly	Private Entities
<b>DANSOMAN</b>	Sea defense system	Awareness and capacity building programs initiated by Dansoman fishery union and co-operatives as well as Dansoman Premix dealers association
	Sanitation activities/events like; National sanitation day	
	Distribution of trash-bins	

Source: Field survey, 2017.

**Table 1.2** depicts adaptation strategies initiated by both the local assembly and private entities in Dansoman. The distribution above shows limited adaptation strategies initiated in the area by these bodies to significantly reduce the locals' vulnerability to both short and long term impacts of climate change. Among these strategies mentioned by respondents based on results findings are;

**Plate 1.2 Stagnant water resulting from water splashed from the sea behind sea defense**



Source: Field survey, 2017.

**Plate 1.2** illustrates stagnant water behind the sea defense resulting from water splashed from the waves due to increase in the intensity of wind as well as rise in sea level during rainy seasons causing high tides. Unprecedented and fluctuations in rainfall patterns in recent years based on findings shows, stagnant water are formed periodically in most parts, hence, results in the breeding of mosquitoes and other worm infections. The sea defense being an adaptation mechanism initiated by the local assembly caused unintended consequences like; breeding of mosquitoes, cholera, worm infections and so on among local residents living along the coast. This mechanism which brought relief to locals end up generating another simultaneously, hence, can be linked to mal-adaptation under the no-regret strategy concept if care and adequate plans are not effectively formulated, implemented and evaluated

**3.2.3 National Sanitation Day**

The National Sanitation day event which turns out to be carried out on first Saturday of every month across regions in Ghana was a key initiative in addressing sanitation issues. Choked drainage systems are cleared for easy passage of water during heavy rains to avoid flooding, destruction of personal properties and disease break-outs. The National Sanitation day was declared on November 1<sup>st</sup>, 2014 by the Government of Ghana (GoG) after cholera break out in most areas including Dansoman hence, the need for this event to ensure sanity and in preventing conditions that breeds diseases. Being an initiative by the Ministry of local government and rural development, a bill was recently passed into law to punish individuals, who fails to regard this day and act accordingly. Respondents in tables 1.0, 1.1 and 1.2 asserted that, the sanitation day event was embraced among locals as a key adaptation mechanism to clear drainage systems to prevent floods after recent unprecedented heavy rains and choked gutters which breeds mosquitoes and cause other diseases in the area. This in essence, will reduce the locals' susceptibility to floods after heavy rains, diseases break-outs and so on.

**3.2.4 Distribution of waste bins**

A senior member of National Disaster and Management Organization (NADMO), who occurs to be the assembly member, representing the entire unit area, Gbegebeyise and Glefe opined that, the local assembly distributed waste bins to individual households and some community zones to encourage the habit of keeping their surroundings clean which in effect, will prevent people from dumping refuse into gutters or drainage systems which causes flooding in most areas when choked with solid or plastic waste and sediments, hence, inability for storm water to pass through these drainage systems after heavy rains. The storm water eventually finds its way into people's homes and other areas. Other interviewees during the course of data collection opined that, waste bins which were distributed in the area were inadequate with the purpose not being fruitful as waste management agencies often delay in picking up waste on time and as waste accumulates, most of these locals dispose them off into the sea or nearby lagoons, rivers and drainage systems. Citing the Chemu lagoon and drainage systems within Dansoman and its environs as examples.

**3.2.5 Awareness creation and capacity building**

Officials interviewed within institutions mentioned in methodology section asserted that capacity building programs on climate change and its related events were organized for them through workshops. Dansoman fishery unions and co-operatives, which constitutes some private entities in the area, had initiated some awareness and capacity building programs among its members. Some fishing folk members of these unions attested to these programs initiated by their unions in sensitizing them on climate change events and its relation to their economic activities. Results show 33.3% representing 20 respondents out of the total, who were mainly local residents and had experienced flooding, coastal inundation and gradual submersion, low catch along with other impacts were sensitized or made aware through NADMO after event occurrence coupled with that done by the fishery unions and co-operatives in the area. Other local residents interviewed representing 66.7% of total respondents said there were no sought of awareness or capacity building programs initiated by the local assembly or any private entity in the area but only heard or were made aware on TV/radio, hence, had accounted to their limited in-depth knowledge on climate change issues.

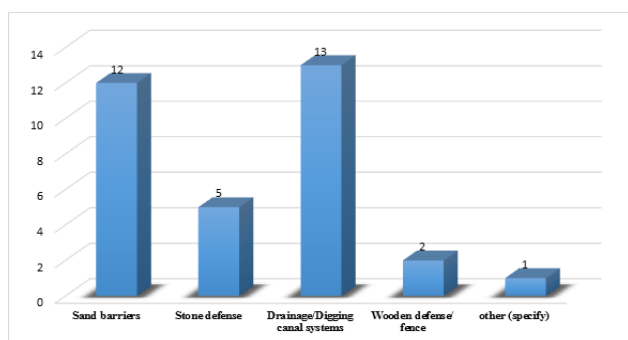
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### 3.3 Self-Protective measures initiated by individual households in the study area

Figure 1.2 depicts some self-protective measures initiated among some individual households in the study area. The figure illustrated below based on questionnaires administered show, 66% representing 33 respondents out of 50 respondents said they had self-protective measures which temporally helps them to adapt to some impacts of climate change. Among such impacts were; flooding after heavy rains among those not very close to the sea, coastal erosion and gradual submersion of land as a result of sea level rise and high spring tides to those living close to the sea. 34% representing 17 respondents said they had no self-protective measure against any unforeseen events which may arise from climate change thereby making them highly vulnerable to climate change events.

Moreover, 66% of the respondents who had initiated some adaptive measures in their households had developed canal or drainage systems, sand barriers, stone barriers, wooden or fence defense systems and other mechanisms like; raising of structures above normal levels in a proportion of 26%, 24%, 10%, 2% and 1% respectively as household defense systems against flooding, coastal erosion and inundation and other impacts which evolves from climate change.

**Figure 1.2 Self-protective measures initiated by individuals along the coast of Dansoman**



Source: Field survey, 2017.

As highlighted in section 3.3 (figure 1.2), the study sought to find out some self-protective measures initiated by individuals living along the coast of Dansoman and its environs as adaptive strategies in reducing their level of vulnerability to climate impacts in the area. Based on findings, respondents were further asked how often they spend time, energy and resources to maintain these self-protective measures against climate change events in the area. 12.1% representing 4 respondents said they often spend time, energy and resources to maintain the facility, 84.9% representing 28 respondents said they maintain the mechanism once in a while, whereas 3% representing a respondent said he does not do anything to maintain it. Most of the respondents attested to the fact that, these measures require a lot of funds to develop and increase their adaptive capacity but lacked funds in maintaining it periodically. The reasons for this huge obstacle in terms of maintenance were attributed to lower earnings, higher cost of materials for developing these measures, bigger family sizes with priority of needs, economic hardships, uncertainty and change in rainfall patterns makes it difficult to improve or maintain these measures against coastal erosion, gradual submersion of land, flooding and so on. This assertion made by respondents were evident in their responses to cost of developing their household self-protective mechanism against climate change events in the area. 27.3% representing 9 respondents said it was very costly to develop such measures, 42.4% representing 14 respondents said it was costly, 30.3% representing 10 respondents said it was not costly to develop such measures.

In conclusion, results show self-protective measures initiated by individual households as adaptive climate change measures are mainly short-term reactive measures, which does not have the capacity to reduce local residents' vulnerability to climate change impacts significantly. Increase in magnitude of any already existing climate impacts in the area can cause more havoc due to limited capacity to adapt. In a nut-shell, self-protective measures initiated among local residents in the study area are short-lived and not robust enough to stand against worst havocs which may evolve from climate hazards. On the other hand, measures initiated by the assembly have only one major intervention, thus, the sea defense mechanism, which is still under extension and despite the relief to some households in the area, still leaves some residents highly vulnerable to climate hazards. Awareness and capacity building program which turns out to be another adaptation strategy initiated by fishery unions and co-operatives in Dansoman among their members who constitutes a section of the entire population still leaves the area susceptible to climate disturbances.

### 3.4 Discussion

The results from the study area proves that, there is no local climate change adaptation policy framework institutionalized from the NCCAS in the area to help achieve objectives set out in the national climate change policy framework. The results proves only few initiatives had been implemented by the central government through the local assembly and other private entities as highlighted in section 3.2 (table 1.2) like; the sea defense system, distribution of waste bins, awareness creation and capacity building programs. The sea defense system was initiated as an emergency long term tool by the central government through the local assembly to reduce residents' burden of being faced with coastal erosion and inundation due to sea level rise or high spring tides forcing people to evacuate their homes (resettle) to relocate to safe zones.

Plate 1.0, 1.1 and 1.2 show on-going sea defense system under construction and extension leaving some areas along the coast highly vulnerable to sea level rise which causes inundation or gradual submersion of land. This forcibly affects infrastructure and people living along the coast's personal properties like; houses, agricultural farms, pens for pig farming and so on. It can be observed from Plate 1.1, 1.2, 1.3 and 1.3 that, the wave action resulting from extreme wind events and heavy rains causing high spring tides causes water to splash after hitting the defense wall. This creates a plunge pool or stagnant water behind the defense system. Residents whose households are close to these defense systems attested to the relief this mechanism has brought to them unlike in previous years. They further stressed that, the pool of water created behind the defense system over a period of time causes diseases such as; malaria, cholera, schistosomiasis, onchocerciasis (river blindness) and other worm infections. Increase in the intensity and formation of rainfall patterns in the area as highlighted in figure 1.1 above cause expansion of these stagnant water behind the defense which further worsens the plight of the people. Disease outbreak formation which are unintended consequences, arising from initiated adaptation strategies by the assembly like that of the sea defence and untimely picking up of trash bins at community centers or zones maybe linked to the no-regret strategy concept, which when effectively developed and implemented, should not be an obstacle to development. The strategy has a key principle of not being accompanied by or generate any blight that will serve as a bottleneck in enhancing people's welfare as observed in plate 1.2.

It was observed that, awareness and capacity building programs were only organized through workshops and assembly meetings for various leaderships and fishery union members in the area. These awareness and capacity programs

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which in effect are adaptation measures were not done on a broader scope among locals in the area except those faced with natural disasters when NADMO takes that opportunity to create awareness. Data gathered clearly states the only major adaptation strategies among coastal communities in Dansoman is the sea defense system and capacity building program organized by fishery unions to fishermen in the area. It was also observed that, the national sanitation day's goal embraced as an adaptation tool in the area to enhance sanity had not been realized due to poor waste management systems, people's inability to change their lifestyles and limited climate change capacity building programs in the township.

**Plate 1.3 and plate 1.31 Households close to the sea along the coast of Dansoman being affected by coastal inundation**



### 3.5 Recommendations

The following proposed measures from research findings in the study area, are said to be factors when factored into future plans can inform decision-making and reduce people's vulnerability to climate change hazards in the area.

- a. Need for broader participation and consultation across sectors, at all levels among relevant stakeholders to make decision making acceptable and better. Complexities and encompassing nature of some components of the environment always gives room for interdisciplinary approach when developing solutions to tackle environmental problems through diplomacy and so on. Climate change affects a number of sectors hence, developing adaptation strategies needs broader participation/consultation in a holistic manner.
- b. **Need for policy frameworks, action plans, programs and projects:** Need for PPPs from both the private (NGOs and international organizations) and public (state) agencies help in creating blueprints in tackling vulnerability issues related to climate hazards or societal blights. These must be backed by investments, commitment and positive political will.
- c. **More research or studies in several disciplines and sectors:** Climate change impacts on a number of sectors. Among these sectors are climate dependent and highly sensitive sectors like; Agricultural, water and housing, energy among others which are backbones of most countries.
- d. **Strengthening of Institutional capacity:** Need to support institutions with adequate technical and financial resources to operate efficiently in propelling growth and development in the area.

- e. **Behavioral change or change in lifestyles:** Often termed as "climate ignorers" there is the need for people to be fully aware about the impacts of climate change, accept the issue at hand and are willing to take the initiative to effect change about their lifestyles. In addition, people with some certain social practices or habits that impacts on the climate negatively can be changed by developing positive lifestyles that do not impact on our climate. Local government and businesses, the media, professional groups and institutions can develop positive will and commitment at all levels to shape our way of life into acceptable ones that could make us achieve our goals in regulating the environment in our quest to attain sustainable development. For instance: use of Chlorofluorocarbons (CFCs) containing products like; deodorants, second-hand freezers, some sun shade creams that people use for swimming as a means to protect themselves from sun burns affects corals which absorbs carbon in the atmosphere by causing them to bleach due to unfavorable growth conditions, Deforestation and so on, increasing population and better standards of living creates room for fancy lifestyles using of more automobiles and airplanes as a means for faster and convenient transportation.

### IV. CONCLUSION

The study aimed at finding out some self-protective measures, initiated by the local assembly, private entities and individual households. Results generated shows;

1. There is no formal local climate change adaptation policy framework, institutionalized from the Ghana National Climate Change Policy by Ablekuma West District Assembly for Dansoman and its environs.
2. Most local adaptation strategies initiated in Dansoman are short term reactive measures developed by people after the occurrence of a climate change hazard like; flooding or have the perception of possible floods occurrence during heavy rainy seasons with few long term adaptation measures. These short term measures initiated at the assembly and household levels are costly and ineffective.
3. The two major interventions or adaptation strategies initiated by the local assembly in the area is the sea defense system which is still under construction and extension as well as the national sanitation day which has been fully embraced by locals as an adaptation tool in clearing drainage systems for easy passage of storm water after heavy rains to avoid flooding which is a highly dominant natural phenomenon arising from climate change.
4. Majority of the respondents claimed to have initiated some self-protective measures in their various households as an adaptive tool against floods, coastal inundation and other climate change impacts. Among such measures commonly used in the area are; digging of canal systems, sand barriers, wooden defense/fence as well as raising structures highly above normal levels.

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