Effectiveness of Adaptation Strategies Among Coastal Communities in Ghana: The Case of Dansoman in the Greater Accra region.

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Abstract

Global climate action plans risk resulting to climate maladaptation and shocks when prudent measures are inapt. Adaptation strategies require multidisciplinary approach from all sectors with periodic monitoring and evaluation which are carefully planned, locally adaptable and results-oriented. For decades, various governments, development practitioners and international organizations have made concerted efforts in tackling large scale climate events. These stern initiatives forms part of Millennium Sustainable Development Goals (SDGs), specifically SDG 13 meant to combat climate change. The increasing demand for frameworks that effectively monitor and examine the outcomes of these huge investments made by policy-makers across regions have enhanced the evaluation and monitoring of various climate change adaptation strategies. This study sought to assess the effectiveness and sustainability of initiated adaptation strategies. The study used descriptive statistics based on informants' knowledge and experience to assess the effectiveness of adaptation strategies in Dansoman and compare the results with the case of Nador-Berkane coastal community in north eastern part of Morocco where the "no-regret strategy" concept was adopted. Assessing the effectiveness of strategies is one of the key components of monitoring and evaluation process of climate change and is often overlooked, hence, the need for this study. Results from this study based on the informants' experience and assessment show that climate change adaptation strategies in the study area are not effective and sustainable. This study serves as a baseline information for relevant stakeholders on critical areas, which ought to be prioritized to reduce the locals' vulnerability to climate hazards. Assessing the effectiveness of adaptation strategies aid in ensuring efficiency and efficacy of planned and already initiated projects. Further research could be conducted on the cost of adaptation mechanisms and willingness to pay for sea defense systems in the area.

Keywords: Effectiveness; SDG 13, Climate Change, Adaptation, Dansoman, Accra, Nador-Berkane, no-regret strategy, institutions, stakeholders, participatory rural appraisal.

1.0 Introduction

Opportunities for planning and implementing public climate change adaptation strategies are depend on effective strategies. Prudent measures enhance the capacity of areas to overcome bottlenecks, which derail the effectiveness of initiated adaptation mechanisms. Actions to reduce sensitivity through livelihood diversification has often failed in developing countries, where people are trapped by poverty, lack of skills, access to capital and other critical resources (Towela et al., 2014). Combating climate change, as a theme for Millennium Sustainable Development Goal (SDG 13) is key in informing decision and addressing impact of climate change at various levels (Pradhan et al., 2017). Effectiveness and sustainability of initiated strategies are essential in monitoring and evaluation processes to determine the way forward for 'people-based' and practical climate change adaptation and mitigation efforts and associated impacts. Most studies conducted in Ghana on climate change, however, are centered on single climate large scale events

and its impacts on sensitive sectors of Ghana's economy such as; agriculture, water, health and energy, with minimal research on small scale-community based resilience dimensions. Studies on this gap identified in several literature are very limited, hence, this exploratory study sought to provide more information to guide relevant stakeholders on using institutions and vulnerable groups in Dansoman as a means of measurement to assess the effectiveness and sustainability of localized climate change adaptation strategies.The objective of this study therefore, is to assess the effectiveness and sustainability of local adaptation strategies initiated by the local assembly, private entities and individual households in tackling climate change impacts in the area.

The No Regret Strategy (NRS) Approach is one of the concepts developed to study and understand peculiar problems caused in many areas of the world due to climate change. Rizvi et.al (2014) per the IUCN Ecosystem based approach (EbA), highlights some key principles and core values of the NRS. The concept was developed in response to threats posed by climate change hazards and is geared at adapting short and long term environmentally based strategies and options through a holistic climate risk reduction approach for addressing negative impacts arising from natural phenomena. It is known to have 'no harm or serve as a bottleneck to development', hence, its extensiveness and participatory nature in mainstreaming a number of inputs for formulation and implementation of policies, strategies and so on (Trochta et al., 2018).

Case studies and evidence from Nepal, Morocco, Uganda, Senegal, Peru and so on (Rizvi et al., 2014) show that the approach is effective when fully realized but requires time, cost-effective mechanisms, and can slow down decision making due to differing motives, views and knowledge on the part of relevant stakeholders and actors. One major challenge of this approach is the complexity of natural phenomena which requires consideration of a range of several sectors which maybe directly or indirectly affected by climate change.

The paper notes key principles embedded in this approach which takes into account; stakeholder participation and consultation at various levels, promotion of synergy of indigenous or traditional and scientific knowledge at different stages of formulation and implementation of policies, plans, programs and projects. The study liaised some local adaptation strategies in the area to the NRS approach. Vulnerable groups and institutions in the study area aided in using descriptive statistics to determine the effectiveness and sustainability of individual households and community initiated strategies to enhance resilience, adaptive capacity and specific adaptation efforts. In addition, the concept of social capital and Participatory Rural Appraisal (PRA) tools particularly use of matrix ranking and score-cards were used to determine the

level of assistance offered by institutions to the area prior or after the occurrence of a climate change event or natural disaster (Wahib et al., 2017).

2.0 Study Area and Methodology

This section presents factors affecting the choice of research strategy, design, methods, research process and result analysis as well as challenges encountered during the course of data collection. It also provides brief information about the study area.

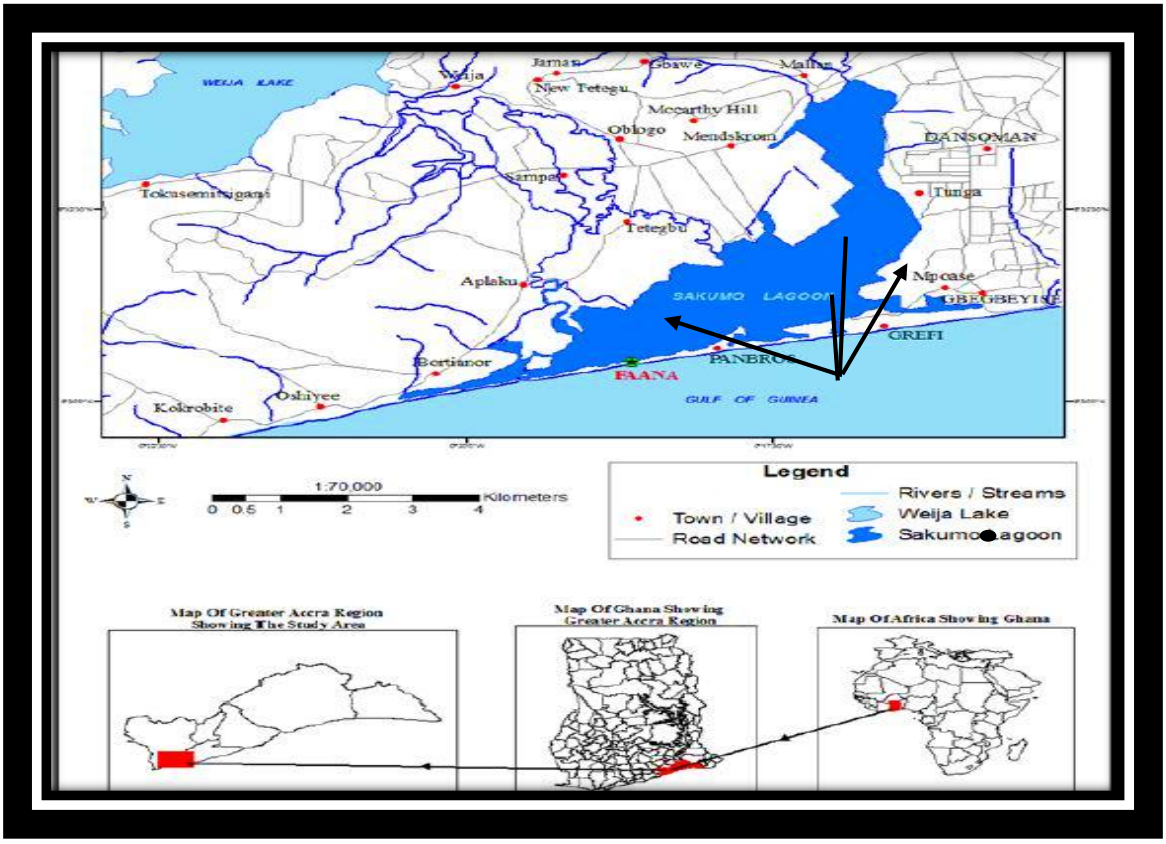

Figure 1: Map of Dansoman illustrating the study area

Source: Adapted and modified from Oteng-Ababio et al., 2011.

Figure 1 shows coastal areas in Dansoman that are vulnerable to impacts of climate change. Communities along the coast of Dansoman used for the study are: Panbros, Gbegbeyise, Glefe and part of Mpoase. A number of studies conducted in these areas were largely on potential impacts of single large scale climate events. Examples are: sea level rise, coastal inundation and gradual submersion of land on socio-economic livelihoods of people (Appeaning et al., 2011).

2.1 Selection of Study Area

The choice of area were partly down to the following reasons; (i) Geographical location of the area (ii) Past and recent trend of climate events in the area (iii) Demand for monitoring and evaluation frameworks in assessing efficiency of initiated adaptation projects.

2.2 Geographical and Demographical Characteristics of Study Area

Dansoman is a local administrative region in the 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 and is dominated by 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 with an estimated population of about 56,267 people (AMA, 2014; AMA and UN Habitat, 2011). Dansoman is experiencing rapid growth in terms of urbanization like other major areas in Accra. The coast of Dansoman has a number of informal urban settlers, consisting of squatters and higher density of hood slums.

The coastal zone in Dansoman is characterized by a gently sloping shoreline and a sandy beach. Fishing and other farming activities are predominant activities, which creates some source of livelihood both directly and indirectly, in the area. Dansoman has relatively an open coast that enables considerably strong unimpeded swell waves to reach the coast (Appeaning, 2009) and break obliquely generating long shore currents (Ly, 1980). The area is administered by two different authorities, i.e, traditional and political authorities.

2.3 Research Strategy and Design

The study employed a combination of qualitative and quantitative approach in the data collection and analysis. Descriptive and exploratory based research strategies with participatory tool were adopted for the data collection, and a single qualitative case study design was adopted, with focus on gaining holistic and meaningful knowledge on adaptation mechanisms in the study area. This is with a view of assessing the effectiveness and sustainability of initiated adaptation strategies in the area based on the knowledge and experience of officials and vulnerable groups in the study area. Quantitative tools using excel spreadsheet and Statistical Package for Social Sciences (SPSS) were used in analyzing and presentation of data. Response from informants were subjected to descriptive analytical statistics to achieve the overall objective of the study.

The study used both primary and secondary sources of data in assessing the effectiveness and sustainability of initiated local adaptation strategies. Primary source of data collection adopted the use of well structured, open-ended questionnaires. Informal interviews, focus group discussions, personal and direct observations were made in providing other information regarding the research objective.

Secondary source of data collection adopted the use of existing literatures from both the internet and print media. Reports and other relevant documents were collected from institutions operating (alone or in conjunction with other institutions) within the study area.

The study employed purposive, snowball and convenient probabilistic sampling methodologies. The sampling size for this study was sixty (60). Two different set of questionnaires were administered among local residents and some officials in the area. Out of this, fifty (50) were administered to local residents and the remaining ten (10) were administered to the officials. Target group were classified as vulnerable groups based on their occupation, social stratification (status), gender and geographical location. The sample size included the elite who work within various institutions such as; 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 e.g. 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.

3.0 Results and Discussion

3.1 Results

This section assesses the effectiveness and sustainability of local climate adaptation strategies, initiated by the local assembly, private entities and individual households in Dansoman based on research findings. The results of data collected and analysed are presented in the following sections:

3.2 Identified Stakeholders

This section presents some relevant stakeholders who play significant roles in the formulation, implementation and evaluation of local climate change adaptation strategies at the national, regional, district and local or grass-root level.

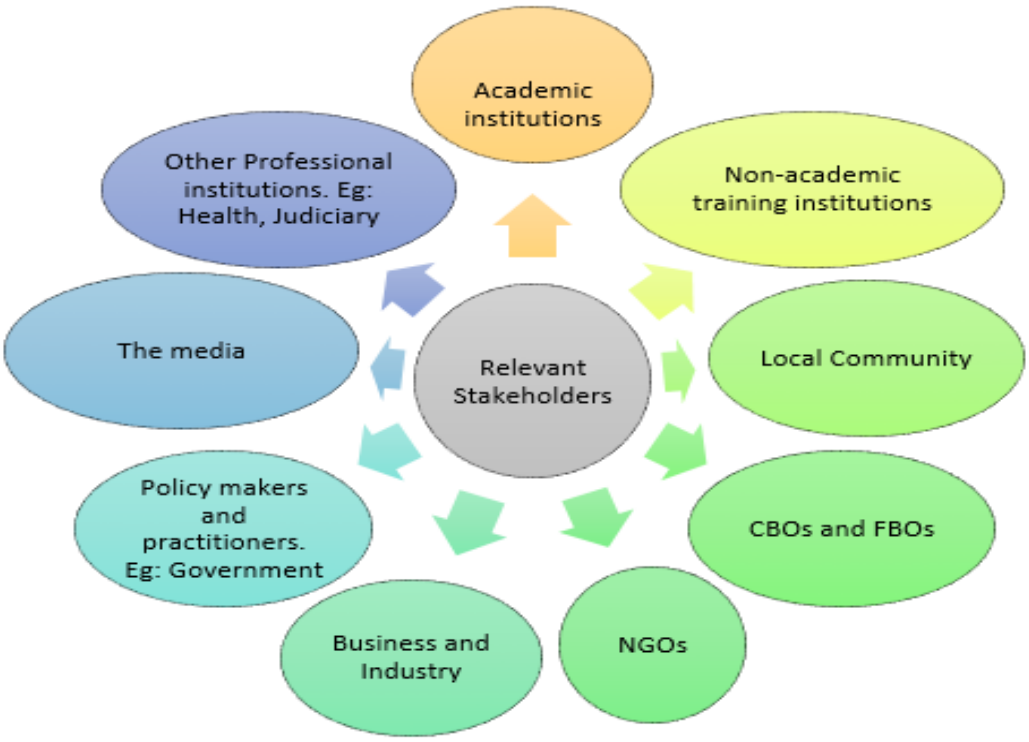

Figure 2: Some Identified Stakeholders in Climate Adaptation and Awareness

Figure 2 shows some identified stakeholders with some proposed roles in climate change adaptation process. Information on these stakeholders and the significant roles they play in the study area are based on interviews with the district coordinator, safety and project coordinator at Ablekuma West District Assembly as well as some key assembly members in the study area.

3.3 Institutional Climate Hazard-Aid Offered To Affected Communities

Figure 3 shows a rank of institutions (developed using participatory appraisal tools like score-cards and pair wise ranking) that assist local residents in the study area during periods of climate events, i.e. flooding, coastal inundation and gradual submersion.

The institutions in the circles with specific radii and distance from the study area (or affected community) indicate assistance level (offered and received) in the occurrence of a natural or climate change hazard. The bigger and closer the circle is to the community, the higher the level of assistance and vice versa.

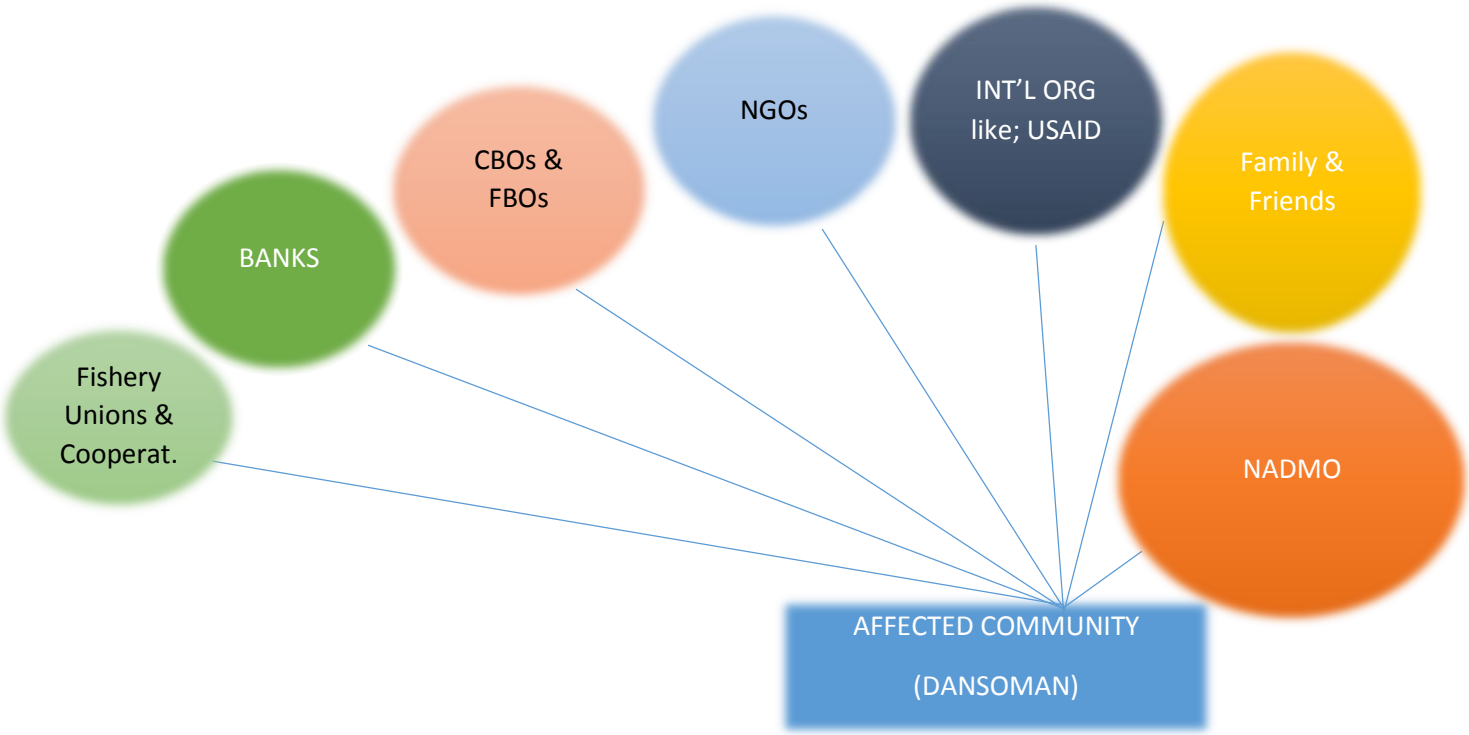

Figure 3: Institutional Framework

3.4 Effectiveness of Local Climate Change Adaptation Strategies in Dansoman.

A comparison between Dansoman and Nador-Berkane in Morocco was made using the data results obtained in the study. The design (Table 1) for assessment based on findings from the study area and a study conducted by Khattabi and Jobbins (2012) was chosen to compare these two local fishing communities and their vulnerability to climate change impacts based on the NRS concept.

Table 1: CASE SCENARIO OF NADOR-BERKANE IN MOROCCO AND DANSOMAN IN ACCRA, GHANA.

No regret Strategy Concept case scenario		
Comparison		
i.	**Case study: Scenario of Nador-Berkane in north-eastern part of Morocco, North Africa.**	Scenario of the coast of Dansoman (Gbegbeyise, Glefe, Mpoase and Panbros as unit areas and study site within Dansoman)
ii.	**Availability and implementation of a local climate change adaptation strategy policy framework**	Non-availability or existence of a local climate change adaptation strategy policy framework. Just shades of interceptive (local assembly) and individual household self-protective measures.
iii.	**Broad participation or action based among relevant stakeholders in the formulation and implementation of**	Limited participation and consultation among relevant stakeholders in terms of major interventions or adaptation projects initiated by

	local climate change adaptation strategy	the central government through the local assembly.
iv.	**Strategy has feasible elements with socially acceptable issues, economic, environmental and technically viable options with resource availability.**	Limited feasible elements which tends to tackle social, economic, environmental and technically viable options in a holistic or integrated manner due to limited resources.
v.	**Measures embedded in local climate adaptation strategy entails both short and long term measures. In terms of severity and type, climate change impacts are acute (more severe) with residents being highly vulnerable.**	Limited short and long term climate change adaptation measures. Only major intervention which is effective and sustainable is the sea defense mechanism with ineffective short term measures. In terms of severity and type, climate change impacts in the area are not highly vulnerable but impacts are severe.
vi.	**Strategy is accompanied by key measures such as; coastal zone management and development with more/further research options for effective monitoring and evaluation to inform better decision-making**	No strategy in place with poor coastal zone management and development. Need for more research as well as strengthening of institutions with needed resources, technically and financially to inform better decision-making.

(Source: Adapted and modified from Khattabi & Jobbins, 2012)

Table 2: INTERVENTIONS AND OTHER RISK-REDUCTION VULNERABILITY STRATEGY CHECK IN THE STUDY AREA.

Parameters (Socio-economic and institutional factors)	Description of Existence/Functionality
Sea Defense mechanisms	√√√
Storage Facility for fish and other seafood products	**X**
Good drainage systems	√
Good transportation networks (roads, railway lines and so on)	√√
Alternative livelihood source of Income (majority of respondents have no alternative livelihood sources)	**X**
Assistance from family and friends (Informal networks) after the occurrence of climate change hazard/disaster	√√
Assistance from government and other private entities	√√
Climate change Awareness and Capacity building	√
Availability and access to climate change information in state institutions in Dansoman	**X**
Port for harboring fishing boats and other vessels	**X**
Education and Health facilities (Schools, research centers, hospitals, clinics and so on)	√√√

Strong and well-functioning institutions (Fishery unions, co-operatives and state institutions)	√

Some key areas which when implemented or looked at can help reduce residents' vulnerability to climate impacts in the area are presented in Figure 4. 34% of the respondents representing 17 respondents preferred government and other stakeholders to invest or enhance socio-economic infrastructure in the area, before strengthening institutional capacity then tackling environmental or climate risk solely in that order. 26% representing 13 respondents preferred strengthening of institutions which in turn will trickle down or propel socio-economic growth and tackling climate risks and hazards as well as other respondents with their preferred ranks as observed in Figure 4.

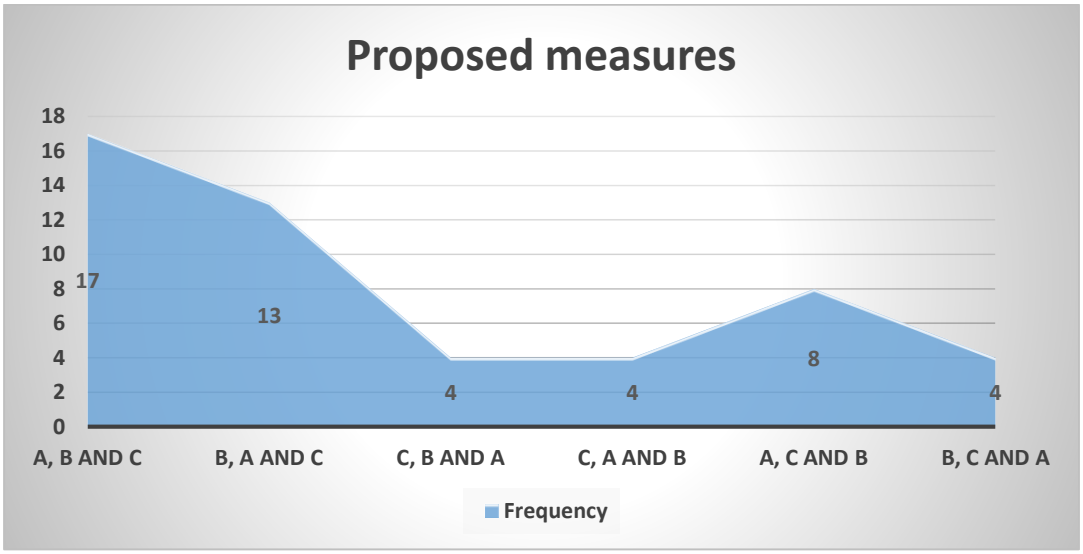

Figure 4: Local residents proposed areas to be strengthened or invested in order to reduce their level of vulnerability to climate hazards

A*-Enhance socio-economic infrastructure **B***-Strengthen institutional capacity **C***-Tackle solely environmental or climate risks and hazards

3.5 Discussion

The effectiveness and sustainability of local adaptation strategies in the study area are assessed based on local residents' and institutional personnel's responses using descriptive statistics. In assessing the effectiveness and sustainability of adaptation strategies along the coast of Dansoman and its environs, initiated strategies by the local assembly and self-protective measures at the household level were assessed with the NRS concept. The concept is based on socio-economic parameters with key principles that includes; broad consultation and participation, time and scope of the project or strategy (short or long term/reactive and anticipatory) and cost of embarking on projects.

The government and informal networks (family and friends) are the most helpful institutions that offer assistance to flood and other disaster victims in the study area as shown in Figure 2. These two bodies show that the concept of social vulnerability and social capital when strengthened or developed within communities, can help improve societal settings by reducing people's vulnerability after climate hazard occurrence. In addition, creation of more social infrastructure such as schools, health and storage facilities, improving access to climate information, gender equity and equality, awareness and capacity building programs, further integration of climate change issues into formal educational curriculum as well as informal training systems and events can help reduce people's social vulnerability or risk to climate hazards at various levels. These parameters are limited or not in existence in Dansoman as can be seen in Table 2.

Dansoman has no local climate change adaptation policy framework. The major adaptation projects in the study area are the sea defense systems, education and health facilities as seen in Table 2. The sea defense mechanism under construction and extension was halted due to change in government and lack of funds. Implementation of the sea defense system despite its relief to some residents still leaves other areas highly vulnerable to climate change impacts due to its incompletion.

Data collected on adequacy of socio-economic infrastructure shown in Tables 3 and 4 and effectiveness of institutions as shown in Tables 5 and 6 as well as initiated adaptation strategies shown in Tables 7 and 8 indicates that local residents and officials asserting inadequacy and ineffectiveness of these parameters, and therefore results in increasing risk to climate hazard. Observation shows that, when adequate efforts are channeled towards proposed priority areas as suggested by respondents, it will not only enhance growth and development in the area but reduce people's susceptibility to climate hazards (Figure 4).

Table 3: LOCAL RESIDENTS' ASSESSMENT ON ADEQUACY OF SOCIO-ECONOMIC PARAMETERS IN THE AREA

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Very adequate	3	6.0	6.0	6.0
Adequate	14	28.0	28.0	34.0
Not Adequate	28	56.0	56.0	90.0
Very poor	2	4.0	4.0	94.0
I don't Know	3	6.0	6.0	100.0
Total	50	100.0	100.0	

Table 4: OFFICIALS' ASSESSMENT ON ADEQUACY OF SOCIO-ECONOMIC PARAMETERS IN THE AREA

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Very adequate	1	10.0	10.0	10.0

Not Adequate	9	90.0	90.0	100.0
Total	10	100.0	100.0	

Table 5: LOCAL RESIDENTS' ASSESSMENT ON THE EFFECTIVENESS OF INSTITUTIONS IN CARRYING OUT THEIR FUNCTIONS

	Frequency	**Percentage**	**Valid Percentage**	**Cumulative Percentage**
Yes	11	22.0	22.0	22.0
No	29	58.0	58.0	80.0
Indifferent	6	12.0	12.0	92.0
I don't know	4	8.0	8.0	100.0
Total	50	100.0	100.0	

Table 6: OFFICIALS' ASSESSMENT ON THE EFFECTIVENESS OF INSTITUTIONS IN CARRYING OUT THEIR FUNCTIONS

	Frequency	**Percentage**	**Valid Percentage**	**Cumulative Percentage**
Yes	2	20.0	20.0	20.0
No	8	80.0	80.0	100.0
Total	10	100.0	100.0	

Table 7: LOCAL RESIDENTS' ASSESSMENT ON EFFECTIVENESS AND SUSTAINABILITY OF CLIMATE CHANGE ADAPTATION STRATEGIES IN THE AREA.

	Frequency	**Percentage**	**Valid Percentage**	**Cumulative Percentage**
Yes	16	32.0	32.0	32.0
No	26	52.0	52.0	84.0
I don't know	8	16.0	16.0	100.0
Total	50	100.0	100.0	

Table 8: OFFICIALS' ASSESSMENT ON EFFECTIVENESS AND SUSTAINABILITY OF CLIMATE CHANGE ADAPTATION STRATEGIES IN THE AREA.

	Frequency	**Percentage**	**Valid Percentage**	**Cumulative Percentage**
Yes	3	30.0	30.0	30.0
No	7	70.0	70.0	100.0
Total	10	100.0	100.0	

Issues of weak institutions in Dansoman is partly due to limited resources (infrastructure, skilled personnel, funds and technical capabilities) and political sentiments (partisanship) which delays decision making and halts a number of plans meant to enhance growth and development in the study area. Interviews conducted among informants show that critical issues of concern linked to climate vulnerability and adaptation are not

given maximum priority or atention due to limitation in resources (human, technical and financial resources). On the other hand, gaining political will in addressing issues of climate change has created some sense of urgency among stakeholders, leading to the preparation of a policy document for enhancing adaptive capacity in the area. It is important that the government through local assemblies continue to see climate change phenomenon as an issue with severe implications, especially altering harmonization of ecosystems and their interrelationships. Further efforts regarding political will and commitment in enhancing adaptive capacity in developmental planning for Dansoman (and beyond) is still required.

As shown in Table 1, the comparison between Dansoman and Nador-Berkane, show high vulnerability to climate change impacts in Dansoman despite efforts at improving adaptive capacity. Based on the NRS concept and findings in Dansoman, some initiated strategies (e.g. sea defense, distribution of trash bins – major interventions), posed serious consequences on local residents. Among such consequences are; disease outbreaks and conflicts between waste management officials and locals. This often arise as a result of sea water (wave action) splashed against the sea defense creating pool of water (stagnant water) behind it. Over a period of time this pool of water breeds mosquitoes, worm infections and stench odor causing diseases and discomfort for residents. Untimely waste collection in specific zones and centers often cause blockage in drainage systems and canals which causes floods in the study area after heavy rains. This dilemma has caused several conflicts between waste management officials and locals in Dansoman. These resultant consequences occurring simultaneously with these interventions show limitation in planning, implementation and evaluation of these adaptation strategies in the study area. NRS has a principle of not being an obstacle to socio-economic development as well as developing mal-adaptation. Initiated strategies to reduce vulnerability in the study area (based on respondents' assessment) are limited considering the nature of efforts, commitment, and resource availability in propelling and enhancing socio-economic growth and development in the area. Additionally, adaptation strategies in the area are ineffective and unsustainable with resource availability among vulnerable groups not being adequate to reduce residents' vulnerability to climate change impacts.

4.0 Conclusions

From the results of this study which were presented and analysed in the sections above, the following conclusions are made.

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 such as; 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 most of the time ineffective.

3. Majority of respondents claimed self-protective measures initiated at the household level have not been effective due to cost of maintenance being higher and prioritizing other needs within their families to maintaining these adaptation measures at home. Hence, the reasons for majority maintaining such measures once in a while.
4. Majority of respondents assert socio-economic infrastructure and institutional capacity in the area as poor and inadequate.
5. Among all institutions, NADMO, a state institution is the most supportive institution in terms of financial assistance and donation of items to natural disaster victims in the area, with banks and fishery unions being least supportive. .

5.0 Recommendations

The measures outlined from research findings can be said to inform decision-making and reduce vulnerability to climate change hazards in Dansoman;

a. **Need for broader participation and consultation across sectors, at all levels among relevant stakeholders for enhanced and pragmatic decision making**. Complexities and encompassing nature of components of the environment and climate change dynamics require broader participation/consultation for developing adaptation strategies. This should take into account the principles of the NRS concept.
b. **Need for sustainable policy frameworks, action plans, programs and projects**: There is need for the formulation and implementation of adaptation strategies. Policy frameworks give directions with major areas prioritized and tackled accordingly while indicating some level of 'seriousness and commitment' in addressing pressing issues within the study area.
c. **Strengthening of Institutional capacity:** Findings based on data collected from the study area suggested that institutions in the area are weak, and lack public trust or confidence. Investing in institutions by equipping them with needed resources both technically and financially, is critical for sustained and effective adaptive efforts going forward.
d. 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 be willing to take initiative to effect changes in this wise. Citizens must be educated on the dangers of contributing to increased climate change hazards.
e. Further research into the influence, costs and funding of climate change projects on the effectiveness of adaptation projects along the coast of Dansoman, Accra is still required.

5.1 Acknowledgement

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