**UNIVERSITY OF GHANA**

**COLLEGE OF HUMANITIES**

# AN ASSESSMENT OF THE EFFECTS OF THE DANSOMAN EMERGENCY SEA DEFENCE PROJECT ON THE LIVELIHOOD OF RESIDENTS OF GLEFE, ACCRA, GHANA

**BY**

**VALERIE KPLORM AKU NUTAKOR**

**(10530499)**

**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF ARTS IN DEVELOPMENT STUDIES DEGREE.**

**INSTITUTE OF STATISTICAL SOCIAL AND ECONOMIC RESEARCH (ISSER)**

**MAY 2023**

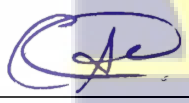
# DECLARATION

I, Valerie Kplorm Aku Nutakor, hereby declare that the information reported here is a result of my own work except for where references to works by other persons are made. This dissertation is therefore the outcome of my own research work, and it has neither been presented wholly nor in part elsewhere in fulfilment for the award of another degree.

Signature: 

Valerie Kplorm Aku Nutakor (Student)

Date: 3rd May 2023

Signature: 

Dr. Cynthia Addoquaye Tagoe (Supervisor)

Date: 3rd May 2023

# ABSTRACT

Resilient infrastructure, such as sea defence systems, have been instrumental in protecting the vulnerable coasts of countries. In Ghana, sea defence walls have been constructed to protect the coast against high tides and coastal erosion. The gap, however, remains in assessing how these structures affect the socio-economic indicators of development, especially livelihood. This study assessed the effects of the Dansoman Emergency Sea Defence Project Phase One (DESDP) on the livelihood of residents in Glefe. The results were obtained through the administration of 120 questionnaires, three (3) key informant interviews and two (2) focus group discussionsusing the mixed methodology design approach. The results show that the DESDP was key in safeguarding livelihood assets, which is essential in enhancing sustainable livelihood, whilst identifying that the construction of the DESDP negatively affected fish-based livelihood especially, as it forced fishermen to move their operations from Glefe to neighbouring areas such as Dansoman and Panbros, with some having to move to Cape Coast. This was a key reason for the agitation of the fishermen which led to the call for a change in the initial designfrom a defence wall to a groyne at the latter stages of implementation. The responses show thatthe DESDP improved the livelihood of traders, since it prevented the intrusion of sea water into their wares, allowing the traders to set up stalls to run their businesses after the construction. The DESDP was key in protecting life and property, giving them peace of mind,which is relevant in pursuing their livelihood strategies. Along gender lines the results indicatethat, formally educated males experienced a more positive effect of the DESDP on livelihood as compared to formally educated females. The study therefore recommends the need for a more holistic and gender-sensitive approach to the implementation of resilient infrastructure projects, and the need to incorporate local knowledge geared towards building hybrid infrastructure that incorporates nature-based solutions, without political interference.

# DEDICATION

This dissertation is dedicated to my parents, Mr. Lawrence Goodwill Nutakor, and Madame Victoria Akafia and to my siblings, Kofi and Makafui, who have been there for me in every step of the way. I am especially grateful for their continuous love, support, and encouragement throughout this academic journey.

# ACKNOWLEDGEMENTS

I thank the Almighty God for seeing me through this course successfully. I want to thank my supervisor, Dr. Cynthia Addoquaye Tagoe of the Institute of Statistical , Social and Economic Research (ISSER) at the University of Ghana, for her guidance and input towards my work. My gratitude goes to Dr. Simon Bawakyillenuo of the Institute of Statistical, Social and Economic Research (ISSER) at the University of Ghana for his interest in my study and the relevant discussions about Climate Change and Policy implementation which sparked an interest in pursuing this path, and to Professor Nana Akua Anyidoho of the Centre for Social Policy Studies for her guidance and a never-ending reminder to consider social stratification and marginalisation in research and policy, and her inputs in and out of school. I also thank the administrative and academic staff at the Institute of Statistical, Social and Economic Research (ISSER) at the University of Ghana.

To Dr. Dzidzor Kwamuar, Mr. Foster Billah, the staff of HATOF Foundation, Derick Ellis, Esenam Edusei , Mr. Enam K. Agbittor, and Sarah Aboagye, thank you for always keeping me focused on my research. Without your care and input, I could not have finished this research.

My appreciation goes to my father, Mr. L.G Nutakor, my mother Madame V.A. Akafia and the entire family: Makafui Matike and Kofi Nyuitor Nutakor. Your support has been priceless. To the people of Glefe, it has been an honour becoming familiar with you, thank you for letting me into your homes and allowing me to tell your story.

Last but not least, my appreciation goes to all who helped in different ways to make this research study successful.

# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# LIST OF ABBREVIATIONS

| | |
|---|---|
| ABWMA | Ablekuma West Municipal Assembly |
| AMA | Accra Metropolitan Assembly |
| DESDP | Dansoman Emergency Sea Defence Project Phase One |
| DFID | Department for International Development |
| FGD | Focus Group Discussion |
| KSDP | Keta Sea Defence Project |
| NADMO | National Disaster Management Organisation |
| SDG | Sustainable Development Goal |
| SVC | Swiss Virtual Campus |
| WCED | World Commission on Environment and Development |

# CHAPTER ONE

# INTRODUCTION

## 1.0 Background of Study

Global reportage highlights the destructive effects of coastal erosion and the measures that have been put in place by policy directives as well as research recommendations to curb the damage these climate change-induced hazards pose to man, coastal areas, and property which in turn affect the security of the livelihood of coastal dwellers (Ayerteye, 2022). Coastal areas have been known to generate revenue for the state and sustain the livelihood of coastal residents through large-scale fishing and tourism. Coastal areas are also considered as being a stock reserve for the extraction of resources such as petroleum, as was recorded at Cape Three Points in Axim, Ghana in 2006 (Owusu-Adjapong, 2018). The ocean, one of the world's largest carbon sinks is home to shorelines that also double as the core of coastal disaster issues such as coastal erosion and unprecedented natural disasters (Intergovernmental Panel on Climate Change, 2011; National Research Council, 2008). The coast has coconut trees with high carbon sequestering ability which are of economic value in terms of their tourism potential, and environmental value as it offsets carbon emissions (Roth & Gustafsson, 2021). The coast equally holds a treasury of historical relics such as Fort Prinzenstein in Keta, the Elmina and Cape Coast Castles in the Central Region and the Osu Castle, Ussher, and James Fort in the Greater Accra Region (Addo et al., 2016). It is thus important that the development and protection of coastal areas are approached as a concerted effort among the state, development partners and the people who reside in these areas because coastal areas are beneficial to all in different ways, and further determine the quality of developmental projects (Kismartini & Yusuf, 2015).

The global coastline undergoes morphological changes, resulting from wave action and movements of sediment in and out of the coastal area. It is, therefore, important to assess techniques to safeguard coastal settlements, as it remains home to 40% of the global population and a wide variety of biodiversity (United Nations, 2007). Coastal erosion has gradually become a topic of interest on both national and international fronts as its effects on the shorelines of many coastal areas have been utterly damaging since it is vulnerable. The vulnerability of coastlines can be attributed to physical, ecological, and socio-economic components (Bevacqua et al., 2018).The physical factors are largely dependent on the location and physical characteristics of the coastline that makes it susceptible to threats and hazards. The ecological factors focus on the material of the soil which increases the risk of coastal erosion while the socioeconomic factors directly refer to the characteristics of people residing close to coastal areas, which expose themto the possibility of being negatively affected by the proximity of the coastline (Bevacqua et al., 2018). The effects include the loss of property, economic livelihood stalls, wearing a way of historical infrastructure and as dire as the loss of lives. Up to 85% of the United States East Coast barrier beaches have undergone erosion over the last millennium (1000 years) (Anim et al., 2013). Studies between 1984 and 2015 have shown that the global loss of permanent land in coastal areas is estimated at 28000km$^2$, almost the size of Haiti (Mentaschi et al., 2018 as cited in Kantamaneniet al., 2022). This includes several settlements such as Fuveme in the Volta Region, and Dunwich in England (Naadi, 2016; Reid, 2009). There is an ongoing global conversation on how the incidence of coastal erosion can be reduced or prevented altogether. Further studies have highlighted climate change as a main causative factor, however, other natural and human factors such as land degradation, sea-levelrise and illegal sand winning have equally played major roles in causing coastal erosion and making the coastline of West Africa vulnerable (Almar et al., 2022).

The coast of Africa and West Africa, in particular, has had its share of these aforementioned adverse impacts, and its vulnerability is measured by how swift measures to address climate change-induced hazards are undertaken (Armah, 2005; Bevacqua et al., 2018).This further explains theneed to undertake projects and plans hinged on policies to protect coastlines from the harsh effects of coastal erosion through soft engineering techniques such as revegetation along the coastline, beach nourishment or hard engineering techniques such as the construction of sea walls and groynes (Prasetya, 2001).

According to Ghana's 2017-2024 Socio-economic Growth Policy, 'The potential rise in sea level would result in wetland flooding, contamination of agricultural soil, loss of habitat, and the wiping away of entire communities (Republic of Ghana, 2017). In Ghana, the coast forms 7% of the country's total land area and is home to about 25% of the country's population (Olympio & Amos-Abanyie, 2013). As it is with many other coastal areas around the world, fishing and fish-related activities are a major source of livelihood for residents in Ghanaian coastal communities (Anim et al., 2013). The sea, therefore, becomes a major resource that forms their economic base to a large extent. Coastal erosion however disrupts this, as it essentially leads to the destruction of the settlement of indigenes, further affecting their livelihood source, and stalling development (Boateng, 2012). As a measure to adapt to the impact of coastal erosion on the life of indigenes, there has been a move towards the construction of sea defence walls along the coasts of many shores to safeguard life, sustenance, and property (Williams et al., 2018). Ghana as part of its Coordinated Programme of Economic and Social Development Policy (2017-2024) has plans of investing in resistant coastal control structures, such as using boulder revetments and gabions. This is to regulate illegal sand mining activities, protect the coastline and sustain the livelihood of residents in these localities who are dependent on the coast (Republic of Ghana, 2017).

The canker of coastal erosion has been a hindrance to the development of areas along the coastal belts of various countries since oftentimes, these projects are washed into the sea. This has therefore led to integrated coastal management mechanisms being developed and implemented along coastal zones in many developed countries (Olympio & Amos-Abanyie, 2013). In developing countries such as Ghana, where the adverse effects of coastal erosion are still being felt, sea defence walls are constructed to curb the havoc and protect livelihood, property and infrastructure has become a growing necessity (United Nations Climate Technology Centre and Network, 2016). This is equally driven by the need to protect industries, communities, and cultural heritage sites to sustain development in holism with national agenda (Republic of Ghana, 2017). The construction of sea defence is to separate the land affected by wave action from the sea to a large extent and keep the sea within its confines. Sea defence projects require a hefty sum to undertake, and it thus becomes imperative to ensure that the construction of such an engineering project is properly assessed over time to safeguard livelihood (van der Meer, 2017).

Some sea defenses within the country are the famous Keta Sea Defence Project (KSDP), The Ada Sea Defence Project and the Axim Coastal Protection Works (Conterra Limited, 2005 as cited in (Adikah et al., 2020). Typically, the construction involves using resistant boulders which are usually igneous. These boulders are fastened close to each other without gaps and positioned in such a way that any oncoming wave is immediately broken and does not penetrate the sandy beach area or the community (van der Meer, 2017). Though coastal management practices such as the construction of revetments and sea defence walls are being implemented, there remains the issue of having these defence walls mounted as a rough solution to protect the coastline (University of Ghana, 2022). There is the need to therefore pay attention to the other aspects of the lives of people and how the construction of the defence wall may further affect their livelihood, either positively or otherwise. As with any developmental project, it is

important to assess how these projects affect various aspects of the lives of residents in the area of implementation which is what this research seeks to do in Glefe.

### 1.1 Problem Statement

The quest to attain development is closely linked to the standard of living of a people which is determined by livelihood which can be affected by changes in the original conditions of a place or the situation of a project resulting from policy directives, project implementation or the existing gender norms within that area (Keeley, 2001; Yusoff, 2020). The Government of Ghana has deemed it fit to manage coastal erosion to a large extent, by constructing sea defence walls, groynes, and revetments, which is a move towards managing disaster and its associated risks by ensuring that long-term structures are put in place (Government of Ghana, 2017). As a country with 30% of the populace living along the coast, measures to improve protective infrastructure, through proper community engagement, plans and funding are vital to reducing the vulnerability of such disaster-prone communities and safeguarding lives and property (Ministry of Environment, Science, Technology, and Innovation, 2013). With the high incidence of coastal flooding and erosion in Ghana, which poses a threat to development, the government through the Ministry of Works and Housing, as a part of its Medium-Term Development Plan spells out the budgetary allocation, progress report and proposed sea defence projects across the country (Ministry of Works and Housing, 2018b).

Glefe, a low-lying community, battled the destruction of its coast, with the lives and property of dwellers destroyed, due to coastal erosion. According to Kudiabor (2012), residents lost their structures and were displaced after tidal waves hit their coast, which gradually caused coastline erosion. As a measure to combat this, some residents who could afford it, went ahead to build walls as a way of protecting themselves whereas those who could not, were left to bear the brunt of the sea. As a response to the request, the construction of a sea defence wall commenced in

2015, as a measure to safeguard the environment and residents. This, however, led to more issues as fisher folk had tomove their trade to neighbouring towns since they could not berth at the shore anymore and traders who plied their wares in and around the township had to relocate because of property destruction which affected the plying of their trade (Field Report, 2022). In order to understand the effects of the sea defence on the livelihoods of residents, it has, thus, become necessary to conduct a study aimed at understanding how the construction of the DESDP has affected the livelihood of residents in Glefe, from their perspective. This is key in ascertaining the demographic characteristics of residents in Glefe, who were affected by the construction of the sea defence, how it has affected their livelihood assets, outcomes, and strategies and how it threatens their ability to further sustain their livelihood. This also provides insight into the effects of the sea defence project on livelihood along gender lines, in a bid to study the effects the construction of the Dansoman Emergency Sea Defence Project Phase One has had on residents.

### 1.2 Research Questions

**The research questions guiding this study are as follows**:

1. What are the demographic characteristics of residents whose livelihoods have been affected by the construction of the DESDP in Glefe?

2. How does the construction of the Dansoman Emergency Sea Defence Project affect the livelihood assets, strategies, and outcomes of residents in Glefe?
3. How does the construction of the Dansoman Emergency Sea Defence Project affect the livelihood of residents along gender lines?

### 1.3 Research Objectives

The purpose of the study is to assess the effects of the Dansoman Emergency Sea Defence Project Phase One on the livelihood of residents in Glefe. Specifically, this study aims to;

1. Ascertain the demographic characteristics of residents whose livelihoods have been affected by the construction of the Dansoman Emergency Sea Defence Project Phase One at Glefe
2. Examine the effects of the Dansoman Emergency Sea Defence Project Phase One on livelihood assets, strategies, and outcomes of residents in Glefe.
3. Examine the effects of the Dansoman Emergency Sea Defence Project Phase One on the livelihood of residents in Glefe along gender dimensions.

### 1.4 Significance of Study

The Ghana Climate Change Policy captures as part of its directives, the quest to ‘’…research appropriate infrastructure design standards that meet higher requirements against extreme weather-related natural hazard events’’ (Ministry of Environment Science Technology and Innovation, 2013: 65). This statement, therefore, forms the crux for conducting this research on the outcome of this policy statement, which inspired action in the long run. The issue of coastal erosion as addressed through coastal management has gained the attention of persons within academia, governance spheres and the global community especially, on how it affects livelihood. Climate change has affected coastal areas to the point of destruction, necessitating the construction of sea defence walls along the coast which also serve as a measure to safeguard the livelihood of the affected areas.

This study therefore endeavours to validate and examine the outcome of the Dansoman Emergency Sea Defence Project Phase One on the livelihood of residents, and propose recommendations, which are necessary for policy formulation, and add to knowledge concerning coastal engineering projects being rolled out. Variables such as livelihood have been considered and serve as a reference point for further research for areas with similar indicators.

### 1.5 Organisation of the Study

The study consists of five chapters. Chapter One presents an overview of the topic under study, the problem statement, the research questions and objectives, the significance of the study and the organisation of the chapters of the study. The second chapter covers literature on coastal erosion, coastal management, an overview of previously constructed sea defences in Ghana and sustainable livelihood, and the conceptual framework teased from the Department for International Development (DFID) – the Sustainable Livelihood Framework (SLF). This outlines theories and models relevant to putting the problem in perspective through literature and research. It also provides a global and local outlook of how coastal management and sea defence structureshave impacted livelihoods as well. The third chapter comprises a detailed outline of the methodology. This includes a background of the study area, research design and data collection, sample size and method of selection, data analysis method and projected limitationsof the study. The fourth chapter further delves into a detailed analysis of the data collected anda discussion of the results. The concluding chapter, Chapter Five, includes a summary of the research findings, conclusion, and recommendations.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.0 Introduction

This chapter provides in-depth information on the research area by highlighting definitions of the key concepts of livelihood and sea defence projects. The chapter also highlights the underlying conditions that necessitate the construction of sea defence structures, the materials used for construction, the importance of sea defences, and how it affects the livelihoods of persons living in coastal areas, with key reference to background characteristics and gender dimensions. An overview of the challenges and the underlying reasons that hamper the construction of sea defence walls will equally be delved into. It will also provide an overview of the theoretical underpinnings that will guide the research and attempt to explain how coastal management projects can influence the livelihood assets, strategies, and outcomes of residents in Glefe, with consideration to their background characteristics and gender dynamics.

## 2.1 Definition of Key Concepts

### 2.1.1 Coastal Erosion

Coastal erosion is the wearing away of land or the removal of beach or dune sediments by wave action, and currents along the coast. This wearing away may be sudden or gradual depending on the intensity of the drivers that cause the erosion (Gibb, 1978: Mörner & Finkl, 2019). The adverse effects of coastal erosion on development, owing to the changing climate, as well as natural and anthropogenic causes have equally caused a growing sense of alarm at local, national, and

international levels, as coastal areas serve as a hub for infrastructural development, fishing activities and oil drilling (Olympio & Amos-Abanyie, 2013). There is the need to therefore address these effects, through a holistic effort by the state, private, and industry actors, including the citizenry (ibid). Coastal erosion, therefore, threatens vulnerable coastlines, depletes the already scarce resource, and threatens the stability of livelihoods along the coast (Poku-Boansi et al., 2016). The destruction caused by coastal erosion necessitates the construction of sea defences as a measure to protect the shoreline, protect lives, and safeguard livelihood.

#### 2.1.1.1 Anthropogenic Drivers

Coastal areas are gradually altered by human-induced factors such as the construction of dams, unregulated sand mining, and improper coastal management practices. These extensively affect the supply of sand to coastal areas, weakening the resilience of the terrain and thus making the coastline prone to experiencing erosion. Sand winning, which is legally prohibited, provides sand, a raw construction material for the building and construction sector, which means there is a ready market for the sand. This ready market for the illegally mined sand, gives the illegal miners the leverage to perpetrate these acts for economic returns to cater for basic needs (Anim et al., 2013). The constant and illegal mining of sand consequently affects the barrier between the sea and the coastal areas, making them prone to erosion and putting coastal communities at risk.

#### 2.1.1.2 Natural Drivers

The main processes that influence the gradual erosion of the shoreline can be attributed to Abrasion, Hydraulic Action, Attrition and Corrosion (Coastal Innovations, n.d.). Abrasion involves the breaking of cliffs along the shoreline or coast because of intensified wave action

occurring repeatedly. This action scrapes off the cliffs and rocks, resulting in erosion in the long run. Another causative agent is known as wave action (linked to hydraulic action) which results in erosion in the long term. This occurs when waves have an impact on the surface of a cliff, resulting in air being forced into the crevices of the cliff under pressure. The result is the widening of the crevice over time, weakening its structure and eventually breaking it into pieces, allowing intrusion and gradual recline of the beach barrier (National Research Council, 1990).

Apart from wave action-induced causes, sediments knocking against each other within the sea is another process that causes coastal erosion. This process is referred to as attrition. Rocks are therefore chipped and smoothened over time, eventually turning them into sand. The rate at which the debris is removed depends on the strength of the waves and the size of the fragments. The debris that gets hit by the waves causes them to collide and chip each other, creating a smoother and rounder surface (Coastal Innovations, n.d.). This process is rife in regions where there are a lot of soft materials that easily erode. Another cause of coastal erosion is a chemical process known as corrosion**.** This process happens when weak carbonic acid is formed as a result of the dissolution of carbon dioxide in water, within the atmosphere (National Research Council, 1990). The newly formed chemical compound then seeps into crevices of the rocks along the coastline and gradually disintegrates by weakening its chemical components, and gradually eats away the rocks, leading to coastal erosion (British Broadcasting Corporation, 2022). Rocks such as limestone are vulnerable to this acidic water and thus are thus susceptible to erosion (U.S. General Services Administration, 2016).

Although the above are significant causative factors, one major factor that cannot be ignored in explaining coastal erosion is climate change, as it poses a risk to sustaining coastal

livelihoods and development in general. Climate change is expected to accelerate the erosion of coastal areas globally due to rising sea levels (Vousdoukas et al., 2020). The attribution of sea level rise to coastal erosion and shoreline change is known as the Bruun effect, which is explained using a two-dimensional linear equation (Bruun, 1988), and further used to calculate the magnitude of recline of a sandy shore in response to rising sea levels. It is relevant to note that Ghana has recorded an increase of 136.3% in Greenhouse Gas emissions over the past twenty-two years (1990-2012) (Republic of Ghana, 2017). This emission rate puts the country at the risk of experiencing the effects of climate change which include the unusual rise in sea level.

### 2.1.2 Livelihood

Livelihood has been operationalised in different contexts. The term 'livelihood' is referred to as the ''adequate stocks and flows of food and cash to meet basic needs"(WCED, 1987a, pp.2). The World Commission on Environment and Development (WCED) in this definition explains how the stocks available create an enabling environment for individuals to maximise their outcomes and productivity, through strategies, using the assets available to them. These assets are strongly linked to the patterns and decisions taken by individuals on what strategies they seek to pursue. This definition was however redefined and modified by Chambers and Conway (1992), who referred to livelihood as the means people employ to cater for their needs, such as food, shelter, security, and education (Chambers & Conway, 1992). A person's livelihood should thus, enable them to satisfy personal and household needs, be sustainable, dignifying, and decent- such that it does not affect an individual's reputation within the society (Chambers & Conway, 1992).

Livelihood in the context of development goes beyond how much money or returns a person accumulates whilst practising a livelihood strategy, it also includes the relationship between various activities, assets, and means of supporting themselves (School of Oriental and African Studies London, 2021). The idea of what assets are may be complicated as they are cross-cutting and can be linked to existing broader assets. For instance, the social assets that enhance livelihoods can be linkedto structures put in place at the national level (Ellis, 2000).

### 2.1.3 Sea Defence

Coastal defence structures are constructed to protect the coastline from erosion and flooding which destroy the livelihood and physical characteristics of the coastline (Sea Defence and Erosion Projects, 2022). The height of these structures ideally takes into consideration, sea level rise and wave intrusion, as well as the velocity of the wave action (van der Meer, 2017).

#### 2.1.3.1 Sea Defence as a Coastal Management Measure

Coastal management systems are structures that are put in place to combat the havoc wrought by erosion and other coastal hazards. Coastal management engineering measures are classified into two main systems depending on the type of engineering employed: hard or soft engineering (Williams et al., 2018). This study is concentrated on hard engineering, with a focus on revetments and groynes. Addressing coastal erosion and putting up relevant policies and projects to ensure that the effects of the hazards are mitigated must take into consideration, the diverse nature of project formulation and implementation, given the varying scenarios that come to play, such as the effects on livelihood and the recommendations of residents as well (World Bank Group, 2021). In the construction of sea defence projects, considerations such as who the active stakeholders are, and the engineering approaches, to employ for coastal management are equally important (Ellis, 2000).

### 2.1.3.2 Sea Defence as a Hard Engineering Technique

The hard engineering technique uses permanent rock components for construction as a measure to reduce the strength of waves along a coastline and are visible over an average distance (Angnuureng & Appeaning Addo, 2013). Globally, different sea defence structures have been constructed in the Netherlands Australia, (Kingdom of The Netherlands, n.d.), The United Kingdom, and some parts of America. The benefits of these defences have ranged from land reclamation to shoreline protection, securing infrastructure and the lives of coastal dwellers to a large extent (Kantamaneni et al., 2022). The Ghanaian coastline is also decked with different sea defence structures along the Ada, Keta, Accra and Takoradi stretch. The Axim Coastal Protection Works, New Takoradi Sea Defence Project, Ada Sea Defence Wall, and Keta Sea Defence Project are examples in Ghana (Mensah et al., 2020). Although having proved effective, the technique is expensive and has the tendency to further damage the areas that lie along the parts of the coastline where the defences do not reach (World Bank Group, 2021) There are equally different types of sea defences such as groynes, revetments, barriers, dams, and gravel beaches, (Charlier & De Meyer, 1989) the concentration of this research will be on groynes and revetments as they go hand in hand and are the major projects that have been constructed in pursuance of protecting the Glefe-Dansoman shoreline.

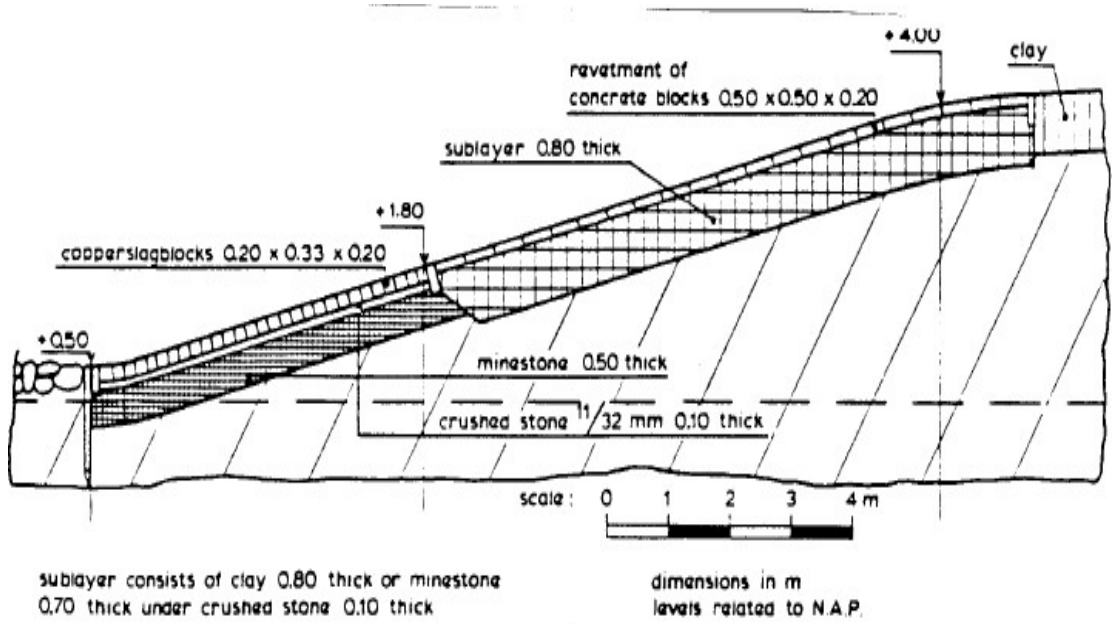
Coastal defences can therefore be constructed with different materials considering the area in question, and the function it is to perform. Rocks are typically used for the construction of coastal defences (Ellis & Eden, 2022), however, the consideration of which other materials to use, are dependent on the type of construction, available resources, cost of the said materials, purpose of construction as aforementioned and the design of the structure (Pilarczyk, 2011). In the Netherlands, industrial waste is recycled for use as construction materials for the construction of the sea walls, because resistant rocks such as granite and igneous were not

readily available in their terrain (Pilarczyk, 2011). The case in Ghana, however, proves different as resistant rocks are largely used to construct the defence walls as the igneous rocks are readily available in Ghana, as it was with the Ada and Keta Sea Defence walls where igneous (granite) rocks are used (Angnuureng & Appeaning Addo, 2013; Kusimi & Dika, 2012) and as it is with the ongoing Dansoman Emergency Sea Defence Phase One Project. Revetments and groynes are therefore viable in ensuring the protection of land againstexcessive erosion along the coastline (Williams et al., 2018). The construction and sustainability of sea defence projects however require proper engagement with direct and indirect stakeholders for design, management and maintenance and project sustainability (ANZDEC, 2009).

### 2.1.4 Revetments

Revetments are coastal defence structures constructed at an angle (or slope) to primarily combat coastal erosion (Massachusetts Office of Coastal Zone Management, 2013). Revetments are also designed and constructed considering the peculiarity of design details such as the ideal slope, width, height as well as length it can cover, its design can however be modified in cases of future sea level rise (Mangor et al., 2017; van der Meer, 2017) (see Figure 2.1). The definition of a revetment is however often confused with that of a seawall as they have similarities concerning function and design (van der Meer, 2017). The comparative difference, however, lies in the design specifications, as seawalls are usually designed as vertical structures, whereas revetments are sloped (Massachusetts Office of Coastal Zone Management, 2013).

Figure 2.1: Basic revetment concepts




Source: van der Meer, 2017, p. 3

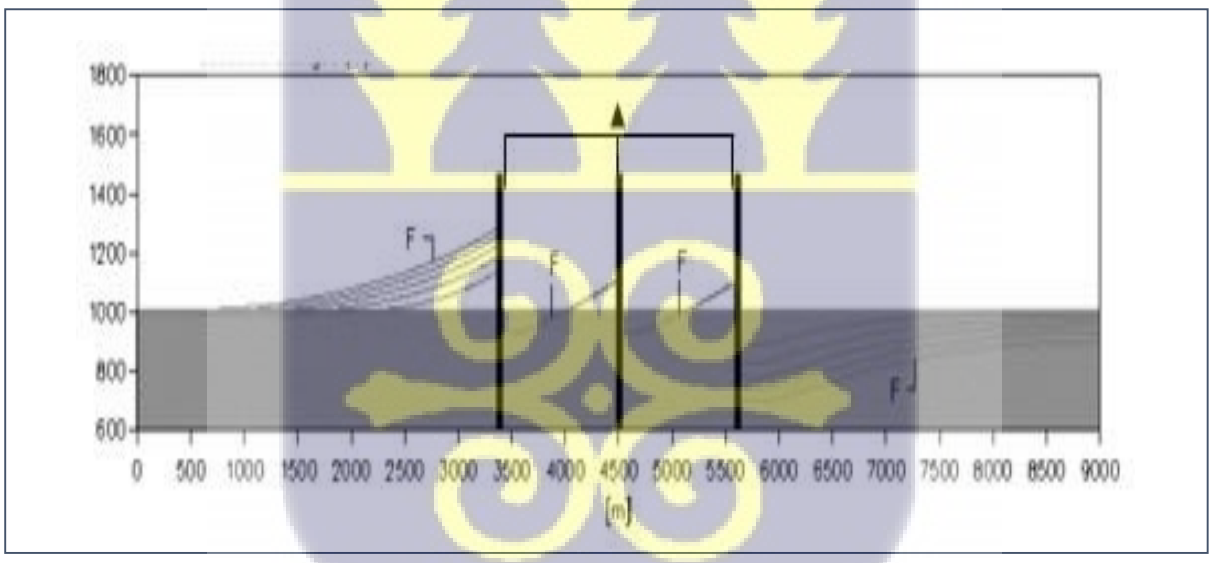
Another factor to consider is the foundational depth below sea level as this is important in preventing the seepage of seawater into the crevices of materials used for construction, weakening the bonds, and posing possible damages (CoastalWiki, 2002). Revetments in hard engineering serve as tide breakers and prevent overhead spillage of high tides into coastal communities as well. In most cases where revetments are used, the communities may face the issue of being cut off from accessing the sea directly and have little to no access to engage in fishing as a livelihood strategy, in cases where it is a source of livelihood within the community (National Research Council, 1993). Further separation of the community from the beach means the possible seizure of the beach from use for recreational purposes by residents and tourists.

### 2.1.5 Groynes

Groynes are horizontal structures constructed perpendicular to the shoreline to ensure the protection of beach sand from erosion, as well as the nourishment of beach sand along an

eroding coast. Groynes come in various forms and may be outward, submerged, or sloping, depending on the purpose of construction (Kraus et al., 1995; National Research Council, 1990). In many cases, groynes are built in groups equidistant from each other to create groyne fields. These groyne fields are important in ensuring nourishment (sand reclamation along the coast) (CoastalWiki, 2002) of the beach to serve as good berthing grounds for canoes, reclaim land for building and to serve as a space for the buying and selling of fish catch as well as net mending sheds for fishermen. The construction of a groyne is therefore, used to maintain the beach structure and allow for the formation of a beach in dire cases (Codjoe et al., 2020; Pilarczyk, 2011) (see Figure 2.2 for technical representations, where F depicts the groyne field, and the arrow depicts the groynes).

Figure 2.2: Technical representation of groynes, groynes fields and nourishment




Source : Mangor et al., 2017, p. 212

When constructing groynes, the gradient of the slope at which the wall is inclined is taken into consideration, since it is important in determining how the side boulders are formed to prevent the rocks used in construction from falling off (CoastalWiki, 2002). Another major factor to consider is the depth of the excavation to ensure that the defence system is sturdy and not

susceptible to intrusion by water, as well as the height, width, and length of the structure. Groynes also vary depending on the severity of the waves, the height of the peak tide and the length of the coastline that needs safeguarding (Pilarczyk, 2011; van der Meer, 2017; Williams et al., 2018).

### 2.2 Effects of Sea Defence Projects on Livelihoods in Ghana

The construction of sea defences in Ghana as a measure to address coastal erosion also names livelihood protection as part of its intended benefits (Ministry of Works and Housing, n.d.; Ministry of Works and Housing, 2018a; Republic of Ghana, 2017). The Ministry of Works and Housing and District Assemblies in Ghana are major facilitators of the construction of sea defence walls across the country, on behalf of the government (Ministry of Works and Housing, n.d.). The number of completed and ongoing sea defence structures within the country is not explicitly stated, with minimal research having been conducted on how sea defence structures have affected livelihood.

Gleaning from extensively researched literature on the Keta Sea Defence project, it can be deduced that, the construction of the sea defence wall caused a shift in the livelihood strategies employed by the residents (Adikah et al., 2020). A noticeable decline of residents who were engaged in fishing activities was observed (from 61.9% to 33.3%), with other strategies such as trading, farming and artisanship recording a growth (see Table 2.1). The only livelihood strategies that remained constant were within the civil/public sector. In terms of assets, earlier dilapidated roads were reconstructed and allowed for free movement and aided transportation of goods and services for residents, there was also the construction of housing units for resettlement as well as the protection of existing educational facilities among other benefits (Adikah et al., 2020).

Table 2.1: Sources of livelihood before and after the Sea Defence

| Livelihood Source | Before (%) | After (%) |
|---|---|---|
| Fishing | 61.9 | 33.3 |
| Trading | 14.2 | 20.9 |
| Farming | 5.9 | 23.9 |
| Civil/Public Service | 11.4 | 11.4 |
| Artisanship | 6.6 | 10.5 |
| Total | 100.0 | 100.0 |

Source : Adikah et al., 2020, p. 153

Studies conducted by Kusimi and Dika (2012) regarding other sea defence structures such as the Ada Foah sea defence project suggested that the construction of sea defence walls are likely to affect livelihood and property, and thus called on considering relocation of communities as an option, to promote other coastal management options (Kusimi & Dika, 2012). The document however does not explicitly mention how the construction of the sea defence will affect livelihood (ibid). A singular database of sea defence projects across West Africa is virtually non-existent, however, a thorough deep search revealed documentation of a variety of sea defence projects, scattered across different sources (see Table 2.2 for the list). They are also various, completed, ongoing and proposed sea defence projects in Ghana, including the Keta Sea Defence Project (KSDP), the Ada Foah Sea Defence Project, the Aboadze Sea Defence Project, the Blekusu Sea Defence Project, and the Dansoman Emergency Sea Defence Project.

Table 2.2: List of Sea Defence Structures in Ghana by location and status

| COASTAL PROTECTION WORKS | LOCATION | STATUS |
|---|---|---|
| **GHANA** | | |
| Keta Sea Defence Project | Keta | Completed |
| Ada Sea Defence Project | Ada | Completed |
| Sakumono Sea Defence Project | Sakumono | Completed |
| New Takoradi Emergency Sea Defence Project (Phase II) | Elmina | Completed |
| Takoradi/Elmina Emergency Sea Protection Project | Komenda | On-going |
| Cape Coast Sea Defence Project | Cape Coast | On-going |
| Amanful Kumah Coastal Protection Works | Amanful | On-going |
| Axim Coastal Protection Works | Axim | On-going |
| Dixcove Emergency Coastal Protection Works | Dixcove | On-going |
| The Aboadze Coastal Protection Works | Aboadze | On-going |
| The Adjoa Coastal Protection | New Takoradi | Ongoing |
| The Dansoman Emergency Sea Defence Project | Glefe | Completed |
| Nkontompo Coastal Protection Works | Nkontompo | Completed |
| Ngyiresia Sea Defense | Ngyiresia | Completed |
| The Blekusu Coastal Protection Phase I | Blekusu | Completed |
| The Blekusu Coastal Protection Phase II | Blekusu | On-going |
| **WEST AFRICA** | | |
| Cotonou Sea Defense | Benin | Completed |
| Great Wall of Lagos | Victoria Island, Nigeria | Completed |

Source: Asiedu-Addo, 2021; Business Ghana, 2022; Cape Coast Oguaa, 2021; Dibajnia & Nairn, 2005; Eko Atlantic, n.d.; Hawkson, 2015; Ministry of Works and Housing, 2019; Western Regional Coordinating Council, 2021

### 2.3 The Nature of the Dansoman Emergency Sea Defence Phase One

The construction of the Dansoman Emergency Sea Defence commenced on 25th November 2015 as part of the government's measure to combat the alarming rate of erosion caused by high-velocity waves and tides affecting the Glefe coastline (Tsogbey, 2021). The project was awarded to Sidalco Hydro Construction Limited with the Ghana Hydrological Service acting as the consultant for the project (Tsogbey, 2021). Further deliberations concerning the nature of the project led to a change in the original design, to factor in the construction of groynes owing to activism by fishermen during the course of implementation, to aid nourishment of sand for the fishermen along the coastline to berth their canoes and goashore and fish (ibid). The specifications of both the sea defence and groynes are as follows: The revetment extends from the Panbros area to the beach road, totalling 1.66km in length(1660m). The type of material used in construction includes igneous rocks and beach sand thatare transported to the site. The rocks used at the foundation level weigh approximately (0-500kg) (Tsogbey, 2021).

### 2.4 Theoretical Underpinning and Conceptual Framework

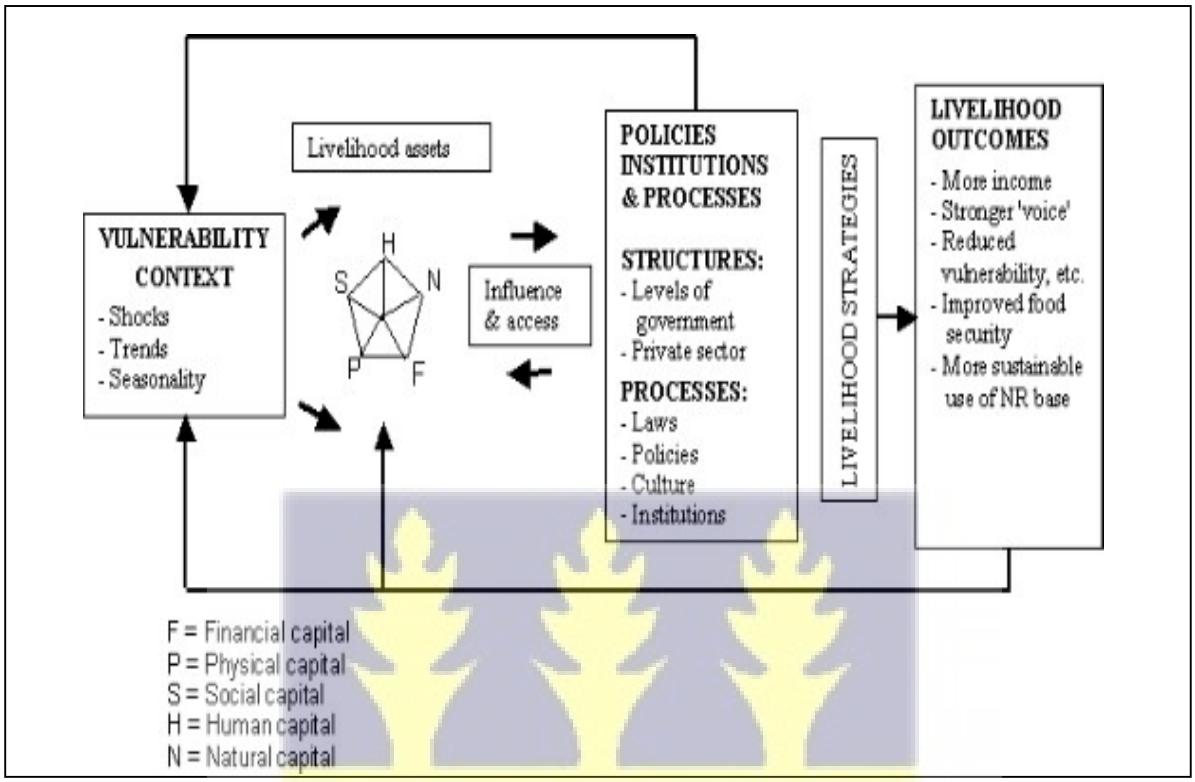
This section describes the theoretical underpinning guiding the study and provides an insight into the relevance of the Sustainable Livelihood Framework in assessing the effects ofprojects such as the DESDP on livelihood.

#### 2.4.1 DFID Sustainable Livelihood Framework

The study adopts the Sustainable Livelihood Framework, which focuses on understanding how various variables and initiatives impact livelihood outcomes, which empower individuals who rely on available assets for their well-being (Swiss Virtual Campus (SVC), 2013). The SLF, shown in Figure 2.3, is an adapted version of various livelihood theories and has been adopted by the Department for International Development (DFID) of the United Kingdom and has since

been used in different studies and projects to explain sustainable livelihood approaches (Mensah, 2012).

Figure 2.3: The DFID Sustainable Livelihood Framework




Source: United Kingdom Department for International Development (DFID), 2001

### 2.4.2 The Livelihood Asset Pentagon

The asset pentagon represents the different assets that are important in pursuing sustainable livelihood and enable people to have access to more livelihood options (Khan & Korbel, 2008). The pentagon consists of five major capitals (United Kingdom Department for International Development (DFID), 2001) which include social, physical, financial, natural, and human capital. Social assets include the establishment of networks and relationships that influence the livelihood options of citizens (ibid.). Physical assets include the properties and basic needs required to live, such as basic amenities (water, food, infrastructure, etc.) (Kollmair & Gamper, 2002). Financial assets include the monetary assets used in exchange for other assets. Natural capital includes the natural resources employed in the use of carrying out one's livelihood,

which include, water bodies and land. Human capital refers to the skills and capabilities that individuals have which enable them to safeguard their livelihood as a means of poverty alleviation. According to the framework, policies and institutions influence the allocation and distribution of capital assets (United Kingdom Department for International Development (DFID), 2001).

Livelihood assets refer to the main reserve of households and individuals usedin pursuing livelihood strategies. According to some scholars, livelihood assets have a major influence on what type of livelihood strategies to pursue (Wu et al., 2013), to earn monetary returns Chambers & Conway, 1992). The presence of some of these assets in Glefe such as fishing materials to fish with, and a navigable inner road will be instrumental in improving the livelihood sources such as fishing and trading as well as salt mining of residents in Glefe, as was in Keta (Mensah et al., 2020).

### 2.4.3 The Vulnerability Contexts

The vulnerability context refers to the external environment people live in and comprises of trends and shocks (United Kingdom Department for International Development (DFID), 2001). Trends refer to local or international recurring patterns recorded over time, which affect the pursuance of livelihood strategies (ibid.). Trends include natural hazards such as floods, droughts, earthquakes, and extreme heat waves occurring over time, changes in governance patterns, whilst shocks are the unexpected occurrences that can affect the external or internal environment, ranging from natural hazards to conflicts. Seasonality covers the period within which trends or shocks are experienced and includes changes in the prices of goods and services, as well as employment opportunities (Kollmair & Gam per, 2002; United Kingdom Department for International Development (DFID), 2001).

### 2.4.4 Institutions, Policies, and Processes

This component highlights the role of the necessary institutions, organisations, policies, and legislation in the context of livelihood, and establishes the results to be obtained from adopting a particular livelihood strategy, based on the access to various assets within the livelihood asset pentagon. This aspect of the framework is also referred to as 'transforming structures and processes' (Department for International Development, 1999). Structures refer to the organisations and institutions that are involved in the setting and implementation of policy and legislation, which have an indirect or direct effect on livelihood. The inadequacy or nonexistence of structures can affect the realisation of the Sustainable Development Goals (SDGs) and resilient livelihood (United Kingdom Department for International Development (DFID), 2001).

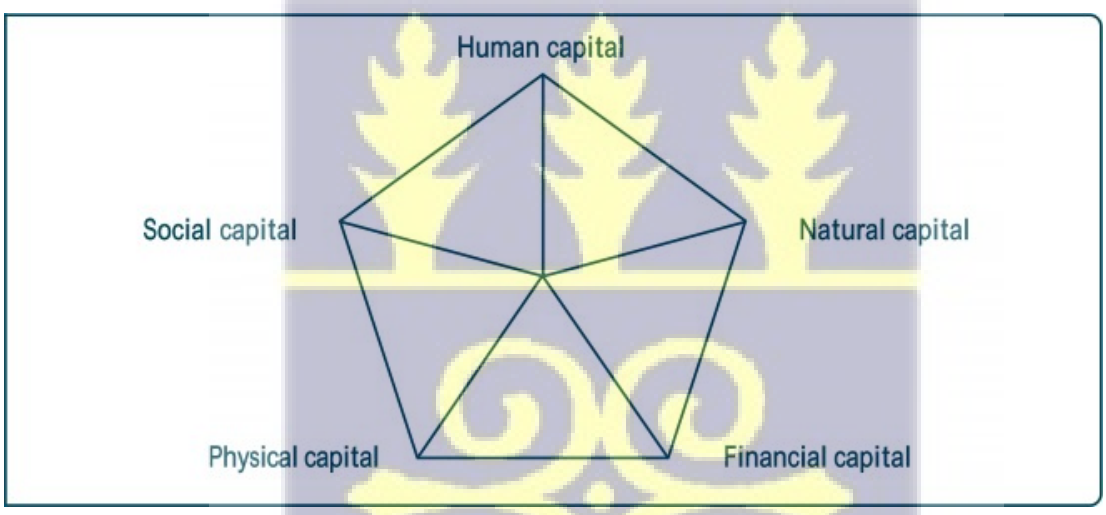
## 2.5 The Effects of Sea Defences on Livelihood Assets

Livelihood assets are the main reserve of households and individuals. According to some scholars, livelihood assets have a major influence on what type of livelihood strategies to pursue (Wu et al., 2013), and to earn a living out of them as well (Chambers & Conway, 1992). In the case of the Dansoman Sea Defence Project, where the goal is to protect and stabilise the beach front (Ministry of Works and Housing, 2019), it becomes relevant to probe into how it can affect their livelihoods, and the dynamics that come to play with this effect. The effects of a project on livelihood assets can be positive or negative in many instances with active case found in studies conducted by Dogbey (2015), where personal livelihood assets and strategies were negatively affected due to the construction of the Keta Sea Defence Project.

Some residents lost livestock and land, whilst others who earlier engaged in salt mining (a major economic activity) were left jobless after the dredging of the Keta lagoon (Dogbey, 2015). Another study conducted by Mensah et al. (2020) also opined that the construction of

the Keta Sea Defence Project had both negative and positive effects on livelihood. The highlighted positive effects ranged from '…provision of social services and infrastructure development in the Kedzi and Vodza-Adzido communities' (Mensah et al., 2020, p. 158). The negative effects uncovered because of the study also included '…inadequate housing units, loss of viable fishing activities, loss of ownership of reclaimed lands to the government, landlessness, inability to save and difficulty to access credits' (ibid.). To put these effects in context, the various livelihood assets that can be affected in each area/household are explained using the asset pentagon from the DFID sustainable livelihood approach framework (see Figure 2.4).

Figure 2.4: The DFID Livelihood Assets Pentagon




Source: (United Kingdom Department for International Development (DFID), 2001, p. 17)

### 2.5.1 Human Capital

The implementation of projects influences the quality of human capital and the number of persons involved in pursuing a particular livelihood strategy. This is based on a range of factors as these projects may affect education, health status and the drive to actively engage in the labour market to appreciate one's standard of living. In the Bui dam scenario, residents were generally satisfied with resettlement resulting from the implementation of the dam project as it

meant, ready access to health centres, meaning an improvement in their human capital to continually engage in agriculture, which was a major source of livelihood (Amankwah et al., 2020).

A project can also displace human capital or attract and improve labour (based on the experiences or the part a person plays in the whole process). In rural fishing scenarios, labour skills may depend on how far a fisherman can go up the shore, and the type of activity one is actively involved in such as net mending, pulling the catch onshore, marketing the catch to fishmongers and consumers at the beach or mending canoes or fishing boats for instance. Obstruction of access to human capital may therefore pose a challenge. Human capital embodies qualities such as skill, knowledge, and overall traits that an individual possesses to ensure holistic well-being for quality of life (United Kingdom Department for International Development (DFID), 2001). Achieving this state of development through sustainable livelihood is thus hinged on one's human capital. In assessing human capital, education also plays a major role as the level of education and skill may affect the individual's chance of improving their livelihood strategies to sustain well-being, thus the tendency for a project to hamper the education of persons active in a particular livelihood strategy would not be an ideal scenario in many cases (Dehghani et al., 2018). A study conducted by Dehghani et al. (2018) in Iran also reveals the role of livelihood assets on livelihood strategies, and bears credence to how assets (particularly human assets) such as education and labour inform the choice of livelihood strategies adopted by a household. (See Figure 2.5).

Figure 2.5: Comparison of livelihood assets explanatory variables among livelihood clusters

Comparison of livelihood assets explanatory variables among livelihood clusters.

| Variables | Livelihood strategies | | | ANOVA test |
|---|---|---|---|---|
| | Commercial (75)[A] Mean (SD) | Mixed (56)[A] Mean (SD) | Fishery/Livestock (81)[A] Mean (SD) | |
| *Human assets* | | | | |
| Education of HH (year) | 9.16 (4.146) | 6.54 (4.138) | 3.16 (3.088) | 49.553*** |
| Education of total HMs (year) | 8.33 (2.735) | 6.38 (3.276) | 5.48 (2.017) | 23.137*** |
| Labor (number) | 2.48 (0.777) | 2.34 (0.721) | 3.12 (1.354) | 12.069*** |

Source: (Dehghani et al., 2018)

According to the results from the regression, Dehghani et al., (2018) stated that there was a significant relationship between the level of education measured in years and the strategies adopted, showing that continuous education and skill polishing is relevant. Persons engaged in commercial livelihood had higher levels of education as compared to the fisherfolk/livestock. Members of households with commercial livelihood strategies, therefore, had triple the rate of education as compared to fishermen. With larger employment of family labour in fishing, the assumption is that the labour force may easily engage in the family business of fishing (Dehghani et al., 2018).

### 2.5.2 Financial Capital

These are the fiscal assets available, and mechanisms that are employed by persons to enable them to attain their livelihood goals (Swiss Virtual Campus (SVC), 2013). These may be dependent on the regularity of inflow and available stock resources as well. Improved access to financial capital and assets would therefore go a long way to enhance livelihood expansion and improvement, as the more capital injected, the more yield can be realised (United Kingdom Department for International Development (DFID), 2001). In instances where financial compensation is given out as part of implementation requirements and compensation,

livelihoods are sustained (Dogbey, 2015). These assets range from credit and compensation facilities, and savings as well. Financial capital also includes how much those employed within a particular industry can accumulate their savings to raise capital for re-investment in the short to medium term and long run (Department for International Development, 1999). The tendency for a project to affect the income and returns of persons engaging in a particular strategy can therefore be closely linked to a person's overall financial capital (Kollmair & Gamper, 2002).

Financial assets refer to the overall stock (cash, bank deposits, remittances) and flows (including state funding) that enhance the ability of individuals to re-invest and exercise control over their consumption and purchasing power (United Kingdom Department for International Development (DFID), 2001). The relevance of financial capital in safeguarding livelihoods and ensuring poverty alleviation cannot be underrated as it goes a long way to dictate the national and local political decisions of individuals (United Kingdom Department for International Development (DFID), 2001).

### 2.5.3 Physical Capital

As with other essentials for human survival, physical capital is of immense relevance to structuring and safeguarding the livelihood of persons, and this cannot be tossed aside when it concerns coastal livelihoods. The physical capital of any place refers to the infrastructure, goods and possessions that are relevant to advance one's livelihood and eventually improve their well-being (United Kingdom Department for International Development (DFID), 2001). Physical capital is available to serve communities and enhance the transportation of goods and services across towns. Physical capital can range from bridges, communication networks, roads, electricity, sanitation facilities and sewerage. Physical capital equally plays an important role in modifying the overall system to help individuals meet their needs and increase productivity whilst enhancing satisfaction (Nxumalo & Antwi, 2013). The provision and

improvement in the access to these assets, empower and enable those often regarded as poor to attain their livelihood objectives.

### 2.5.4 Social Capital

Every society thrives on relationships and institutions that give them an added advantage in ensuring productivity. The definition of social capital has according to Keeley (2007), often been attributed to author Lyda Hanifan, who referred to it as "those tangible assets [that] count for most in the daily lives of people: namely goodwill, fellowship, sympathy, and social intercourse among the individuals and families who make up a social unit" (Hanifan, 1916, as cited in Keeley, 2007: 102). Keeley (2007) simplifies this definition by referring to it as 'the links, shared values and understandings in society that enable individuals and groups to trust each other and so work together' (Brian Keeley, 2007, p. 102). In many close-knit societies, bonds and links go a long way in improving cohesion and livelihood strategies (United Kingdom Department for International Development (DFID), 2001). Coastal communities are dependent on the bonds they share as it takes several people to go ashore and pull the catch onto the beachfront for buying and selling to take place and even sell fish to fish mongers/mothers (Casali, 2018; Quagrainie & Chu, 2019). This does not happen only with the fishermen, but can also with the traders along the coast, as they tend to provide a diverse range of services to their consumers. Traders along the coast as with many communities have more customers when they have stronger bonds with the people around their area of operation.

There are a variety of concepts that are regarded as forms of social capital and include bonds, bridges, and linkages (Aghladze, 2017). Bonds are the connection people feel because they have a 'common sense of identity'. This is close-knit and can be used to refer to groups such as family, and persons within a particular ethnic group (Aghladze, 2017). This type of existing bonds may however be detrimental if they cause groups to exist as outliers within the broader

society, which makes it important to have bridges. These bridges denote the interactions that exist between persons with common identities and persons outside of their immediate groups. These enable groups to extend their relationships beyond having a common binding factor. Ensuring that people can relate to others at all strata of society to build more cohesion to improve capital, this idea is referred to as linkages (Ostrom, 1999; United Kingdom Department for International Development (DFID), 2001). These intangible connections are developed through 'networks and connectedness, membership of more formalised groups and relationships of trust, reciprocity and exchange' (United Kingdom Department for International Development (DFID), 2001, p. 21) can improve the income of persons as they maintain close-knit relations and enhance the maintenance of shared resources for better outcomes. Social capital is also important in the management and maintenance of common resources as it can make an important contribution to the well-being of individuals (Ostrom, 1999).

### 2.5.5 Natural Capital

Natural capital is used to describe the 'the natural resource stocks from which resource flow and services (e.g., nutrient cycling, erosion protection) useful for livelihoods are derived'(United Kingdom Department for International Development (DFID), 2001, p. 21) Natural capital may be intangible, such as the atmosphere and sunlight, or may be in the form of tangible assets such as land, the sea, and trees. The benefits derived from natural capital can be both direct and indirect as it may lead to a tangible increase in income, or improvement as well as protect human capital from adverse effects in pursuance of sustaining livelihood (ibid). The natural capital and the vulnerability context within the Sustainable Livelihood Framework are closely related, as there is a higher reliance on natural resources as a source of livelihood, which is prone to shocks that can destroy the livelihoods and the natural capital of an area.

The economic returns obtained from the partial and complete reliance on natural capital in developing countries through activities such as fishing, farming, and mining over the years contributed to maintaining a stable income, food, and other services (United Kingdom Department for International Development (DFID), 2001).

It must however be noted that the presence of useful natural capital does not fully mean it will be beneficial to the people around it. What matters is the quality of the state and its accessibility (Carney, 2003). When it comes to further gaining access to natural capital, the United Kingdom Department for International Development (DFID) recommends considering the following: (i) Which groups have access to which types of natural resources; (ii) The nature of access right; (iii) Conflict over the resources or security right; (iv) How productive is the resource; (v) How the resource is affected by the externalities etc. Natural capital when analysed and utilised can go a long way to promote the livelihoods of the people (United Kingdom Department for International Development (DFID), 2001).

### 2.6 The Effect of Sea Defence on Livelihood Outcomes

Livelihood outcomes are the rewards obtained from engaging in an activity as a means of livelihood (United Kingdom Department for International Development (DFID), 2001). These achievements range from improved income, improved well-being, and reduced vulnerability to shocks and trends (Mensah, 2012). Outcomes also represent the extent to which persons are willing to go, and further aid in understanding why key stakeholders pursue certain policies and implement particular projects (Knutsson, 2016). Livelihood outcomes can be sectioned into different outcomes which inform the choice of variables employed in conducting this study. These livelihood outcomes include:

### 2.6.1 Improved Income

The monetary returns to engaging in a means of livelihood is a major source of income for most households and individuals. These improved net returns to strategy in monetary terms are often linked to attaining economic stability in most households (International Recovery Platform & United Nations Development Programme, 2010). People, therefore, tend to engage in livelihood strategies to improve income levels.

### 2.6.2 Improved Well-Being

This involves valuing non-monetary returns to livelihood strategies. A sense of improved well-being, access to basic services, political freedoms, and protection of the cultural heritage of people in households and communities are a few of the desirable livelihood outcomes under enhanced well-being that can affect all aspects of the lives of people (Kollmair & Gamper, 2002).

### 2.6.3 Minimise Vulnerability

In most cases, local livelihoods are adversely affected by shocks and trends, which disrupt the daily activities of both individuals and households (United Kingdom Department for International Development (DFID), 2001). The ideals of the various structures and processes which include the strategies adopted should lead to minimising vulnerability in the long run, such that livelihoods are sustained and not left to be at the mercy of shocks and trends (ibid).

### 2.6.4 Food Security

Access to food for sustenance is a basic necessity the world over (Food and Agriculture Organization, 2008). Food security as an outcome remains a major focus for households, national and international institutions such as The Hunger Project and The World Food Programme. As an outcome of sustained livelihood, access to nutrient-packed food in the right proportion and variety is an important factor in ensuring that human capital, for example, is

strong and healthy enough to participate in various activities (United Kingdom Department for International Development (DFID), 2001).

### 2.6.5 Environmental and Project Sustainability

This is to ensure that the resources that are dependent on assets for livelihoods are reasonably used in a manner that does not jeopardise the ability of future generations to have access to them. Ensuring that resources are not depleted, creates a safe and habitable environment and space for replenishment and nourishment in the long run, which accords persons an opportunity to engage in livelihood strategies over time (United Kingdom Department for International Development (DFID), 2001). Livelihood outcomes vary as various classes may have different ideas of what these outcomes of a project affecting the livelihoods of persons should be (United Kingdom Department for International Development (DFID), 2001). To establish specific outcomes outlined by the DFID sustainable livelihood framework, it is important to draw out the needs of the household, including all persons who may be affected directly or indirectly by the institutions, policies, and processes at play in implementing a project. This must also include clear statements of the indicators that will be used to measure these outcomes, keeping in mind the complex nature of behavioural choices and ideals along the lines of age, gender, and power dynamics within a society (Kollmair & Gamper, 2002).

## 2.7 Effect of Sea Defence on Livelihood Strategies and the Adoption of Alternative Livelihood Strategies

According to DFID (2001), livelihood strategies are the choices readily available to people, that determine how they make a living. Livelihood strategies cut across both productive and reproductive decisions people make to reach their livelihood goals. The strategies adopted are strongly linked to how readily available and accessible the necessary assets are and can have a

direct or indirect positive or negative impact on the overall attainment of livelihood goals (United Kingdom Department for International Development (DFID), 2001). Examining the choice of a strategy should be viewed as a process, as it follows a logical order and also as being dynamic, as strategies are subject to change over time (Mensah et al., 2020). The dynamic nature of livelihood strategies means that they may differ, depending on factors such as the geographic area, sector, type of household and its unique characteristics (ibid). Livelihood strategies can also differ over time based on accessibility, returns to investment, and the underpinning reason for employing a strategy, or the needs of persons at a given time. Livelihood strategies are therefore subject to change and depend on the consolidation of a range of choices (United Kingdom Department for International Development (DFID), 2001).

### 2.7.1 Influence of Access to Assets on Livelihood Strategy

Access to particular or different livelihood assets influence the choices people make regarding what livelihood strategy to employ as different activities require different assets. Labour-intensive activities require access to and availability of human capital and skill development as a primary asset, whereas infrastructure-intensive strategies would require availability and access to physical capital, financial capital, and human capital for instance (Kollmair & Gamper, 2002; United Kingdom Department for International Development (DFID), 2001).

### 2.7.2 Influence of Sea Defence Projects on Livelihood Strategy

Sea Defence projects influence the pursuance of a livelihood strategy. These effects can lead to a total loss of pursuing a particular livelihood strategy, or lead to persons pursuing an alternative livelihood strategy to realise their goals for pursuing livelihood strategies. It is therefore important that these coastal resilience projects factor in the differential effects to livelihood and where the nexus lies between livelihoods effects and gender. A study conducted by Adikah et al. (2020) shows that after the construction of the Keta Sea Defense Project (KSDP) there was a decline in the percentage of residents engaged in fishing (from

61.9% to 33.3%), an increase in the percentage of residents engaged in trading (from 14.2% to 20.9%) and an increase in the percentage of persons pursuing farming (from 5.9% to 23.9%).

Table 2.3: Sources of livelihood for respondents before and after the sea defence

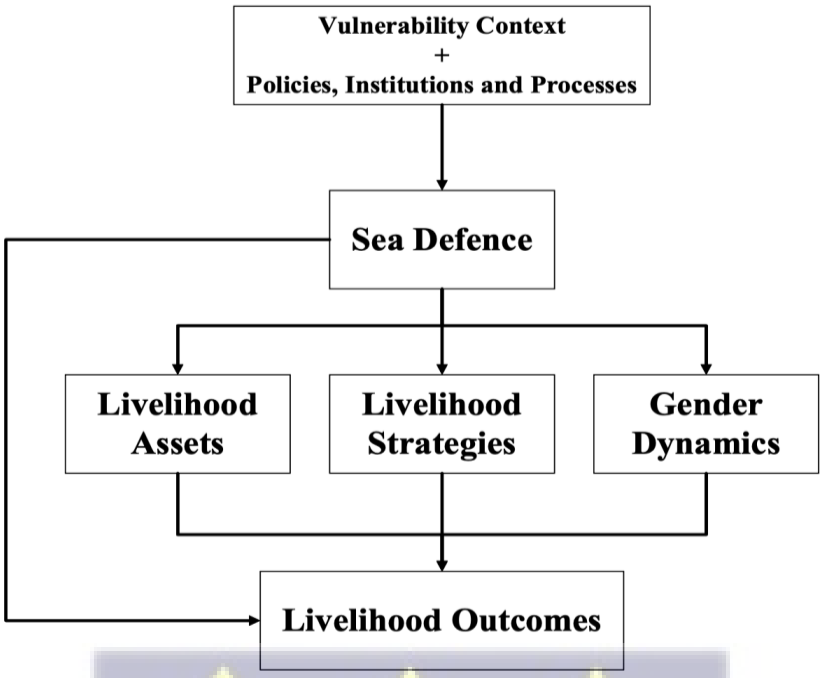
| Livelihood Source | Before (%) | After (%) |
|---|---|---|
| Fishing | 61.9 | 33.3 |
| Trading | 14.2 | 20.9 |
| Farming | 5.9 | 23.9 |
| Civil/Public Service | 11.4 | 11.4 |
| Artisanship | 6.6 | 10.5 |

n = 182
Source: (Adikah et al., 2020)

## 2.8 Conceptual Framework for the Study

The Sustainable Livelihood Framework has been applied to study people's livelihood, especially in deprived communities. The framework (see Figure 2.6) thus aids in understanding the main factors that influence how people make a living and how these factors are interconnected. The framework is therefore people-centric, and promotes qualitative and participatory research methods, ensuring active engagement of individuals, and further informs the recommendations, tailored to their specific needs. This adapted framework also clarifies the relationships between institutions, policies, processes, community vulnerabilities, livelihood assets, strategies, and outcomes.

Figure 2.6: The Conceptual Framework




Source: Adapted from the DFID Sustainable Livelihood Framework (DFID, 2001)

The use of the sustainable livelihood method is widely adopted in development-related research, serving as a tool to understand livelihoods in relation to poverty. The DFID Sustainable Livelihood Framework is regarded as critical for analysing low-income livelihoods and addressing relevant issues (DFID, 1999). The adapted framework demonstrates how the vulnerability context, existing policies, institutions, and processes influenced the construction of the Dansoman Emergency Sea Defence as a resilient infrastructure. This construction, in turn, impacts livelihood assets, strategies and outcomes, with variations based on gender dynamics. The framework facilitates understanding the relationship between policies, institutions, processes, the vulnerability context driving sea defense construction, and its subsequent effects on livelihood strategies, assets, and outcomes. This analysis considers the background characteristics of Glefe residents and gender dimensions at play.

# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.0 Introduction

This chapter discusses the profile of the study area, the methodology to be employed for data collection and analysis regarding how the construction of a sea defence structure affects livelihoods, with special reference to the socio-demographic characteristics of respondents and ascertain the gender dimensions at play. It also considered the research design, sources of data, respondents and sample size, sampling technique, instrumentation, and data analysis technique.

## 3.1 Profile of the Study Area

Glefe is a small but densely populated and old fishing community located in the south-western part of Accra, along the coastal belt of the Gulf of Guinea at Latitude 5º19'5" N and longitude 0º6'0" W (See Figure 3.1). It is within the jurisdiction of the Ablekuma West Municipal Assembly (ABWMA), with a population of about 8,738 (GSS, 2012) Glefe is sandwiched between two lagoons, namely Gbugbe and Dzatakpor (Amoani et al., 2012; Larbi, 2017; Tasantab et al., 2020).

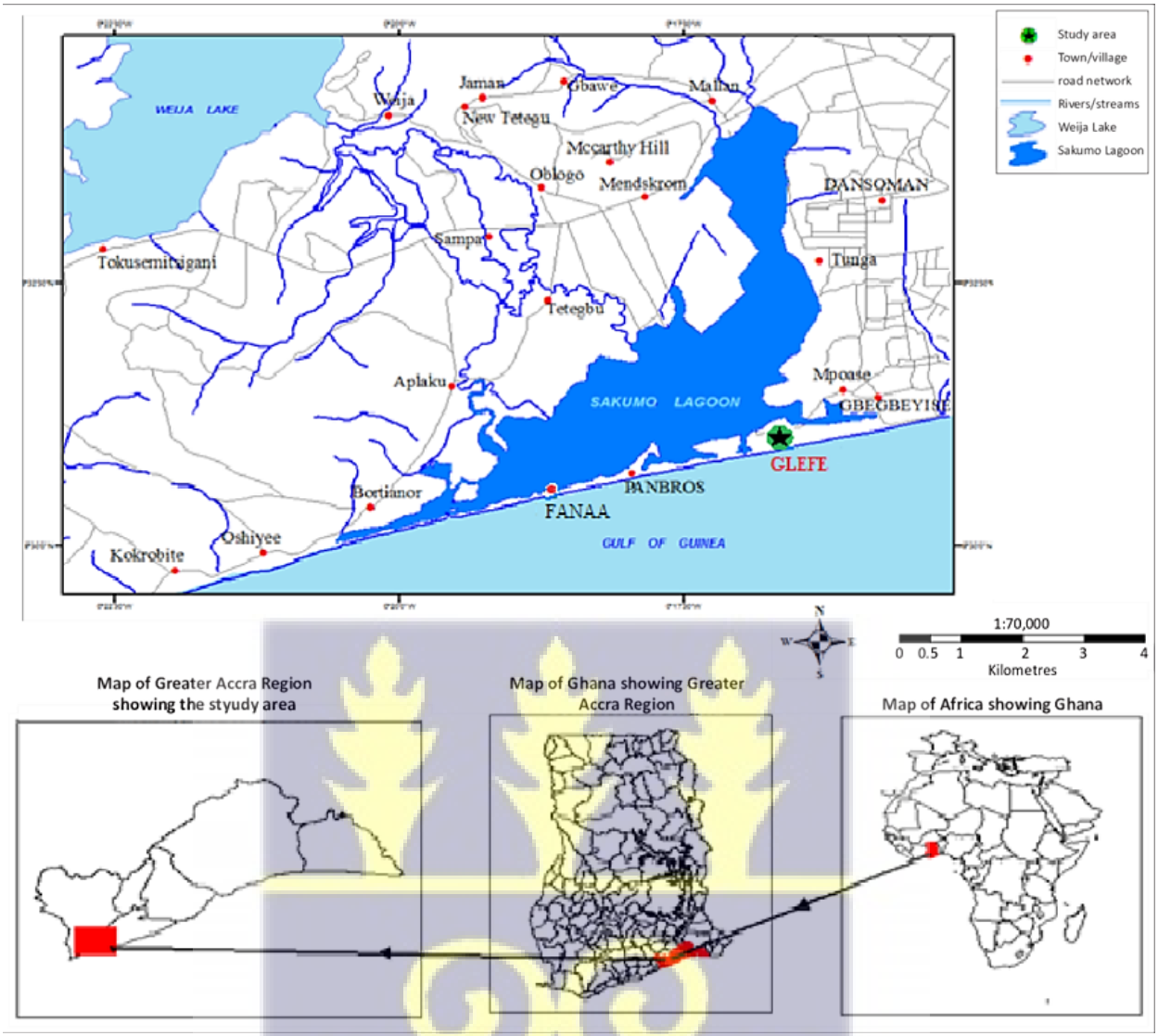
The settlement was defined by the Accra Metropolitan Assembly (AMA) as a largely informal settlement and the residents of Glefe include the indigenes, market queens, other ethnic-based group leaders as well as the Assemblyman and traditional leaders. The main economic activity engaged in, by the residents of Glefe is fishing, due to the presence of the sea and lagoons (Amoani et al., 2012). The local governance system in Ghana has vested power in the Assemblyman of the community to represent the people under the Metropolitan Assembly

system and plays a critical role in community development (Institute of Local Government Studies, 2010).

The Glefe area was previously under the Accra Metropolitan Assembly until 2012 when it was delineated under the Ablekuma West Municipal Assembly (ABWMA) after the ABWMA was carved out of the AMA (Ablekuma West Municipal Assembly, 2020). Glefe's population is discussed considering data from the 2010 population and housing census, during which period, the settlement was captured under the Accra Metropolitan Assembly which then had a population of 1,665,086. It is also worth noting that, the Ablekuma West Municipal Assembly, which Glefe falls under, currently has a population of 153,490 of which 73,879 are male, and 79,611 are female (Ghana Statistical Service, 2021).

Data from the census also shows that only 3% of residents aged 3 years and older had completed tertiary education at the time of the census in 2010, and also pointed out that, 71% of dwellings in Glefe were constructed using concrete/cement blocks for the walls andslate/asbestos and metal roofing sheets in Glefe (Møller-Jensen et al., 2020). In terms of occupation, the working paper by the Department of Geosciences and Natural Resource Management (IGN), University of Copenhagen, shows lower rates of residents who had completed higher education and worked in higher-ranking jobs. The study brought to light, thehigh population of 45% of low-income earners who were mainly self-employed or employeesearning a low wage. These ranged from persons engaged in Agriculture (fishing, farming), petty trading, and vehicle operators. The Glefe settlement is also home to one of the largest salt-production industries in West Africa, Panbros Salt Production Limited (Møller-Jensen, Maya Agergaard et al., 2020)

Figure 3.1: A map of the study area, Glefe




Source: Oteng-Ababio M., Owusu K. & Appeaning-Addo, K., 2011,

Glefe is considered an informal settlement, due to the unplanned and irregular distribution of buildings in the area because of rapid urbanisation growth in recent times. In addition, the proximity of houses littered along the open coastline to the sea makes the township highly flood prone (Amoako, 2017). The community is also located within a low-lying area which levels the area against the water bodies that surround it (Larbi, 2017). Coastal erosion has plagued Glefe for years and has affected the fishing business, caused havoc to property and inthe process, left the residents in a state of emergency (Amoani et al., 2012).

### 3.2 Research Design

This study employed a mixed method research design by combining features of both quantitative and qualitative research to analyse the effects of the construction of the DESPD on the livelihood of residents in Glefe. The research design was chosen since it complemented the theoretical underpinning of the research and was key in providing insight into the lived experiences of the residents, based on the effects of the DESDP on their livelihoods. The mixed methods research design in this study, is further opted for, as an approach to inquiry given that, it combines both qualitative and quantitative forms. The quantitative research feature involved the collection of numerical data to establish trends, patterns, and relationships between the variables under this study. The quantitative research element was however balanced with elements of qualitative research design to capture the lived experiences,sentiments, and opinions of the study population, which the quantitative element will otherwise not draw out (Creswell, 2019). The use of the mixed method also aided the researcher to present a comprehensive analysis of the research problem - The effect of the DESDP on the livelihoods of residents of Glefe (Teye 2012; Creswell, 2009). The qualitative element, was therefore, buttressed with the data collected for quantitative analysis to help minimise any shortcomings that can crop up when only the quantitative or qualitative is used (Merriam, 2009). Thus, each approach complements the strengths and weaknesses of the other thereby increasing the validity of the research findings (Teye 2012, Bryman, 2007; Creswell 2009).

### 3.3 Sources of Data

Both primary and secondary sources of data were used in this study. This research relied on primary and secondary data sources as a way of ensuring that the research gives a narrative that is grounded in literature and not riddled with factual errors. The primary data source was obtained using questionnaires and interview guides. Secondary data was collected from

appropriate data sources, both published and unpublished, ranging from books, verbal narrations, maps, and policy documents. Some of these published texts are available in hard copy and soft copy versions online. Secondary data was employed in this research to establish the theoretical context of this research.

### 3.4 Study Population and Sample Size

Data from the 2021 census with specific population characteristics are currently unpublished, but a population projection of the delineated study zone within Glefe is perked at 4,272, which is an approximation drawn from an aerial count conducted by the researcher using a drone, complemented with a walk through the study areas delineated zones, and ascertained to approximation using the Count App to count the number of houses from a google image of the study area. The buildings identified as commercial buildings were then removed from the count to provide the approximated number of houses within Zone A and Zone B. The total count provided approximately 1,068 houses (647 houses in Zone A and 421 houses in Zone B) this figure was obtained and multiplied by the average number of persons per house, four (4). This population of 4,272 (2,588 for Zone A and 1,685 for Zone B) is what was therefore used as the sample study population, from which the list of respondents was drawn from.

The research population for this study had both the quantitative study population and the qualitative study respondents. The quantitative sample size was calculated using the Yamane (1967) formula. The sample size was the residents of Glefe culled from the projected population from the counting conducted by the researcher. Given that the research population studies a group of people who are a subset of a given general population but have similar characteristics such as geographic location, age, and sex (Banerjee & Chaudhury, 2010), residents of Glefe under the Ablekuma West Municipal Assembly were the research population.

The quantitative sample size for this research was calculated using Yamane's (1967:886) formula stated as n=N / [1 + N (e) $^{2}$], where 'n' denotes the sample size, 'N' denotes the projected population size (being residents aged 18 years and above) and 'e' signifies the error margin or significance level. With a projected population of 4,272 (GSS, 2012), and an error margin of 0.10, the sample size for this study using the Yamane (1967) formula equals 98 respondents (approximated from 97.7), 20% of the number of respondents was added to account for attrition, bringing the total number of respondents to an approximated number of 120 for the quantitative aspect of the study.

The respondents under the qualitative research included the NADMO officer from the Ablekuma West Municipal Assembly, the Assemblyman of Glefe, and the assistant project consultant who doubles as the site surveyor in charge (for Sidalco Construction Limited), bringing it to a total of three (3) respondents considered as key informants, who were interviewed using the interview guide. two (2) focus group discussions of eight respondents each (consisting of fisherfolk and traders), was also conducted under the qualitative study.

### 3.5 Sampling Procedure and Data Collection Methods

This study employed simple random sampling for questionnaire administration under the quantitative data collection and purposive sampling to conduct the key informant interviews and focus group discussions (see Table 3.1) for the qualitative data collection.

The respondents for the questionnaire administration were chosen based on the following criteria;

1. Respondents should have lived in Glefe for a minimum of eight (8) years. This is to ensure that the respondents lived in Glefe for at least a year before the construction of the DESDP and were present during the construction, which was seven (7) years, making a total of eight (8) years.

Respondents should have attained a minimum age of 26 years. The justification for this minimum age requirement is to ensure that respondents were at least 18 years as at the time of the implementation of the project in 2015 plus a year after construction, i.e., eight years (8) from 2015 to 2022.

2. The research study area stretches from the Panbros-Glefe border to the Royal Hospital) and extends toward the Glefe transformer, and approximately 260 metres from the DESDP and on the main Gbebu Road, were grouped into two (2) major zones (A and B). Zone A stretches from the DESDP to First class Commey which is about 130 metres from the DESDP site and Zone B extends from First class Commey to the Glefe Transformer.
3. The starting point for the administration of questionnaires was from the Panbros/Glefe border, and every 9th house after the start point within Zone A and B, this is to ensure a fair distribution of respondents and ensure equal distribution of the questionnaire. Considering the projected number of houses being 1,068 for every 9th house, covering approximately 120 houses to reach the number of respondents needed to participate in the study.

The questionnaires were administered as follows; 60% of the 120 questionnaires, making a total of 72 questionnaires were administered to residents within Zone A, based on their proximity to the DESDP, and the remaining 40%, making a total of 48 questionnaires, were administered to residents in Zone B, since they were slightly farther away from the DESDP but have equally experienced the effects of coastal erosion.

For the qualitative aspect of this research, purposive sampling was employed in line with the criteria outlined above, as it allowed the researcher to gain a better understanding of the lived experiences and sentiments of participants concerning the study by selecting specific

respondents with expertise and knowledge (Wendy et al., 2018) on sea defence techniques, fishing and trading and governance. This also enriched the findings and enabled the researcher to speak to facts and data backed by credibility, as the key informants to be interviewed are regarded as experts for the key informant interviews. The selected residents with first-hand experiences also provided an insight into their lived experiences through the Focus Group Discussions (Gary, 1990).

Table 3.1: Sampled Distribution of Respondents and Instruments used

| Data Collection Methods | Sample Size | Instrument |
|---|---|---|
| Survey | 120 | Questionnaire |
| Key-Informant Interview | 3 | Interview Guide |
| Focus Group Discussion | 2 | Focus Group Discussion Guide |

Source: Author's Construct, (2021)

The quantitative data collection aspect involved the administration of 120 questionnaires, and the qualitative aspect included three (3) key informant interviews and two (2) focus group discussions of eight respondents (consisting of fisherfolk and traders) each, to collect primary data directly from the respondents.

The questionnaires under the quantitative data collection, constituted close-ended questions and were hosted and administered using the Kobo Collect App. The interview and focus group guides were structured but remained open-ended. Each interview session was voice recorded and supplemented with notetaking based on the context of the interview, as recording an interview allows a researcher to pay attention to the respondent and pick up salient points to ask probing questions where need be (Bryman, 2012). The focus group discussions were preferred, as the lived experiences of respondents were noted by the researcher to support the

statistical data garnered from the quantitative data collected (Bhattacherjee, 2012). The questionnaire provided data to analyse relationships between the variables under livelihood, delineated under the study as well (Creswell 2009). The questionnaire and focus group discussions were conducted in English, but translated into Ga, Twi, and Ewe where necessary, owing to the wide array of ethnic backgrounds of residents in Glefe noted from field visits.

### 3.6 Data Analysis and Interpretation

The data obtained from the quantitative data using questionnaires were analysed with descriptive statistics to define and establish the relationship between the construction of the sea defence and livelihood, as well as the background and gender dimensions of livelihood that come to play with the construction of the DESPD. The qualitative primary data obtained was manually transcribed and narrated within the thematic context with central themes linked to the objectives of the study. The thematic analysis was relevant in analysing qualitative researchdata to detect and establish the various themes that commonly appear within findings, makingit an organised analytical tool for reporting themes within qualitative data (Goodwin, 2010).

### 3.7 Limitations of the Study

This research specifically sought to assess the effects of the Dansoman Emergency Sea Defence Project on the livelihoods of persons in Glefe in the Ablekuma West Municipality, Ghana. The refusal of residents to participate in this study was a limitation. In the case where a respondent refused to participate, the respondent was replaced to address the limitation. Furthermore, census data accessibility for data on the population and demographic data of Glefe also proved a major challenge.

### 3.8 Ethical Consideration

As a measure of good research practice, data was not forcefully obtained, respondents were not taken advantage of, personal views that were explicitly stated off-record were not included without consent, and the purpose of this study was fully explained and translated where necessary to respondents and participants to ensure good practice and obtain consent. The data that was acquired was cross-checked with respondents for confidentiality and validity as well (SRA., 2003). The research thus obtained the consent of respondents before any questionnaires were administered or interviews conducted, to ensure the protection of the respondents listed in this study from harm and ensure that a thorough evaluation of responses was done to maintain confidentiality. During transcription, pseudo-names and generic names were used to replace the identities behind the recorded voices. Participation was also voluntary, and participants had the freedom to opt out of responding to questionnaires or participating in interviews and focus group discussions.

# CHAPTER FOUR

# DATA ANALYSIS AND DISCUSSION

## 4.0 Introduction

This chapter analyses and discusses the data collected based on the research objectives. The results are presented according to the demographic and background characteristics of respondents, the effects of the Dansoman Emergency Sea Defence Project Phase One on livelihood assets, strategies, and outcomes of residents in Glefe, and discusses the effects of the Dansoman Emergency Sea Defence Project Phase on livelihood along gender lines.

## 4.1 Demographic Characteristics of Respondents

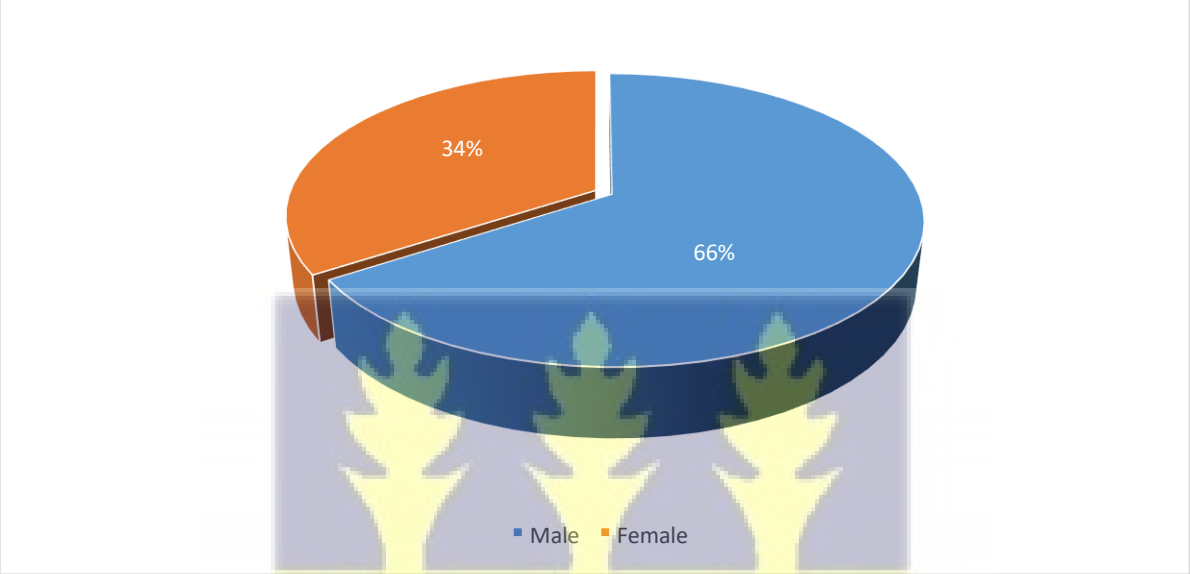
The researcher, for the study, probed into the following background and demographic characteristics of respondents as follows: sex, age, level of education, marital status, position in the household, occupation, number of children and dependents, number of years resident in Glefe, and house ownership status for analysis. In total, 120 respondents, partook in the study. These respondents were made up of fishermen (26%), traders (16%), civil servants (13%), private company workers (11%), unemployed persons (9%), fishmongers (6%) and employed in other occupations (19%) (informal jobs).

### 4.1.1 Sex of Respondents

The data on the sex of 120 respondents, show that approximately two in three respondents were male (66%) and 34% were females as shown in Figure 4.1. The findings denote that the gender composition of respondents are contradictory to the GSS (2014) report on the number of residents in the Accra Metropolitan Assembly which noted that the proportion of the female

population is rather higher (51.9%) than males (48.1%). It must be noted that this can be understood, since the study was focused on residents delineated within specific zones in Glefe, as opposed to the census data which is a collation of a larger data set from different sub-clusters of areas under the Accra Metropolitan Assembly.

Figure 4.1: Sex of Respondents



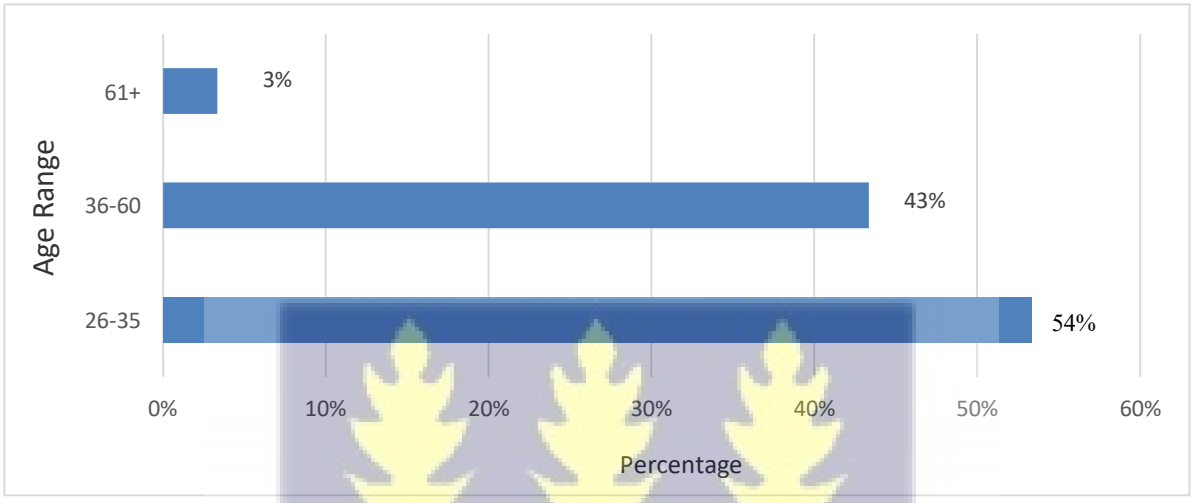

Source: Field data (2022) n=120

### 4.1.2 Age of Respondents

The age range of the 120 respondents for the study area was perked between 26 to 70 years. This age range is informed by the average delineated age specification of 26 years, with the base age being 18 years at the time of constructing the DESDP and an additional eight (8) years being the number of years the respondent has lived in Glefe before, during, and after the construction of the defence. The data on age was categorised into age ranges for analysis. This categorisation indicated that many respondents fell within the ages of 26 years to 35 years, representing 54%, with 43% being between 36 years to 60 years, and the remaining 3% aged 61+ years (Figure 4.2). The data shows that the majority of the respondents fall within the Organisation for Economic Co-operation and Development (OECD) classification of a

working age population, which is an important indicator in pursuing economic growth as it also guides how the labour force may be distributed, and understanding how it can influence the livelihood choices of individuals (ILO, 2022; Organisation for Economic Co-operation and Development, 2017).

Figure 4.2: Age of Respondents




Source: (Field data, 2022) n=120

Per the data obtained from the 120 respondents, an average age of 38.16 years was recorded. This denotes that the average ages collated were within a 10.57 standard deviation and therefore the distribution of age in the data collected is averagely closer to the mean.

Table 4.1: Age of Respondents

| Variable | Observations | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| **Age** | 120 | 38.15833 | 10.56552 | 26 | 70 |

Source: Field data (2022) n=120

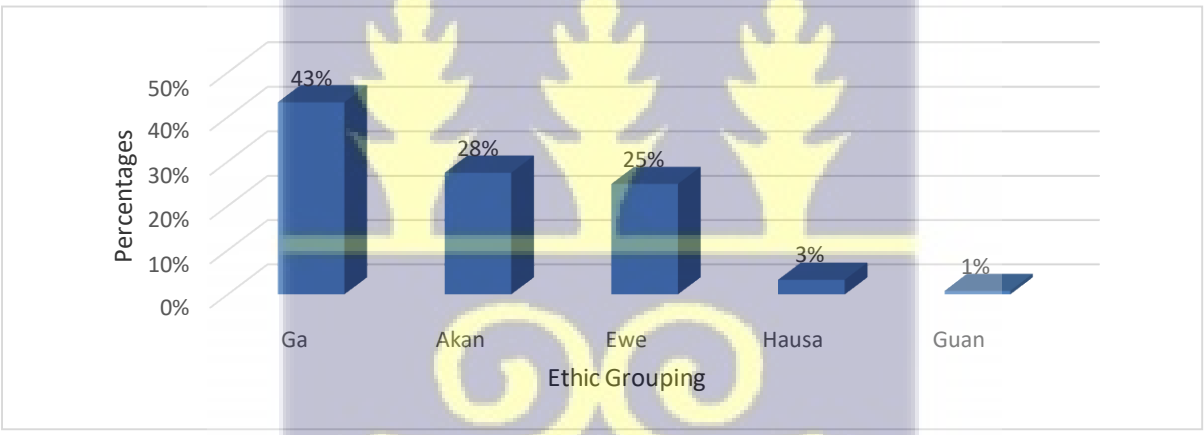
The age distribution of respondents in this study is in alignment with the findings in the GSS (2014) census report which present that the majority of the residents (i.e., 67.4%) in the Accra

Metropolitan Assembly were between the ages of 15 years to 60 years as well (Ghana Statistical Service, 2014).

### 4.1.3 Ethnicity of Respondents

The data on the ethnic groupings of representing the 120 respondents depict that a majority of the respondents were Gas. The data for ethnicity is presented as follows, Gas (43%), Akans (28%), Ewe (25%), Hausa (3%), and Guan (1%) (Figure 4.3). Glefe has been described as being made up of predominantly Gas, Akans, and Ewes with pockets of other ethnic groups being residents (Abeka, 2014; GSS, 2014).

Figure 4.3: Ethnicity of Respondents

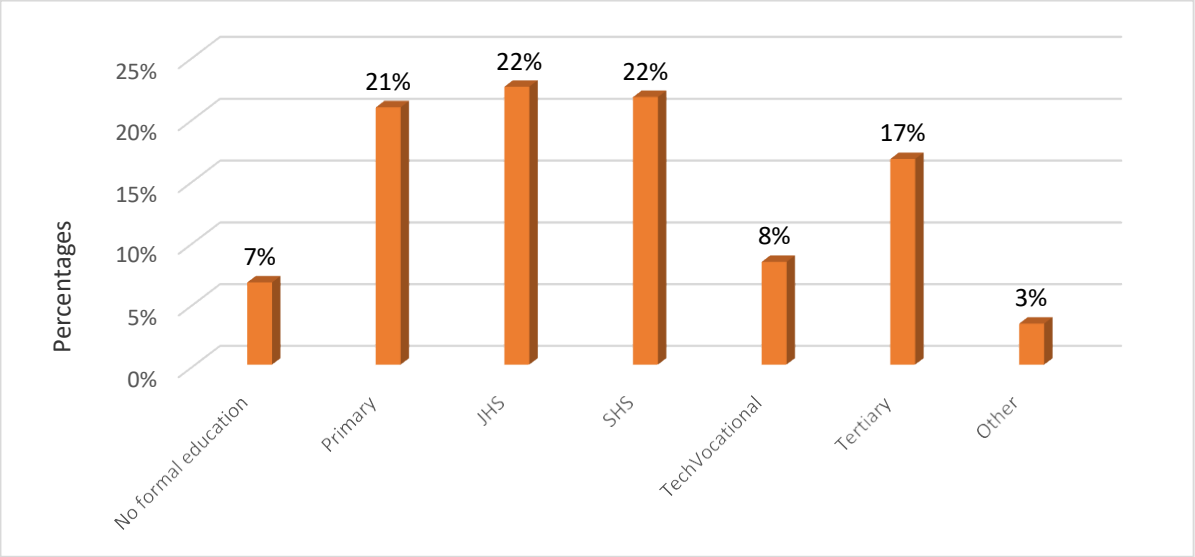



Source: Field data (2022) n=120

### 4.1.4 Level of Education

The level of education of respondents for this study shows that out of the 120 respondents, 7% had no formal education, 21% had completed Primary, 22% of the respondents had completed Junior High School (JHS), 22% had completed Senior High School (SHS), 17% had completed Tertiary education, 8% had received Technical and Vocational Training, and 3% had received training through apprenticeship (Figure 4.4) The responses generally show that the average level of education of the respondents was between Primary and SHS.

Figure 4.4: Level of Education of Respondents



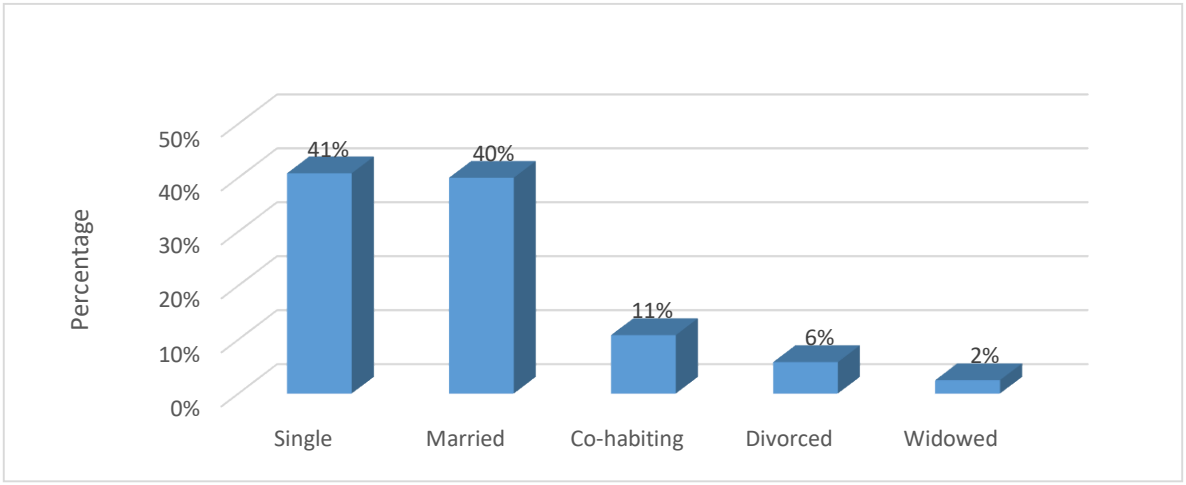

Source: Field data (2022) n=120

The relevance of education of persons in coastal communities cannot be underestimated. The responses show an alignment with data on education from the GSS (2014) data, which shows that the general population within the AMA has a higher percentage (24.7%) of persons having attained an average level of education of JHS (GSS, 2014).

### 4.1.5 Marital Status of Respondents

Data from the survey of 120 respondents indicated that 41% of the respondents were single. The results further showed that 40% of them were married, 11% were co-habiting, 6% were divorced, and approximately 2% were widowed (Figure 4.5). The data on marital status is relevant in discussions on livelihood assets, strategies, and outcomes especially along gender lines under this study.

Figure 4.5: Marital Status of Respondents

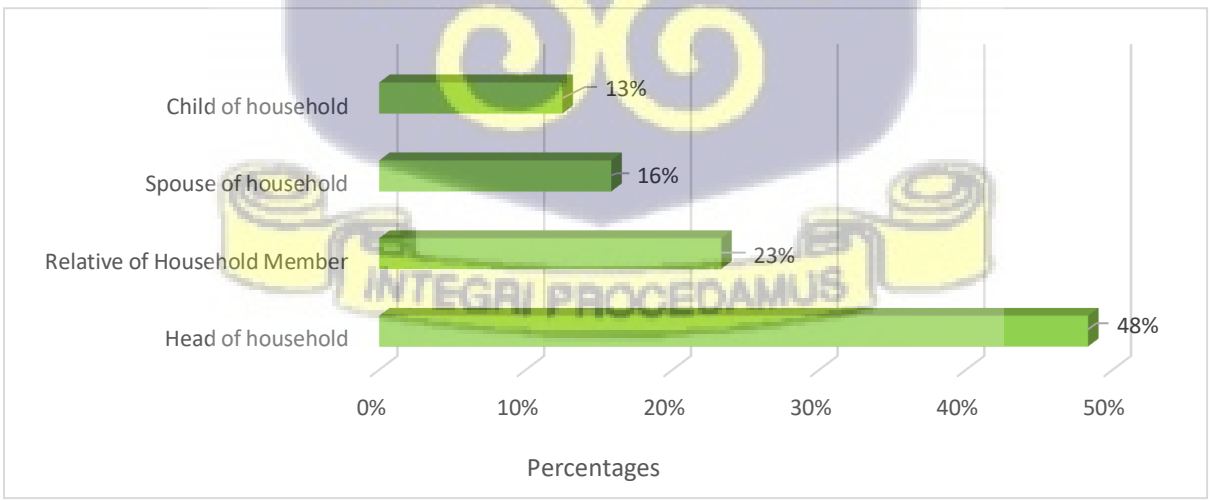



Source: Field data (2022) n=120

### 4.1.6 Respondents' Position in the Household

The probe into the position of the 120 respondents in the household indicates that 48% were household heads, with the rest (52%) being other members of the household. Out of this 52%, 23% indicated that they were related to other members of the household, 16% specifically indicated that they were spouses of the household and 13% were the children of the household) (Figure 4.6). This result shows that the majority of the respondents in the study area are household heads.

Figure 4.6: Household Headship status




Source: Field data (2022) n=120

The analysis of data from 58 out of the 120 respondents, who were household heads, showed that the majority were male (82%), and 18% were females. This speaks to a common trend in local Ghanaian communities, where it is relatively common to have male figures representing the households as the head and being the first point of call and decision-making as opposed to having female heads (Ghana Statistical Service (GSS), 2014).

Table 4.2: Position in Household by Sex of Respondents

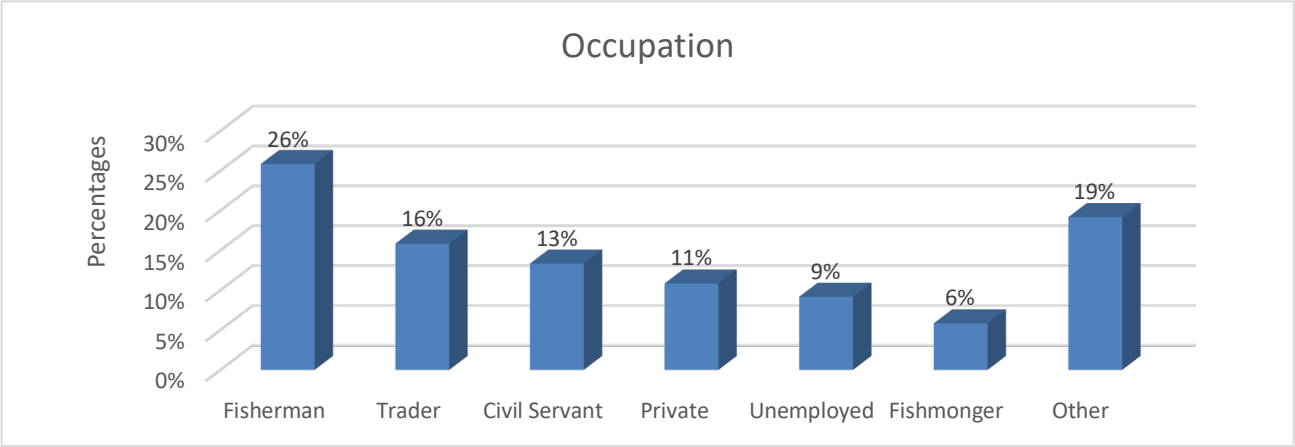
| Household Head (HH) | Frequency | Percentage |
|---|---|---|
| **Male HHH** | 48 | 82% |
| **Female HHH** | 10 | 18% |
| **Total** | 58 | 100% |

Source: Field data (2022) n=58

### 4.1.7 Occupation and Location of Work

Having a means of livelihood and a steady source of income as a resident in a coastal community is an important aspect of enhancing wellbeing and accessing necessities such as food and shelter. According to the results of this study based on data analysed from 120 respondents, 26% of the respondents were fishermen, 16% were traders, 13% were civil servants, 11% were private workers, 6% were Fishmongers, 19% were engaged in other jobs such as masonry, carpentry, glass work and woodwork while 9% were unemployed as seen in Figure 4.7.

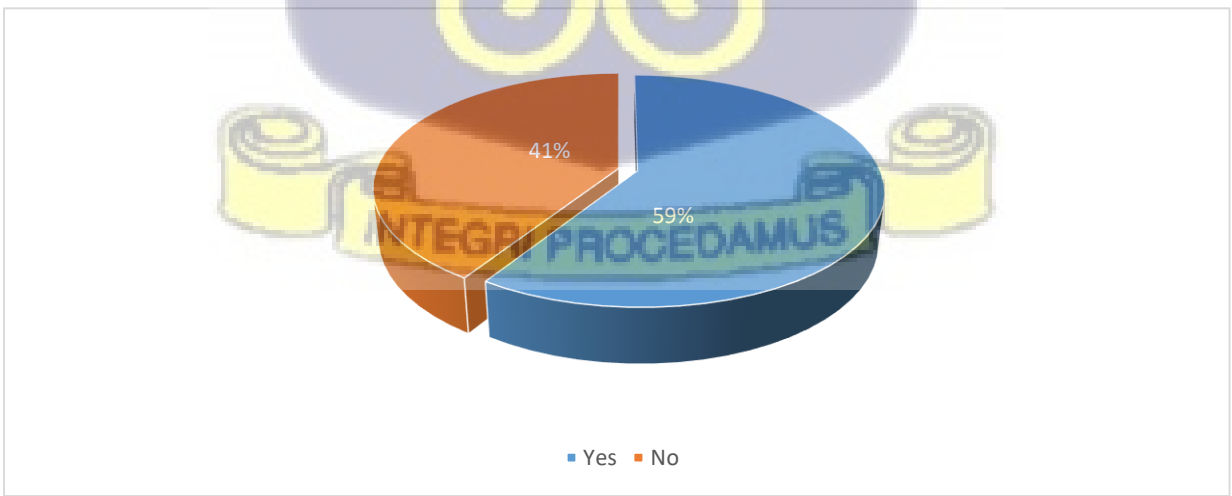
Figure 4.7: Occupation of Respondents




Source: Field data (2022) n=120

The results were in line with the assertion made by Møller-Jensen, Maya Agergaard et al., (2020), that Glefe is a primarily fishing community over time. Further probes based on data from 120 respondents to ascertain the location of the respondent's occupation were done to ensure a clear understanding of the availability of occupations around. Almost six in ten respondents (59%) work in or around Glefe with the rest (41%) indicating that they work outside Glefe (Figure 4.8). This points out that, most of the work available to respondents in the study was largely informal.

Figure 4.8 Occupation of Respondents by Location

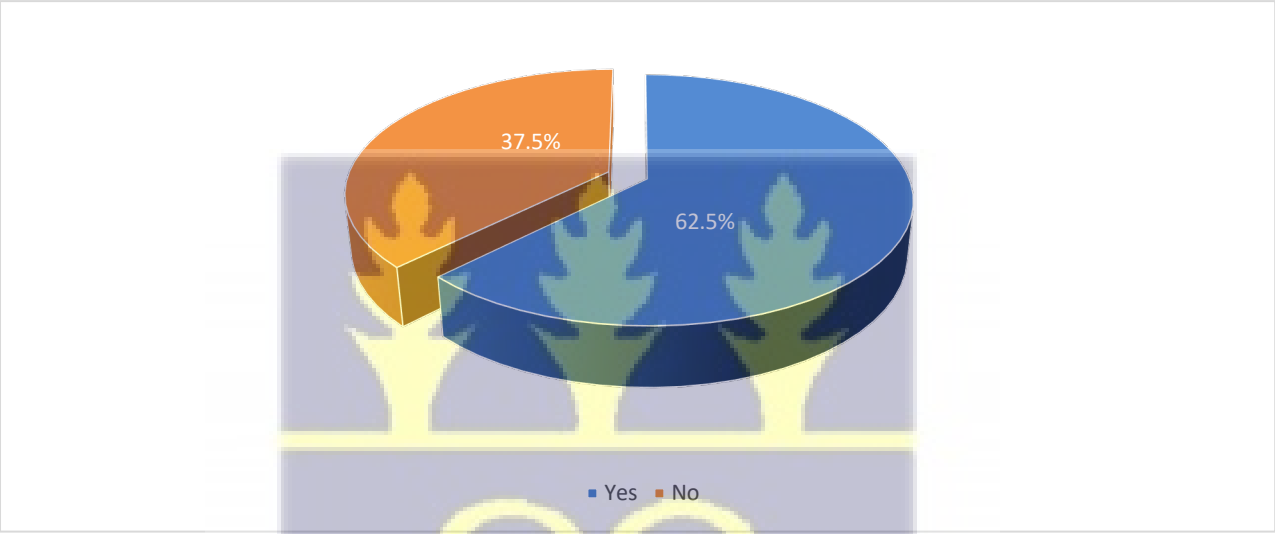



Source: Field data (2022) n=120

### 4.1.8 Childbearing Status

As part of establishing the demographic characteristics of the study sample, the study probed whether the respondents had children, how many children they had, and the number of dependants under 18 in their care. The results from the study analysed using data from 120 respondents indicated that approximately 62.5% of the respondents asserted that they had children, and 37.5% stated, that they did not have children (Figure 4.9).

Figure 4.9: Childbearing Status of Respondents




Source: Field data (2022) n=120

Out of this data, it was noted that the mean number of children had by respondents of the study sample was 1.8 with a standard deviation of 2.144369, with the highest number of children being 12 (Table 4.3).

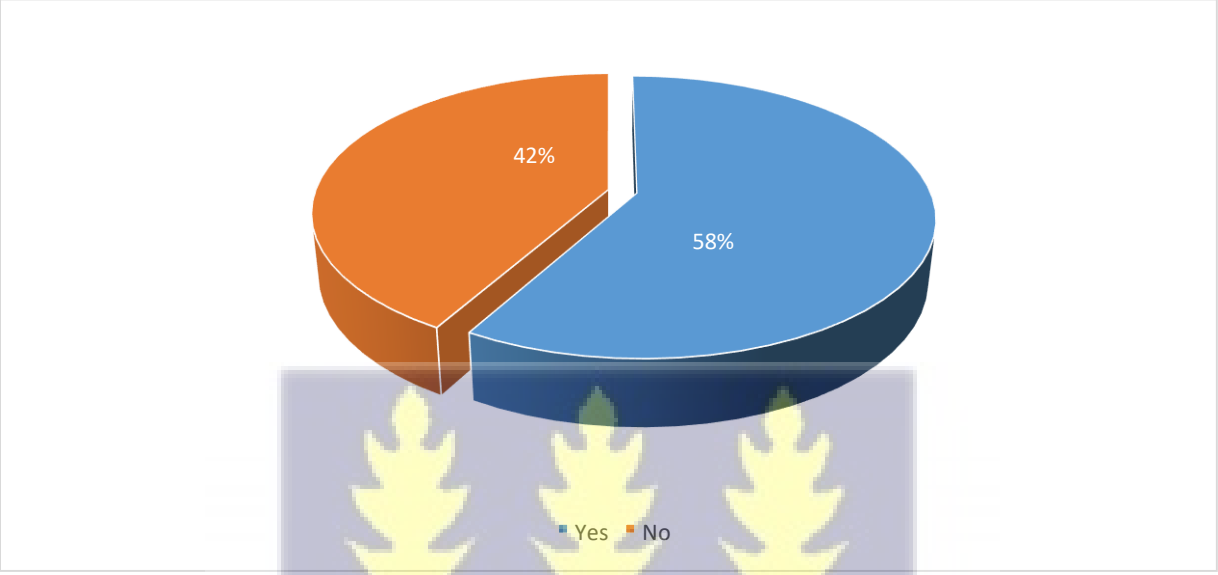
Table 4.3: Average number of Children per Household

| Variable | Observations | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| No. of Children | 120 | 1.8 | 2.144369 | 0 | 12 |

Source: Field data (2022) n=120

The study further probed whether respondents had any dependants, and to ascertain the number of dependants (those aged under 18 years and under the care of the respondents). The results indicate that 58% of the respondents had dependants under 18 under their care (Figure 4.10).

Figure 4.10: Dependency Status of Respondents




Source: Field data (2022) n=120

The average number of dependents recorded was 1, with a high dependency rate being between 1 to 5 persons at 57.5% and 41.7% having no dependants (Table 4.4). This is consistent with the GSS (2014) report that indicates that the dependency ratio within the AMA is approximately 48.5%, which represents mid-level to high rate of dependency (GSS, 2014).

Table 4.4: Statistics on Dependents

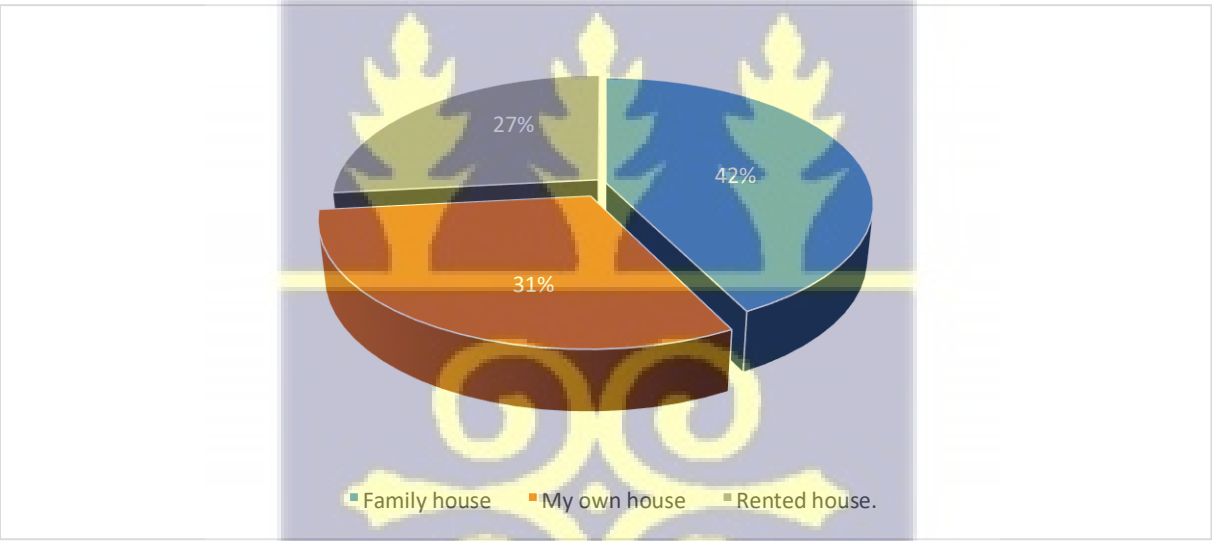
| **Number of Dependants** | **Frequency** | **Percentage** |
|---|---|---|
| None | 50 | 41.7% |
| 1 to 5 | 69 | 57.5% |
| 6 to 10 | 1 | 0.8% |

Source: Field data (2022) n=120

### 4.1.9 Residential Status of Respondents

To ascertain the residential status of the respondents, two variables were probed, these are whose house the respondent lived in and the number of years resident in Glefe. A look at these variables provides an understanding of how the type of residential facility a person lives in can be a determinant of the number of years a person is likely to live in a space over a period. The responses show that 42% of the respondents lived in a family house, 31% lived in their own houses and 27% lived in a rented house (Figure 4.11). This data is like the census data from GSS (2014) for the AMA, where the majority of the residents lived in compound house settings.

Figure 4.11: Residential Status of Respondents




Source: Field data (2022) n=120

The results show that the longest time a respondent has lived in Glefe was for 67 years and those who had lived the least years, have lived there for 5 years. The average number of years lived in Glefe was 21.18 years, with a standard deviation of 11 (Table 4.5). This brings to the fore, thefact that the Glefe area has existed for over 60 years although it has oftentimes been regarded as a peripheral town and its presence was only noted during the 1980s census exercise (Møller-Jensen, Maya Agergaard et al., 2020).

Table 4.5: Statistics on Number of Years Lived in Glefe

| Variable | Observations | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| **Number of Years Lived in Glefe** | 120 | 21.18333 | 11.9368 | 5 | 67 |

Source: Field data (2022) n=120

## 4.2 Effects of the Dansoman Emergency Sea Defence Project Phase One (DESDP) on Livelihood Assets, Strategies and Outcomes of Residents in Glefe

The effects of the Dansoman Emergency Sea Defence Project Phase One (DESDP) on livelihood assets, strategies and outcomes of residents were probed in this part of the study. The responses were drawn from persons pursuing a variety of livelihood strategies through the administration of questionnaires, a series of interviews and focus group discussions.

### 4.2.1 Livelihood Assets

The effects of the Dansoman Emergency Sea Defence Project Phase One (DESDP) on livelihood assets listed in the DFID asset pentagon were examined to identify the different assets within the DFID asset pentagon available to the respondents, determine the effect and ascertain the extent of the effect of the construction of the DESDP on residents. The assets under this study are physical, human, social, financial, and natural capital. The data collected shows that 107 out of 120 respondents, representing 89% of respondents indicated that they had physical assets, social assets, human assets, and financial assets whilst 60 respondents, representing 50% indicated that they had natural assets available to them (Table 4.6).

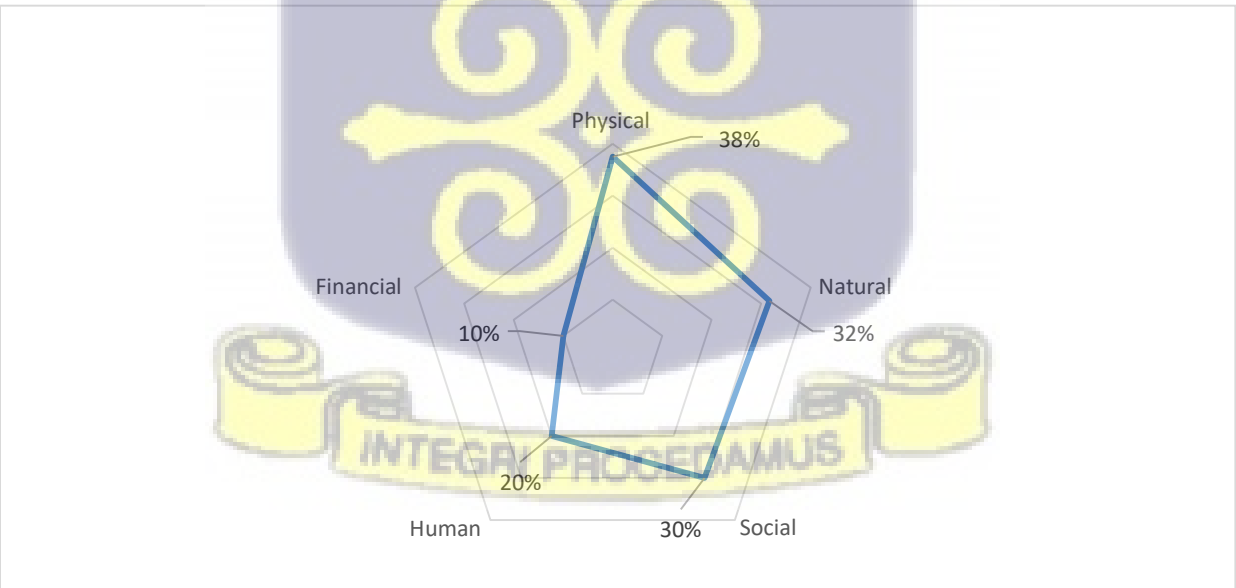
Table 4.6: Type of Assets available to respondents

| Asset | Frequency | Percentage |
|---|---|---|
| Physical Assets | 107 | 89% |
| Social Assets | 107 | 89% |
| Human Assets | 107 | 89% |
| Financial Assets | 107 | 89% |
| Natural Assets | 60 | 50% |

Source: Field data (2022)

The results of the study, based on the data from 120 respondents some of which selected multiple assets, regarding the effect of the DESDP on assets, further indicated that the most affected assets were physical capital (38%), natural capital (32%), then social capital (30%), then human capital (20%) and followed by financial capital (10%), being the least capital affected according to respondents (Figure 4.12).

Figure 4.12: Livelihood Assets affected by the construction of the DESDP




Source: Field data (2022)

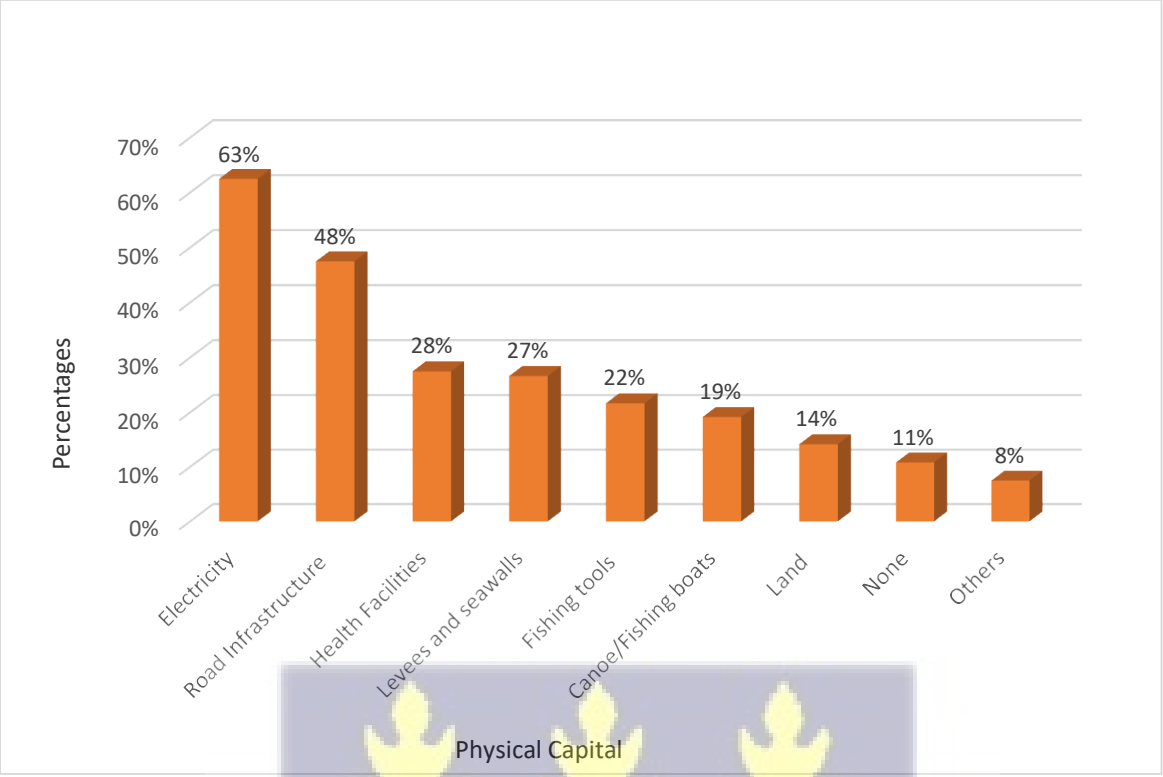
### 4.2.2 Physical Assets

The respondents in the study were probed to ascertain what type of physical assets were available to them, and what effect the construction of the DESDP has had on Physical assets in pursuance of their livelihood. The results will further aid to ascertain the degree to which the DESDP affected access to physical capital assets. The study showed that physical capital was the most affected as compared to the other assets (Figure 4.12).

#### 4.2.2.1 Types of Physical Assets Available to Respondents

The results represent data from 120 respondents, with the most prevalent. asset available to the residents being electricity (63%) followed by road infrastructure (48%), health facilities (28%), Levees and Seawalls (27%), Fishing tools (22%), Canoe/Fishing Boats (19%) land (14%), respondents with no assets (11% ), and a total of 8% of respondents indicated that there were other physical capital such as pots, pans, commercial buses (Trotro) and a fish smoking hearth available to them for use in pursuing their livelihood (Figure 4.13). The results from the study are in line with the concept that physical capital assets are relevant in the pursuance of livelihood as the lack of physical assets to people is regarded as an indication of poverty and indicates an inability to even access necessities for survival and pursuing livelihood (UNDP, 2017; United Kingdom Department for International Development (DFID), 2001).

Figure 4.13: Types of Physical Capital available to Respondents




Source: Field data (2022)

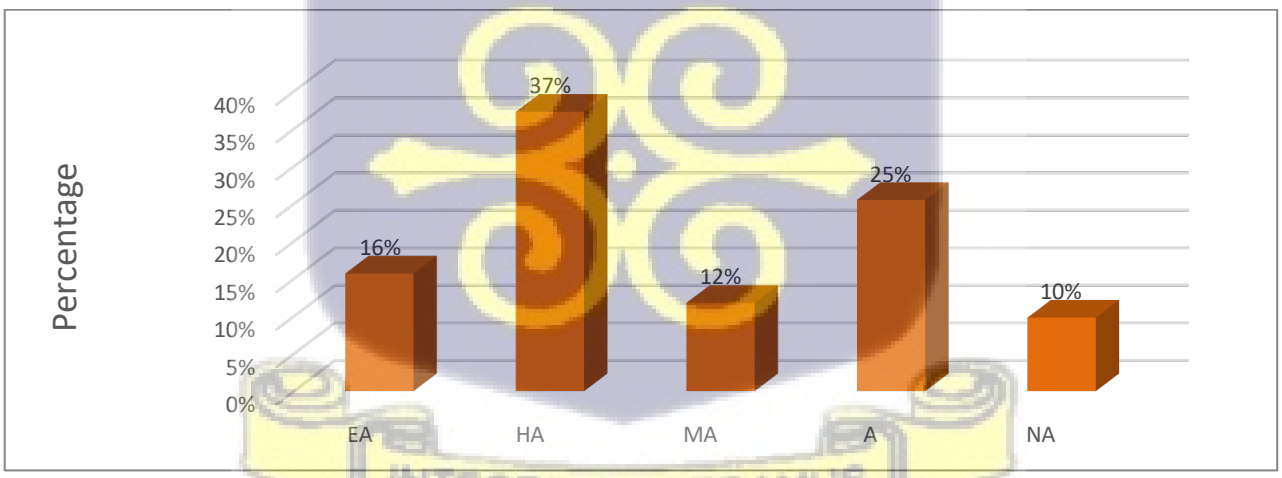
### 4.2.3 Extent of the Effects of DESDP on Physical Capital

The respondents in the study were examined to ascertain how much the construction of the DESDP influenced physical capital assets. The results show the responses of 51 persons, which serves as the baseline for calculating the percentages. The effect of the DESDP on physical assets, 37% indicated that the construction of the DESDP highly affected their physical assets, 25% indicated that they had been affected, with 16% also describing the effect as extreme. The rest of the responses showed that 16% of the respondents indicated that the effect was moderate, and 12% indicated that their physical capital was not affected in any way (Figure 4.14). This goes to show that the construction of the DESDP highly affected the physical livelihood assets of residents in Glefe. During the data collection, some of the residents expressed particular concern about physical assets like electricity, road infrastructure and health facilities.

According to them, before the construction of the DESDP, the intrusion of the sea threatened their access to road infrastructure. Some respondents proceeded to highlight that, although they had electricity, the accessibility varied. According to a community member during the FGD, most people also relied on traditional healthcare and the pharmacy when it comes to their health. Concerning the availability of health facilities, the participants of the Focus Group Discussion pointed out that, due to the unavailability of health facilities, they rather resorted to traditional healthcare services as it was readily available to them and did not cost as much as regular hospitals around them. A response from a pub operator indicated that:

> *When we are sick, we go to either the pharmacy or brew herbal medicine to take. Nature has everything we need to heal. There are different roots and herbs available to men for use. So, the hospital is not our usual first point of contact, the one close by is Royal and it is not under the government, so not all of us can go there* (A Pub Operator, 2022)

Figure 4.14: Extent of effects of the DESDP on Physical Capital



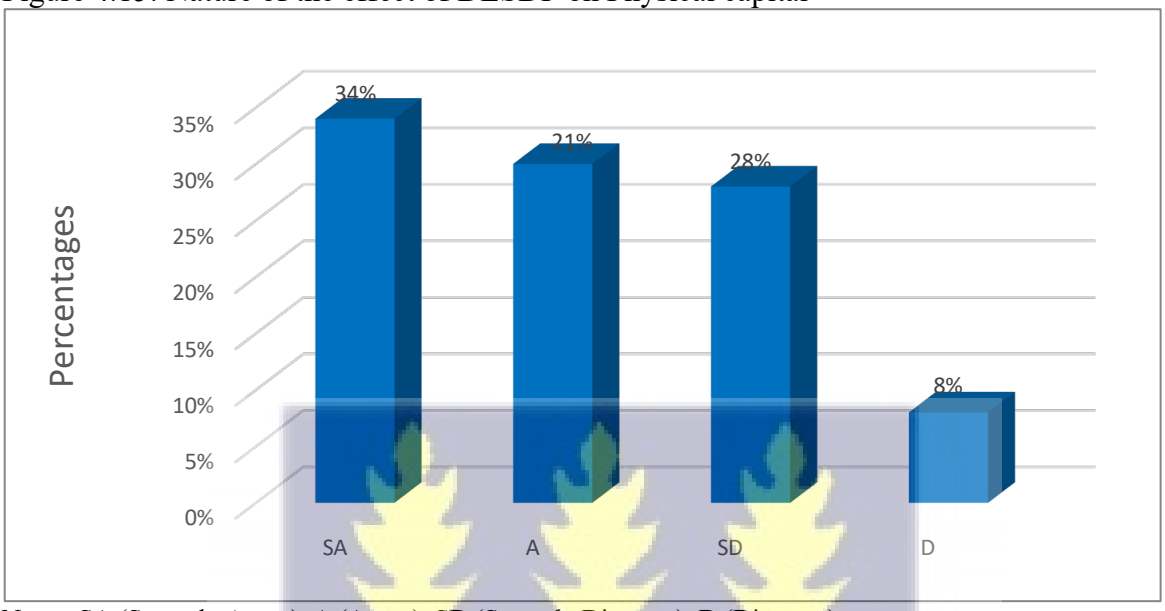

Notes: EA (Extremely Affected), HA (Highly Affected), MA (Moderately Affected), A (Affected), NA (Not Affected)

Source: Field data (2022) n=51

The results from 51 out of the 120 respondents indicated that 34% of the respondents, strongly agreed that the construction of the DESDP had improved their access to physical capital (Figure

4.15), whilst 30% indicated that the survey did not apply to them. This is an indication of how access to physical capital is relevant to persons practising livelihood strategies, as they need these livelihood assets to meet their needs and increase productivity (Nxumalo & Antwi, 2013).

Figure 4.15: Nature of the effect of DESDP on Physical capital




Notes: SA (Strongly Agree), A (Agree), SD (Strongly Disagree), D (Disagree)

Source: Field data (2022) n=51

A review of responses from some residents indicated that, before the construction of the sea defence wall, their physical assets were under threat. The residents explained that the effect of the inward intrusion of the sea left them in darkness with their houses broken, and their source of electricity especially affected, with others providing insight on their experiences before and after the DESDP. The respondents reported that;

> *At first, the sea will come all the way here, (pointing to a hearth) and carry my pots, pans, firewood and even break parts of this building. I will just have to start everything all over again, because all the things I work with are gone. It is not easy, because these are the things I work with, these are the things I have bought with the money I worked for* (A Fish Smoker in FGD, 2022).

Another respondent also expressed how the loss of a part of his building and his canoe getting weakened after a tidal wave affected him.

> *The waves came so close to my home, it broke the bedroom wall and entered the room, the water destroyed everything, and we had to pack all our clothes and what we could get into our living room (family hall) and the rest into my elder sister's room after Transformer (Glefe Transformer). Eh heh, one of my canoes was chipped at the side, the wood was very weak and that cost me a lot of time. At a point, I had to stop bringing the canoe here, I go and fish in Accra rather* (A Fisherman in FGD, 2022).

According to a trader, she is satisfied with the construction of the DESDP because her assets are safe, and this is key in cutting down costs in pursuance of her livelihood strategy. Her response was as follows;

> *Now the water does not come here again, I sell kenkey and this is where I cook. With the presence of the DESDP, I know my wares and pots and hearth I leave outside are safe from the tides. Now the money I was initially purchasing replacements with, I can use to scale up my business* (A Kenkey Seller in FGD, 2022).

### 4.2.4 Effects of DESDP on Natural Capital

The study probed respondents to ascertain what type of natural capital assets are available to the respondents, and what effect the construction of the DESDP has had on natural capital in pursuance of livelihood. The results aid in ascertaining the degree to which the DESDP has affected access to natural capital. The study showed that natural capital was the second ($2^{nd}$) most affected capital as seen in (Figure 4.12).

#### 4.2.4.1 Type of Natural Capital Available to Respondents

The data collated for 63 out of 120 respondents showed that 76% of the respondents stated that the sea was available to them to pursue their livelihood strategies, whilst 21% indicated they had land, and 3% indicated that a river was available to them to pursue their livelihood strategies (Figure 4.16). This is in line with the premise that livelihood in coastal communities is reliant on the availability of natural resource to residents for use in realising their livelihood outcomes, through strategies such as salt production and fishing (Kleih et al., 2003). The interview with the assemblyman for the area also revealed that Glefe was slowly becoming an area where people settle in and moving away from being just a fishing town. He expressed concern about the growing rate of fishermen moving away from Glefe to fish elsewhere, who only come back to settle in with families on their free days.

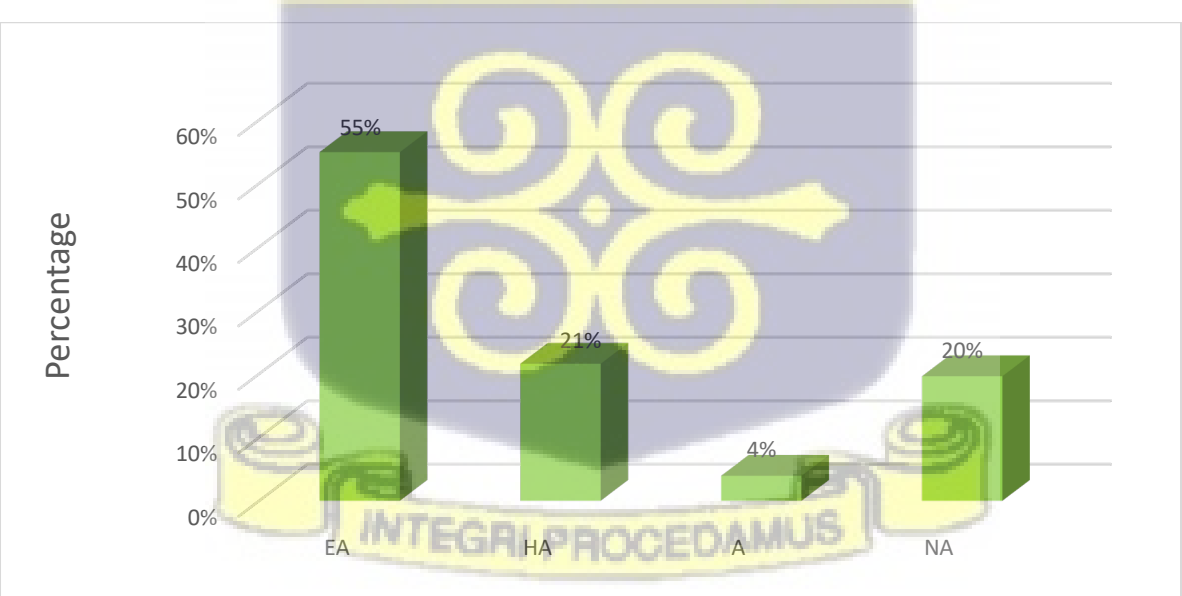
Figure 4.16: Types of Natural Capital available to Respondents


Source: Field data (2022) n=63

### 4.2.4.2 Extent of the Effects of DESDP on Natural Capital

The results were analysed with data from 51 out of 120 respondents, who were examined to ascertain how much the construction of the DESDP influenced natural capital, and how it also affected their access to natural capital while further probing the nature of the effect the DESDP had on the residents who participated in the study. The study showed that 55% of the respondents stated that the DESDP had an extreme effect on natural capital assets, 21% indicated a high effect of the DESDP, 20% also asserted that the DESDP had not affected them, with the remaining 4%, stating that they had been affected (Figure 4.17). It is important to note that, Glefe is considered a fishing town, the fisherfolk expressed during the focus group discussions that, the DESDP extremely affected their work, and that even though their properties and families were safe from destructive high tides, they had resorted to taking their trade to their places such as Dansoman, Panbros and Cape Coast.

Figure 4.17: Extent of effects of DESDP on Natural Capital



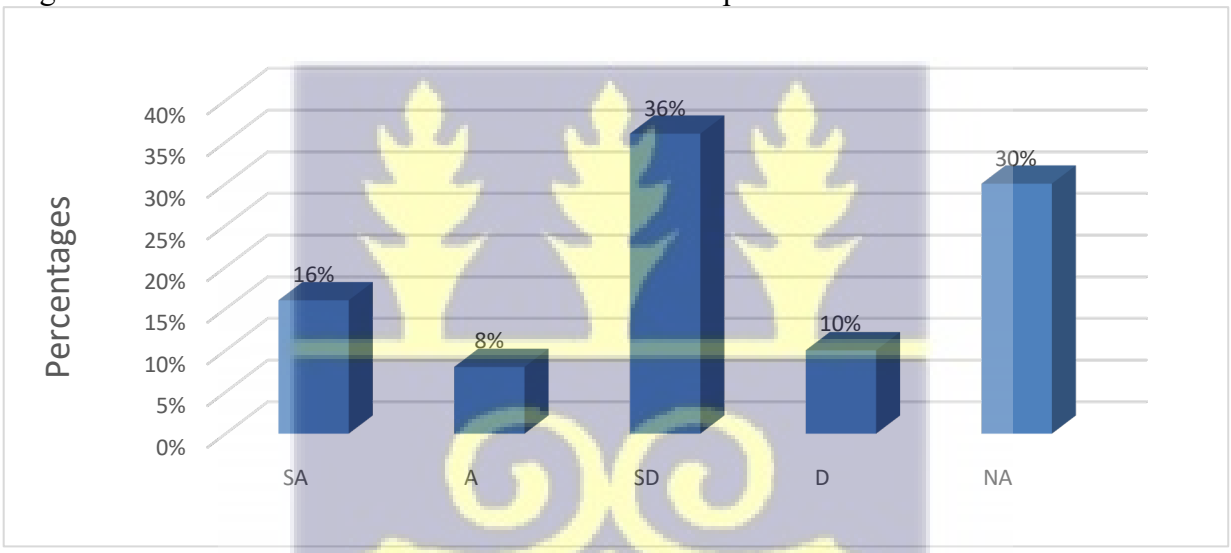

Notes: EA (Extremely Affected), HA (Highly Affected), A (Affected), NA (Not Affected)

Source: Field data (2022) n=51

#### 4.2.4.3 Nature of the Effects of DESDP on Natural Capital

The results from 51 out of 120 respondents showed that 36% strongly disagreed that the DESDP had improved the number of natural capital they could access in practising their livelihood, with 30% also indicating that they were not affected, and 16% strongly agreeing that that the DESDP had improved their access to natural capital (Figure 4.18). This finding is in line with the concept of how natural capital is important to livelihood, and that access to natural capital can be affected by projects, like the DESDP, which can lead to a decline in the number of persons who rely on natural resources for their livelihood (Mensah et al., 2020).

Figure 4.18: Nature of effects of DESDP on Natural Capital




Notes: SA (Strongly Agree), A (Agree), SD (Strongly Disagree), D (Disagree) NA (Not Applicable)

Source: Field data (2022) n=51

According to the chief fisherman during the Focus Group Discussions.

> *When they constructed the DESDP, I was very happy because now the sea will not come and worry us, but now I cannot go to the beach and say I am going to sea, unless I go to the Panbros side or the Dansoman side. Because now, the DESDP*

*has blocked us from direct access. We cannot complain but not being able to access the beach directly is difficult for businesses* (Chief Fisherman in FGD, 2022).

Another respondent, also expressed similar concerns, according to him, their access to the sea is rather limited and even caused some fishermen to move away;

*When they were constructing the DESDP, they just came to tell us that they are coming to do it, but they didn't even care to ask us what we want. Imagine that now if we want to fish, we must go to Dansoman or Panbros, where there are other fishermen already, and this affects catch* (A Fisherman in FGD, 2022).

Another further elaborated that;

*Now if we must even fish around the DESDP, we must wait for low tides and then go behind it, we cannot catch fish, sometimes it is just rubbish and sand we catch, so we have to go elsewhere. We are not saying the DESDP isn't good, we just feel that they could have done it like the other side (referring to the groynes). Even though, we had to demonstrate and threaten before they changed the design, it was late* (A Fisherman in FGD, 2022).

In affirming the sentiments of the fishermen, the project assistant explained that the initial design of the DESDP had to be changed in the latter part of the construction, from a sea wall to a groyne, due to the expression of constant displeasure from the fisherfolk. In narrating his experience, he said,

*The technical sketch and design of the defence were to make it like the Keta Sea Defence, a long seawall made with igneous rocks and according to standard engineering specifications based on the terrain, but we woke up one day to see an angry mob of fishermen who blamed us for cutting off their access to the shore and sea. After calming them, we sat to talk, and the results are what we now see as the groynes at the latter design part of the DESDP. This slightly stalled the project.*

*But it is not far-fetched, that is how they also feed their homes* (Key Informant Interview, Project Assistant, 2022).

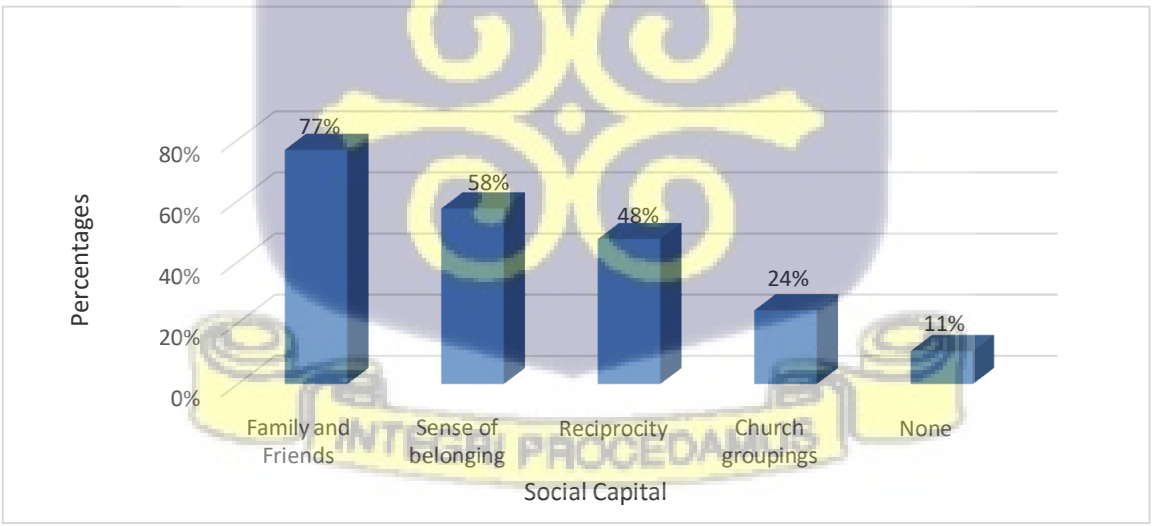
### 4.2.5 Effects of the DESDP on Social Capital Assets

This section brings to light, the effects of the DESDP on the social capital assets of respondents in Glefe. The section sheds light on the types of social capital available to respondents and explains the nature and extent of the effect that the DESDP has had on social capital.

#### 4.2.5.1 Types of Social Capital Available to Respondents

The study measured social capital in relation to the construction of the DESDP. Out of 120 respondents for each indicator for the study, 77% stated that family and friends were the main form of social capital available to respondents in pursuing their livelihood, followed by having a sense of belonging (58%), reciprocity (48%), and church groupings (28%). A section of the residents (11%), however, stated that they had no form of social capital to aid them in pursuing their livelihood (Figure 4.19).

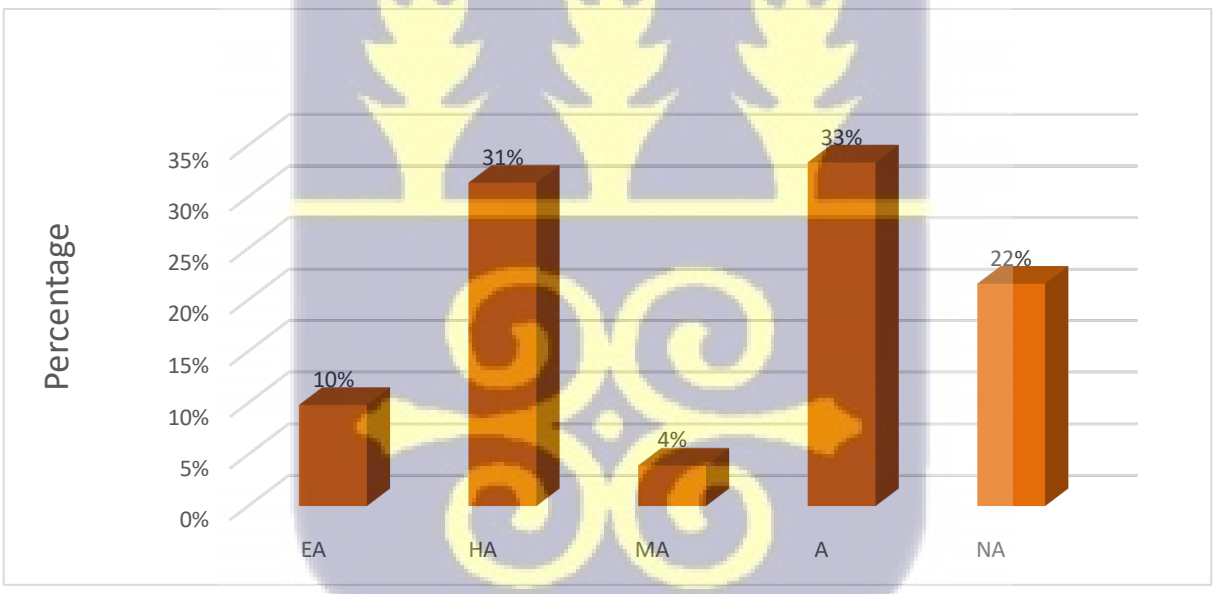
Figure 4.19: Types of Social Capital available to Respondents




Source: Field data (2022)

Social capital plays a key role in influencing livelihood within coastal communities (Department for International Development, 1999). Projects that are implemented may however have an effect, albeit negative or positive, on social capital, which goes a long way in affecting the livelihood of persons. (IUCN, n.d.; Kleih et al., 2003). The results from the study are reported on 51 out of 120 respondents and shows that, 33% persons, denoting the majority, stated that the DESDP affected their social capital in relation to livelihood and this effect, 31% of respondents alluded to the fact that the DESDP had a high effect on them, with the rest of the respondents, indicating that they were not affected (22%), extremely affected (10%) and moderately affected (4%) respectively (Figure 4.20).

Figure 4.20: Extent of the effect of DESDP on Social Capital




Notes: EA (Extremely Affected), HA (Highly Affected), MA (Moderately Affected), A (Affected), NA (Not Affected)

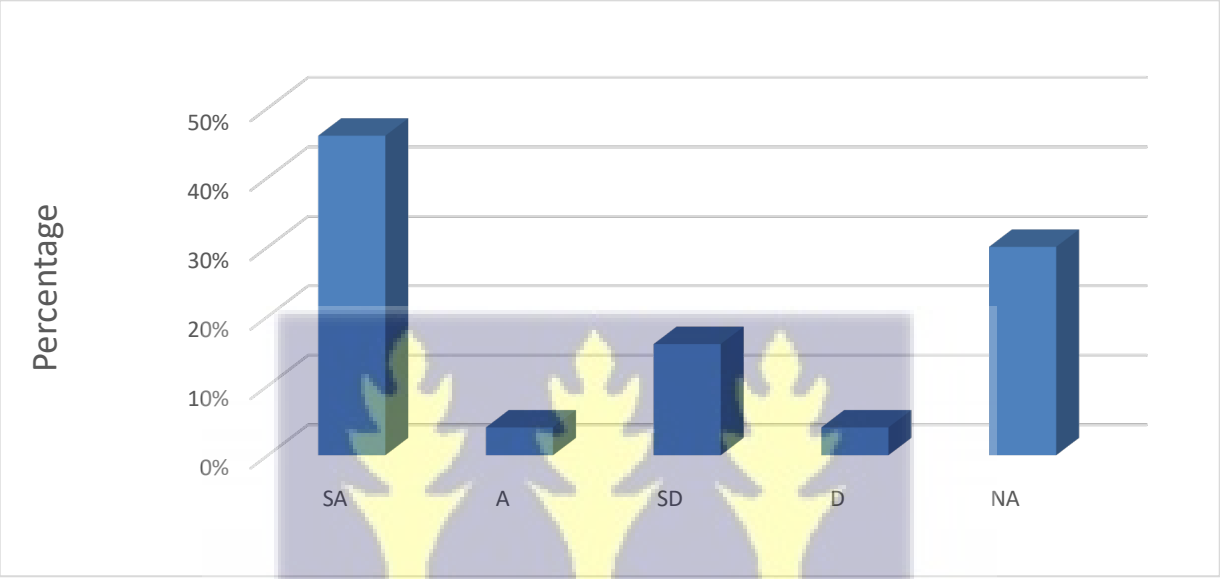
Source: Field data (2022) n=51

The findings are consistent with the assertions made by Casali (2018), affirming that, social capital is key in facilitating livelihood, especially in coastal communities (Casali, 2018).

#### 4.2.5.2 Nature of the Effects of DESDP on Social Capital

The study showed that majority of the 51 respondents who participated in this section, totalling approximately 46% strongly agreed that the DESDP had improved their access to social capital, whilst 30% stated that the inquiry did not apply to them (Figure 4.21).

Figure 4.21: Nature of the effect of DESDP on Social Capital




Notes: SA (Strongly Agree), A (Agree), SD (Strongly Disagree), D (Disagree) NA (Not Applicable)
Source: Field data (2022) n=51

According to some participants in the traders' Focus Group Discussion, before the construction of the DESDP, the benefits of social capital did not directly affect livelihood, but rather, it affected their ability to recover from the shocks of the high tides and the erosion of the coastline. Respondents have, however, also indicated that the DESDP has rekindled bonds andpositively contributed to the pursuance of their livelihood. A trader who participated in the Focus Group Discussion;

> '*When the sea used to worry us, my friends and neighbours will come and help me pack up and keep some of my belongings safe, but now I have a shop and they come*

*and buy from me because they know me, and they know I am here for them, just like they are too. That boosts our businesses* (A Trader in FGD, 2022).

### 4.2.6 Effects of DESDP on Financial Capital

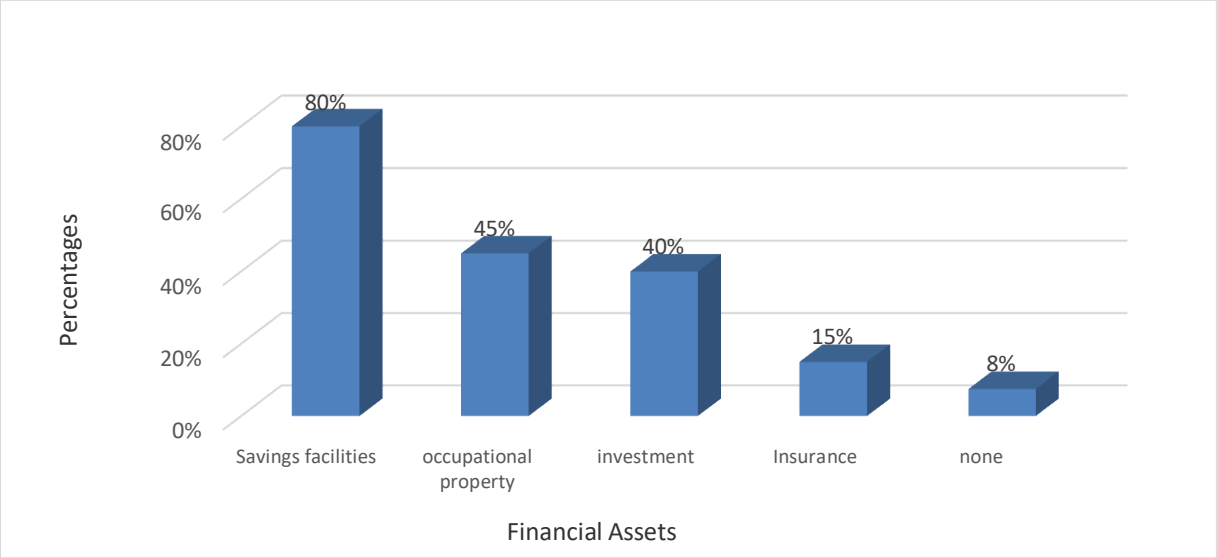
The results from the study indicated that, the DESDP had a comparatively minimal effect on the financial capital of residents who participated in the research. The respondents in the study were probed to ascertain what type of financial capital assets were available to them, and what effect the construction of the DESDP has had on financial assets in pursuance of their livelihood. The results explain the degree to which the DESDP affected access to financial capital assets. (Figure 4.23).

#### 4.2.6.1 Type of Financial Capital Available to Respondents

Financial capital is considered a vital asset to livelihood, as it can be used to attain certain livelihood outcomes and serve as a pathway to improving one's livelihood strategy (UNDP, 2017; United Kingdom Department for International Development (DFID), 2001). Out of the 120 respondents per indicator, savings facilities were the predominant form of financial capital available to them (80%), followed by occupational assets (45%), and the rest spread across investments (40%) and insurance (15%), with 8% stating that they had no form of financial capital to aid in practising their livelihood strategies.

An inquiry into the nature of financial capital revealed that although loans were available to the residents, there was a general disinterest towards applying for loans due to the stringent conditions of repayment and cost to 'their peace of mind'.

Figure 4.22: Types of Financial Capital available to Respondents



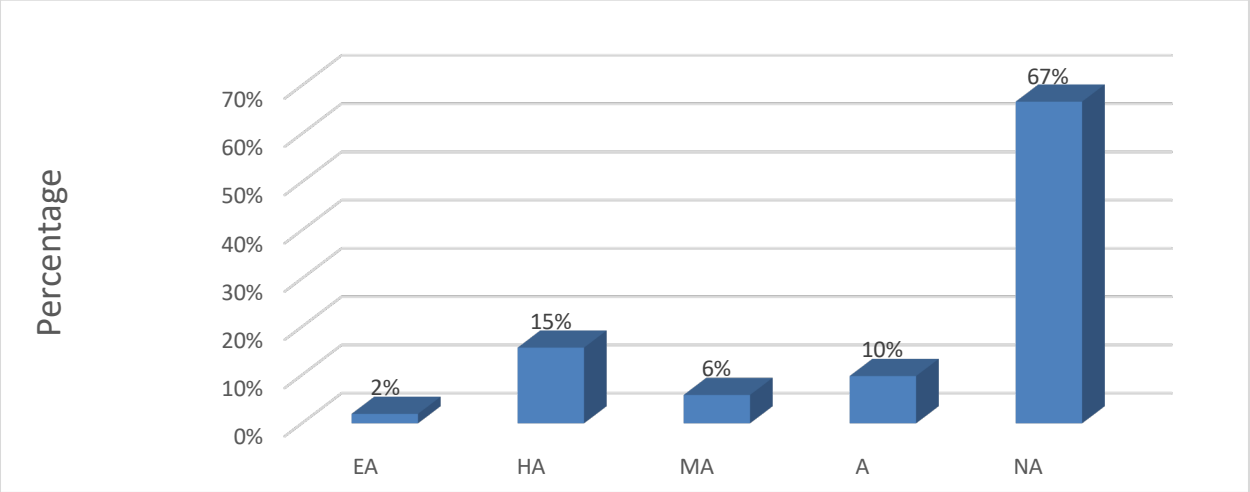

Source: Field data (2022)

In Glefe, the residents explained that the savings facilities they had access to be the local daily savings popularly known as 'susu', which was collected on either a daily or weekly basis by 'susu collectors' who worked with savings and loans companies. Others also re-invested their monies into their livelihood strategies and rather bought any occupational property.

### 4.2.6.2 Extent of the Effects of DESDP on Financial Capital

The result from the study is deduced from responses from 50 respondents, and results further indicate that the majority denoting 67% indicated that the probe did not apply to them, 10% stated that the DESDP had affected their access to financial capital, 6% of the respondents, were moderately affected, 15% indicated that they had been strongly affected (Figure 4.23). A probe into the extent to which the DESDP affected financial assets showed that many respondents stated that the inquiry was not applicable and thereforeconsidered that the effect of the DESDP on financial capital did not apply to them.

Figure 4.23: Extent of effects of DESDP on Financial Capital




Notes: EA (Extremely Affected), HA (Highly Affected), MA (Moderately Affected), A (Affected), NA (Not Affected)

Source: Field data (2022) n=50

The narrative from residents indicated that the effect of the DESDP on financial capital was indirect, but they could now re-invest in their businesses and save more because there was lower destruction of their properties. They, however, maintained the stance that to directly state that the DESDP played a major role in improving access to financial capital, or state that it affected financial capital was out of the question.

### 4.2.7 Effects of DESDP on Human Capital Assets

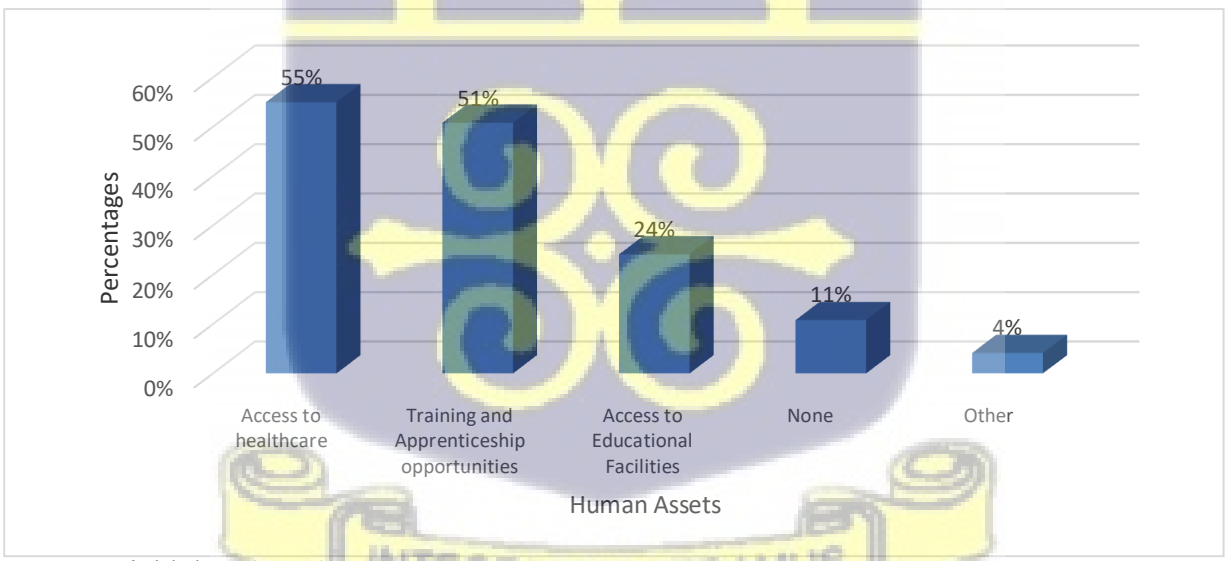
Prior to the construction of the DESDP, residents relocated /moved away from Glefe due to the destruction of their homes and property, and in rare cases lives. The key informant interview conducted with the assemblyman indicated that he was aware that residents had migrated away from Glefe in search of more stable settlements, and the effect this has had on human capital as well. The results from the study sample indicate that the DESDP had a minimal effect on the human capital of residents who participated in the research.

#### 4.2.7.1 Type of Human Capital Available to Respondents

Human capital development involves indicators such as training and apprenticeship, access tohealthcare and education of the people to enhance their livelihood. The study examined what types of human capital exist for residents in pursuance of their livelihood. The key informant interview conducted with the official at the district assembly indicated that the project brief didnot directly include the provision of facilities for the residents of Glefe.

The results from the 120 respondents for each indicator, show that the majority of residents (55%) had access to healthcare, 51% had access to training and apprenticeship, with 24% indicating that they had access to educational facilities. Some respondents (11%) also stated that they had no form of human capital available to them, with the remaining respondents (4%), stating that they had other human capital assets, which includes labour (Figure 4.24).

Figure 4.24: Types of Human Capital available to respondents



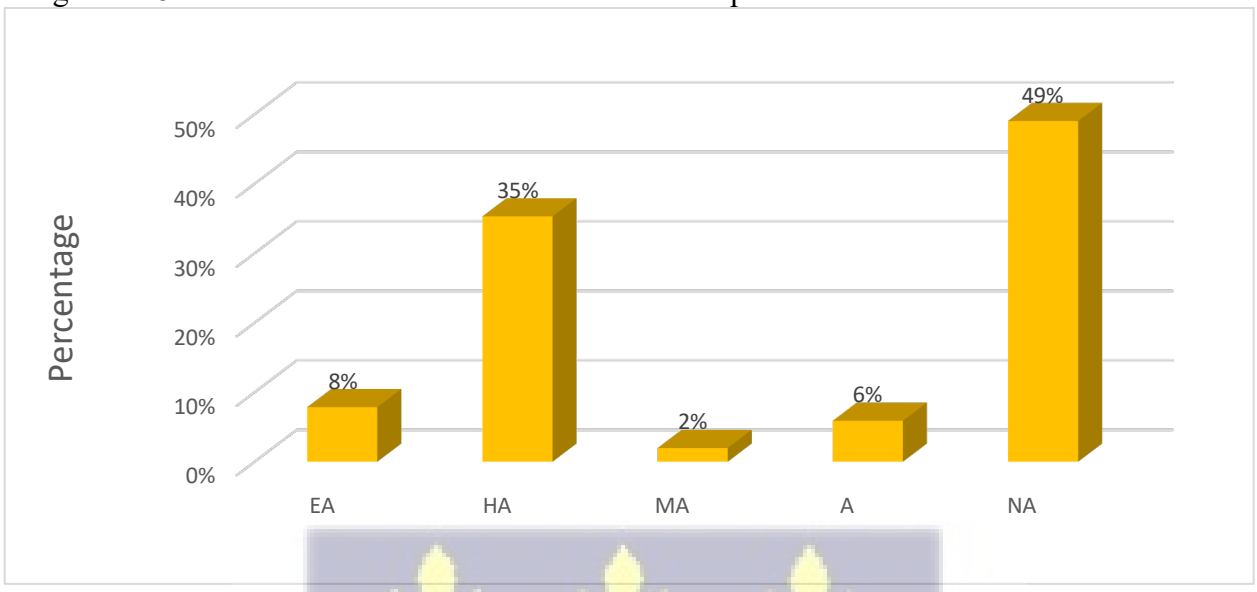

Source: Field data (2022) n=120

#### 4.2.7.2 Extent of the Effects of DESDP on Human Capital Assets

The study showed that out of 51 residents who responded in this section of the study, the majority (49%), stated that the DESDP had not affected human capital, with 35% of the

respondents stating they had been highly affected, 8% indicated that they were extremely affected, 6% affected, and 2% moderately affected (Figure 4.25).

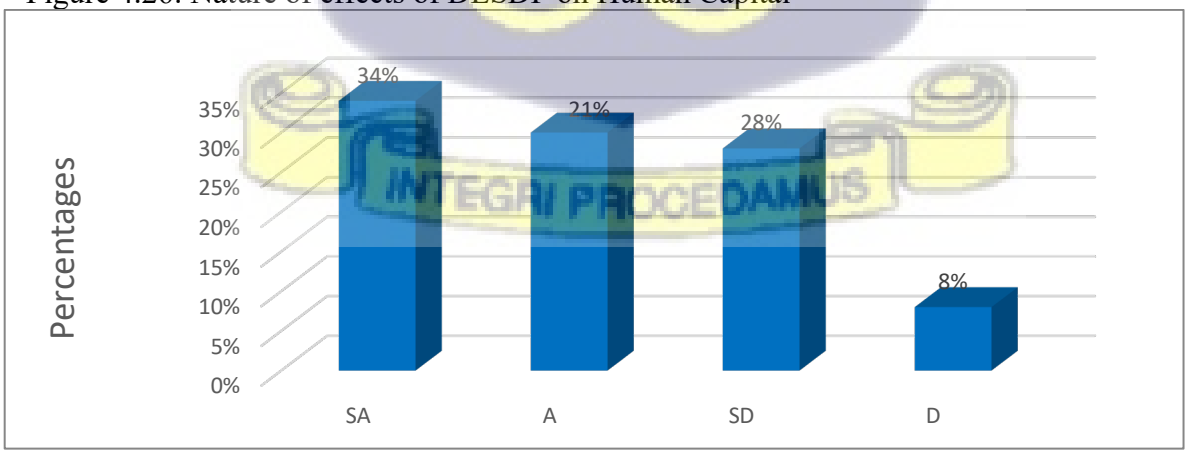
Figure 4.25: Extent of effects of DESDP on Human Capital




Notes: EA (Extremely Affected), HA (Highly Affected), MA (Moderately Affected), A (Affected), NA (Not Affected)
Source: Field data (2022) n=51

The residents, however, stated that the destructive high tides had a more adverse effect on their human capital than the construction of the DESDP. The results further show that, since the construction of the DESDP did not include the provision of health or educational facilities, they could not necessarily qualify how it affected them in relation to human capital.

Figure 4.26: Nature of effects of DESDP on Human Capital




Notes: SA (Strongly Agree), A (Agree), SD (Disagree) D (Disagree)
Source: Field data (2022) n=50

The results from 50 out of the 120 respondents who answered this section, were analysed to understand the effects of the DESDP on human capital. The result showed that the majority (36%) of respondents stated that the DESDP did not affect them, 34%, however, indicated that the DESDP had strongly affected their access to human capital (Figure 4.26). According to the narrative from the Focus Group Discussions and comments from some of the respondents, the DESDP brought stability to Glefe, and this meant people did not have to move away from the settlement. With more residents staying in Glefe, health facilities like traditional healthcare and pharmacies have continued operations to provide services to them when need be. Some respondents also stated that because people have stopped moving, they have relatively more people to train in a skill, and to also understudy, in order to become part of the labour employed in available livelihood strategies such as fishing, driving and carpentry.

## 4.3 Effects of the Dansoman Emergency Sea Defence Project Phase One on the Livelihood Strategies of Residents in Glefe

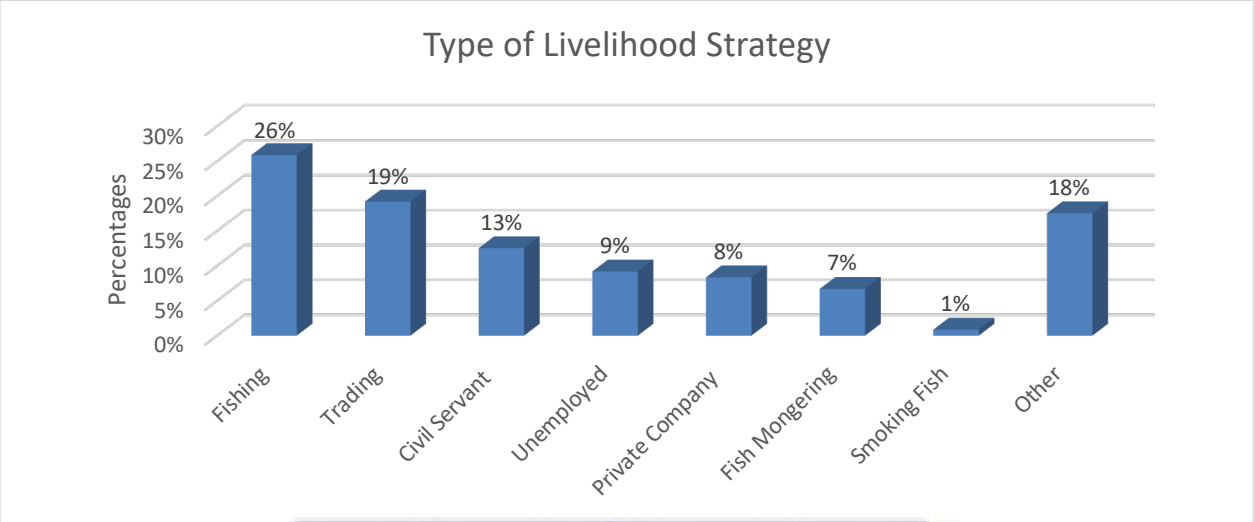
The study examined the different types of livelihood strategies practiced by residents and probed the effect of the DESDP on livelihood strategies. The effects of projects on livelihood strategies vary and can depend on the type of livelihood strategies being pursued.

### 4.3.1 Types of Livelihood Strategies Practised

With respect to the type of livelihood strategies employed by the 120 respondents who responded to this probe in the study, 26% practised fishing, 19% were involved in trading, and 17% were involved in other livelihood strategies (factory work, Uber driving, student, bar operation, carpentry, plumbing apprenticeship, community leader, trotro driving, sales, a handyman, tiling, stay at home mother, and a grocery wholesaler), 13% were civil servants,

unemployed, 9% were unemployed, 8% worked in private companies, 7% were involved in fish mongering and the remaining 1% were into fish smoking (Figure 4.27).

Figure 4.27: Livelihood Strategies of Respondents




Source: Field data (2022) n=120

The high number of persons engaged in fishing as a livelihood strategy asserts the position opined by several scholars, that the primary livelihood strategy of persons living in or around coastal communities is fishing and fish-related activities in Ghana and also worldwide (Eshun et al., 2019; National Research Council, 2008; Roberts et al., 2021). The prevalence of the majority of the respondents being engaged in fishing as a livelihood strategy is in line with the categorisation of Glefe as a fishing town (Møller-Jensen, Agergaard et al., 2020). It is also noticeable that although many respondents were engaged in fishing, there is an observable minimal difference between the other livelihood strategies, which shows that Glefe may slowly have a good number of its residents moving away from fishing as the area's major livelihood activity (ibid). According to the fishermen in the Focus Group Discussion, fishing is not just regarded as business to those involved in it. It is a family heirloom; however, people are becoming more enlightened and are slowly giving it up. Another fisherman stated that,

> *We are not just fishermen; it is a legacy we are building for ourselves and our children's children. This is the way we seek to honour our ancestors. By continuing*

> *the inheritance, they left us (fishing). I quit school by Primary three (3) because I was too distracted by life at sea to even concentrate properly* (A Fisherman in FGD, 2022).

An older fisherman also lamented that the young people were no longer interested in fishing. According to him;

> *Now they (…the young men) attend school, and so they want office jobs. So now it is only a few who come to fish with us, but those ones just come for the money and catch. With no plans of ever owning a canoe or a net. I think they (the younger men) should rather use the knowledge they gain from school to scale-up their business than just shunning it* (A Fisherman in FGD, 2022).

## 4.4 Nature of the Effects of the Dansoman Emergency Sea Defence Project Phase One on the Livelihood Strategies

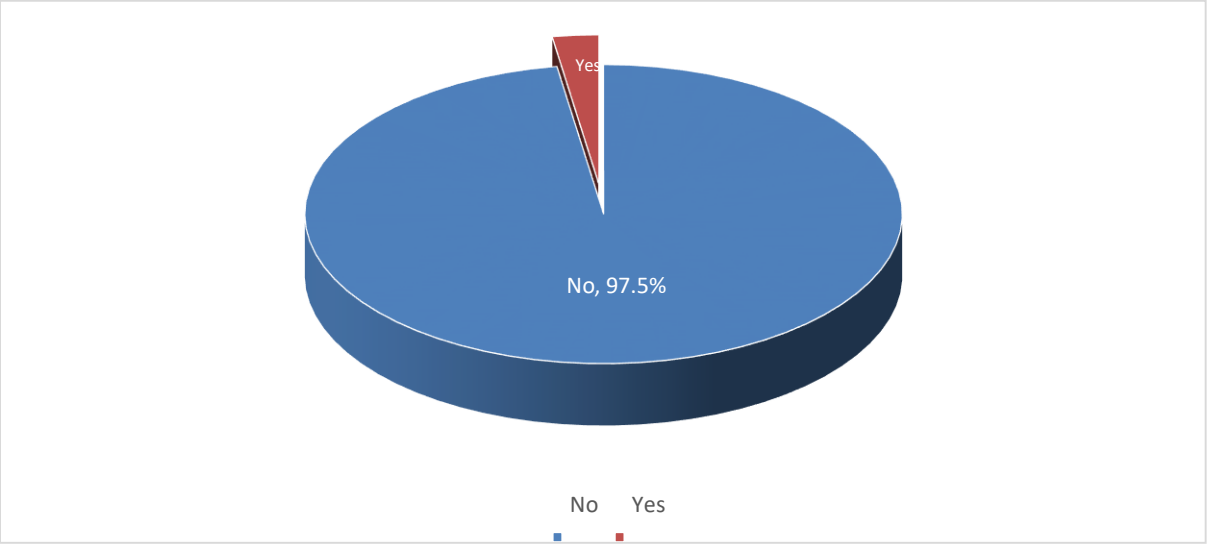
To probe the effects of the DESDP on livelihood strategies, two indicators were assessed. The indicators were:

1. A change in livelihood strategy practiced, and
2. The perception of derived benefits of the DESDP in pursuance of their livelihood strategy.

### 4.4.1 Change in Livelihood Strategy Practiced as a result of the DESDP

The results of the study based on responses from 120 respondents, show that 97.5% of the respondents indicated that the DESDP did not largely lead to a change in the livelihood strategy of respondents, 2.5% however affirmed thatthe DESDP caused a change in the livelihood strategies they practiced (Figure 4.28).

Figure 4.28: Change in Livelihood Strategy of Respondents




Source: Field data (2022) n=120

Out of the three (3) respondents who affirmed that the DESDP was responsible for causing a change in their livelihood, one of them who used to be a trader had become a private company worker indicated that although the DESDP played a role in the change in livelihood, it was not the sole reason for the choice in pursuing an alternative livelihood strategy. Two (2) who were fishermen, had turned to masonry and trading.

The results are contradictory to the results from Adikah et al. (2020), which showed that the construction of the Keta Sea Defence Project (KSDP) led to a negative effect on the number of persons pursuing fishing, as there was a notable decline in the number of persons pursuing fishing as a livelihood strategy (Adikah et al., 2020). Other informal livelihood strategies such as trading, farming, and artisanship indicated that the DESDP had a positive effect, as there was a noticeable increase in the percentage of persons pursuing these livelihood strategies (ibid). In Glefe, however, a decline in the number of respondents pursuing livelihood strategies was not greatly experienced. The FGD however threw light on the different effects the DESDP has had on the dynamics of the effects experienced by different participants.

> *We agree that we needed the Defence to protect lives and property, and it has been beneficial in doing that. But it hasn't been easy on our work. We the fishermen cannot fish around the coastline anymore unless we go to the Panbros and Dansoman side to pull out nets. They should have considered other designs or the other type (the groynes). But there isn't much we can do* (A Fisherman, FGD, 2022).

According to some of the fisherfolk who participated in the Focus Group Discussion, some fishermen didn't give up on fishing because they had the alternative to practise their livelihood strategies in either Dansoman, Panbros, Accra or even in Cape Coast. The issue however was that the number of fishermen who went to Glefe grew lesser by day and therefore affected the selling of fish to people who used to come early to buy fish. Another respondent (a pub operator) however mentioned that the construction of the DESDP was key in safeguarding his business since he could now be sure that people will come to the pub to drink and bond because the defence protects the pursuance of his livelihood strategy since his structure is protected and can continue to operate. According to one fisherman;

> *In Glefe, those of us who are fishing have been doing so for years. It is a family business, so we cannot just get up and leave the job, we must do it, and we must do it for our children to know. But the DESDP has seriously affected us, we have been struggling to continue fishing around, and so many of my people have left* (A Fisherman in FGD, 2022).

This assertion was also made by the NADMO officer at the Ablekuma West Municipal Assembly.

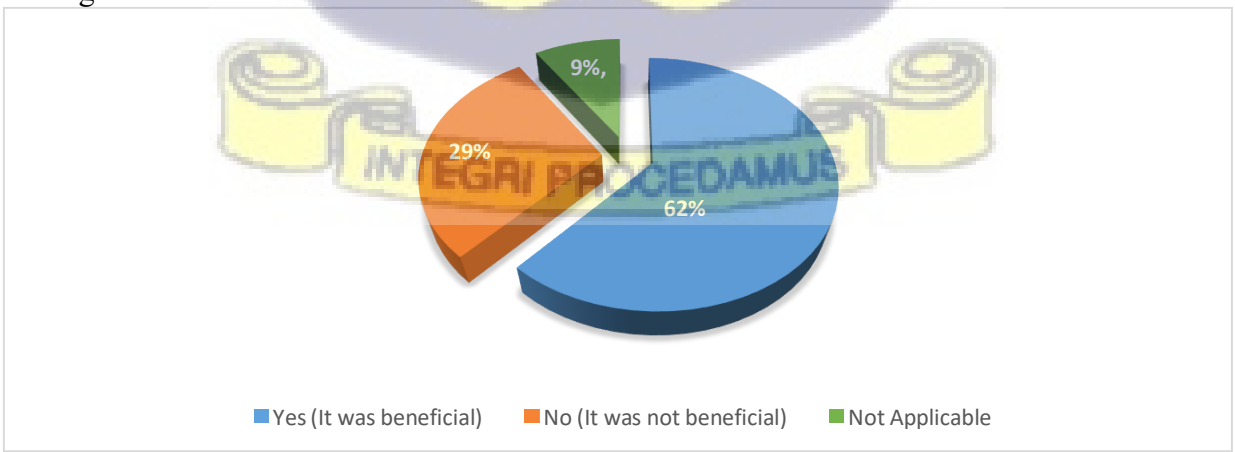
> *I will say, the defence seems to have hampered the local fishermen in their quest to fish on the shores of Glefe. This led to a major stall during the construction, and we had to pause the implementation because the fishermen were agitated at a point when they said it will affect their livelihood. But the project was already ongoing, and it wasn't easy to just get up and change the design* (Interview with NADMO Official, 2022).

According to the Assistant Project Contractor on site, of all the livelihood strategies, fishing seemed to have been most affected, as he also stated that safety was almost compromised when the fishermen were demonstrating, as they demanded that their voices be heard, and an alternative measure should be employed. He also mentioned that the fishermen had the right to express their displeasure because they relied heavily on fishing and the change in design at the end was beneficial to all. The participants in the FGD who were involved in fish mongering also complained of the low catch from the fishing activities around, forcing them to either buy from the fishermen in Accra or from the market. The effects of the DESDP on strategies, directly and indirectly, affected the pursuance of different livelihood strategies during and after the implementation of the DESDP.

### 4.4.2 Perception of Derived Benefits of the DESDP in Pursuance of their Livelihood Strategy

The results of the study show that, out of the 120 respondents, 62% indicated that they perceived that the DESDP was not beneficial to the pursuance of their livelihood strategies, 29% however, affirmed that they perceived that the DESDP was beneficial in pursuance of their livelihood strategies and 9% ticked that the question did not apply to them. (Figure 4.29).

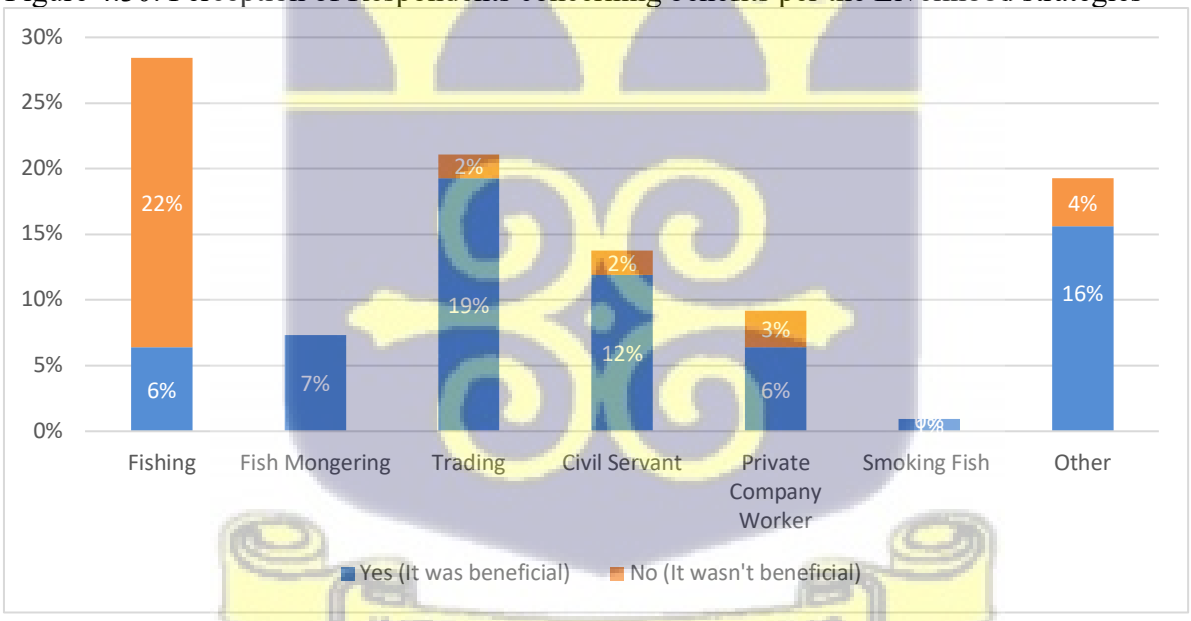
Figure 4.29: Perception of Respondents concerning benefits of DESDP on Livelihood Strategies




Source: Field data (2022) n=120

Further analysis of the data from 109 out of the 120 respondents, on the perception of the benefits of the DESDP on livelihood strategies indicated that trading, civil service and other employment strategies attributed to 43% of the 70% who ticked yes to affirm that the DESDP was beneficial in pursuing their livelihood strategies. A probe revealed that the traders wanted to continue pursuing their livelihood strategy in one location now because the DESDP was complete. They also asserted some had to resort to hawking and moving around before the construction of the DESDP due to the havoc it caused and the fact that they spent more time salvaging property than pursuing their livelihood strategies. Further disaggregation of the responses also indicated that 20% of the respondents who ticked no were fishermen, making them the majority, with the remaining 9% spread across other livelihood strategies such as trading, civil service, private company workers and others (Figure 4.30).

Figure 4.30: Perception of Respondents concerning benefits per the Livelihood strategies




Source: Field data (2022) n=109

The results indicate that the general perception of the benefits of the DESDP to livelihood strategies is positive. However, the fact that it is important to draw out the benefits to the pursuance of specific livelihood strategies is important to note, as this does not affect only those

directly engagedin fishing, but also other fishing-related strategies in the long to medium-term. This result further asserts the tendency that, hard engineering adaptation strategies such as sea defence walls in coastal communities affect strategies such as fishing exists, and thus these hard engineering techniques should rather be good enough to help minimise the impact it can have on livelihood activities such as fishing (Kusimi & Dika, 2012; Nairn et al., 1998).

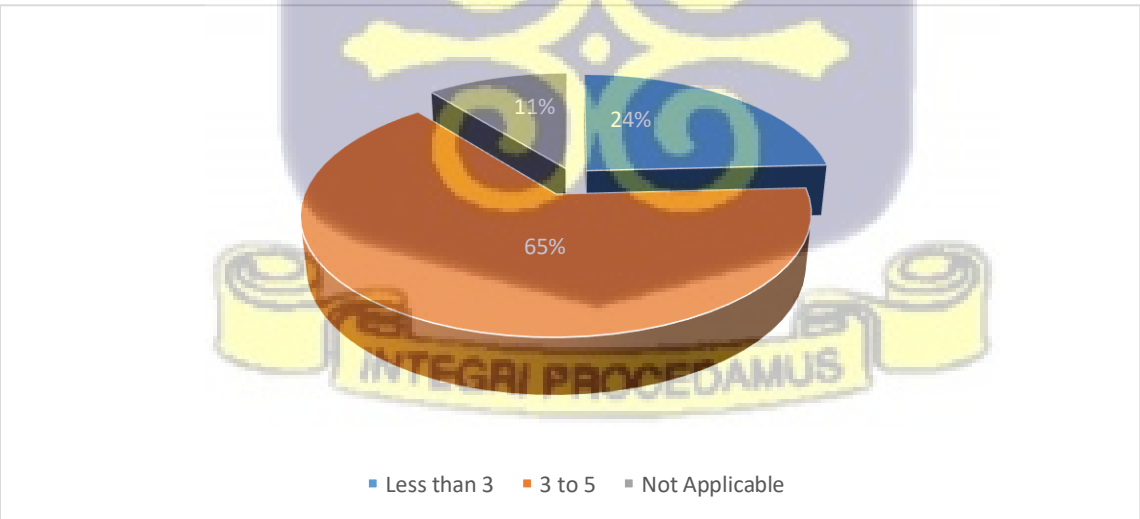
### 4.5 Effects of the Dansoman Emergency Sea Defence Project Phase One on Livelihood Outcomes of Residents in Glefe

The study examined the different types of livelihood outcomes that persons engaged in a livelihood strategy seek to realise, in pursuance of their livelihood strategy, and probed the nature of the effect of the DESDP on the livelihood outcomes of residents in Glefe.

#### 4.5.1 Types of Livelihood Outcomes

Sixty-five percent (65%) of the 120 respondents indicated that they sought to attain less than three livelihood outcomes, whilst 24% indicated that they sought to attain between three to five livelihood outcomes (Figure 4.31).

Figure 4.31: Choice of Livelihood Outcomes according to respondents




Source: Field data (2022) n=120

The results obtained on livelihood outcomes show that 79% indicated that, an increase in income was a major livelihood outcome they wished to attain, 68% also ticked that there was an improvement in their health and wellbeing, followed by 36% who affirmed an increase in their access to resources, 28% also indicated that there was a decrease in their vulnerability to shocks and hazards. The results further indicate that 23% chose increased food security, 8% indicated that they sought to increase assets to facilitate livelihood strategies (Table 4.8), and the remaining 18% indicated that there were other livelihood outcomes (the responses stated attaining a good social standing as a man, build a legacy for their children and continue the heritage of their forefathers, facilitate community development, fend for the family, for their future family and taking care of their parents, personal satisfaction, to afford good education for their children, to have a good life in the future, to keep them active, to make their parents proud, to make myself proud and take care of their sister, to support their husband in taking care of the home and enable them to afford personal effects when they want to, to support the home, support the education of their children and keep them busy, to take care of themselves).

Table 4.8: Types of Livelihood Outcomes according to respondents

| Livelihood Outcome | Frequency | Percentage |
|---|---|---|
| Increase in income | 95 | 79% |
| Improvement in health and well-being | 82 | 68% |
| Increased access to resources | 43 | 36% |
| Decrease in vulnerability to shocks and hazards | 33 | 28% |
| Increased food security | 27 | 23% |
| Increased assets to facilitate livelihood strategies | 10 | 8% |
| Other | 22 | 18% |

Source: Field data (2022)

A review of literature shows that income generation is a major motivating factor for persons engaged in a livelihood strategy and therefore considered a major livelihood outcome (United

Kingdom Department for International Development (DFID), 2001). As deduced from the results, the most prevalent choice of livelihood outcome was income. The relevance of income in ensuring the economic stability of a household and further gaining money to access other goods and services makes it a key livelihood outcome for different groups of people (International Recovery Platform & United Nations Development Programme, 2010). According to a provision store operator in the traders FGD;

> *Income is an important outcome for some of us as we work. We need money for everything. Especially when we have families relying on us. The income we generate can buy us more work tools, take our children to school, and make our women happy* (A Provision Store Operator in FGD, 2022).

This assertion received a few nods amongst the participants, some were however quick to interject that it was important to rather be healthy and active at the end of the day. They stated that there was no need to slave oneself because of work, and that a job that gives them peace of mind and enhances their well-being as a priority.

### 4.5.2 Effects of the Dansoman Emergency Sea Defence Project Phase One on the Livelihood Outcomes

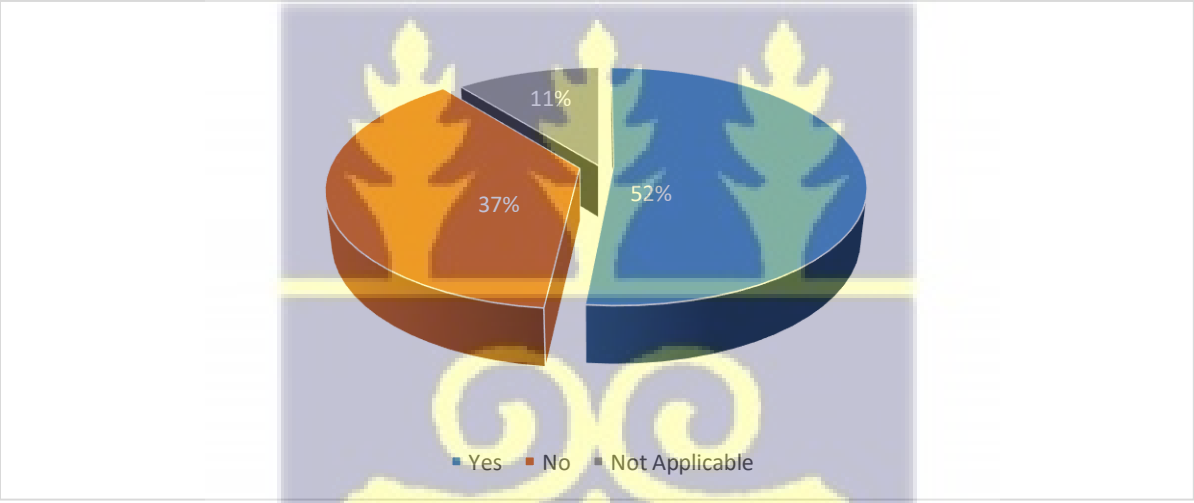
To assess the effects of the DESDP on livelihood outcomes, two indicators were probed. The indicators were:

1. Perception of respondents on whether the DESDP affected the attainment of livelihood outcomes.
2. Assessing the extent of the effect of the DESDP on livelihood outcomes

#### 4.5.2.1 Perception of Respondents on Whether the DESDP Affected the Attainment of Livelihood Outcomes

Per the results of the study, respondents affirmed that the presence of the DESDP influenced their livelihood outcomes. Out of 120 respondents, 52% indicated that the DESDP affected their attainment of their livelihood outcomes, 37% however stated that the DESDP did not affect the attainment of their livelihood outcomes (Figure 4.32). The remaining 11%, largely represented by unemployed people indicated that the assessment did not apply to them, since they were not actively pursuing a livelihood strategy.

Figure 4.32: Effect of the DESDP on the attainment of livelihood outcomes of respondents




Source: Field data (2022) n=120

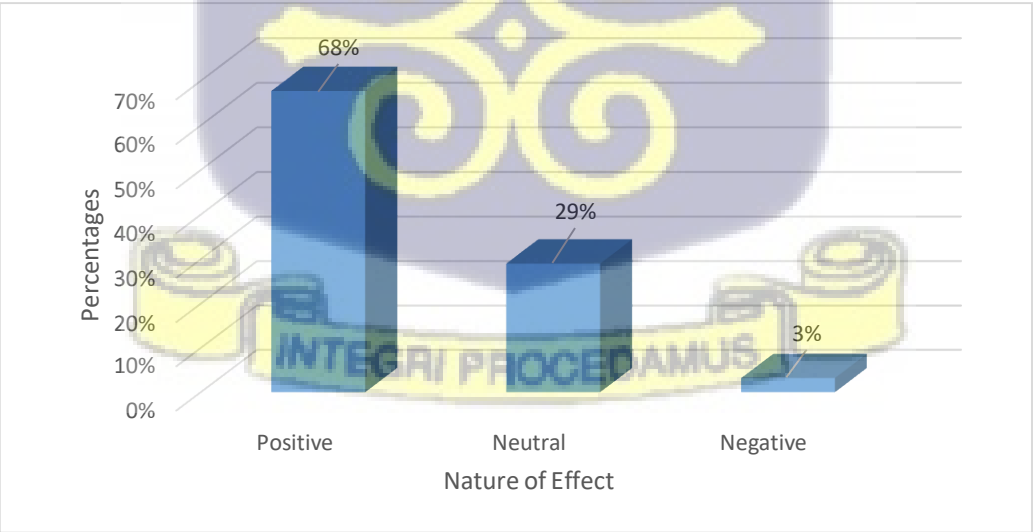
The results are therefore an indication that the implementation of the DESDP project has affected the attainment of livelihood outcomes. The discussions around this result showed that the effect of the DESDP on livelihood outcomes was rather considered as an indirect effect of the DESDP on livelihood assets and strategy. One of the participants, a wood and construction material shop owner, in the traders FGD asserted that attaining these outcomes could be derived from other livelihood strategies that were not necessarily affected by the sea defence. In her words;

*The only thing about the sea defence and my income was that I had to spend the money I could re-invest into my business to now buy some of my work tools again. This meant my profit was getting affected and I could not save much. But all I can say is that, now I don't have to buy my tools again and so I can properly keep account of my income. But honestly, not much has changed I must say* (A wood and construction material shop owner in the Traders FGD, 2022).

#### 4.5.2.2 The Extent of the Effect of the DESDP on Livelihood Outcomes

It is important to assess how intensely the DESDP affected livelihood outcomes in particular because these outcomes can indirectly influence how sustainable a livelihood choice can be (United Kingdom Department for International Development (DFID), 2001). Out of the 62 respondents who indicated that the DESDP had affected their livelihoods, a probe into their response showed that 68% selected that the effect was positive, 29% asserted that the effect was neutral, whereas the remaining 3% stated that the effect negatively affected the attainment of their livelihood outcomes.

Figure 4.33: Nature of the effect of the DESDP on the attainment of livelihood outcomes of respondents




Source: Field data (2022) n=62

The responses from the study however slightly contradict the results reported in Dogbey (2015) study of the KSDP and its effect on livelihood outcomes as part of his study. Dogbey (2015) reported that, per the study, the KSDP did not necessarily lead to an improvement in livelihood outcomes for the residents of Keta where he conducted the study. The extent of the effects was also assessed by juxtaposing the perception of respondents on what the attainment of livelihood outcomes looked like before and after the DESDP.

Table 4.9: Attainment of Livelihood Outcomes before and after the DESDP

| **Attainment of Livelihood Outcome Owing to the DESDP** | **Major Effect on Livelihood Outcome** | | | | | | |
|---|---|---|---|---|---|---|---|
| **Type Of Livelihood Outcome** | **Before DESDP** | | | | **After DESDP** | | |
| | **Positive (No.)** | **Mid Attainment (No.)** | **Low (No.)** | **Negative (No.)** | **Positive (No.)** | **Mid Attainment (No.)** | **Low (No.)** |
| Increase in income | 1 | 45 | 13 | - | 19 | 39 | 3 |
| Improvement in health and well-being | 6 | 41 | 12 | - | 19 | 38 | 1 |
| Increased access to resources | 4 | 31 | 23 | - | 23 | 34 | 1 |
| Decrease in vulnerability to shocks and hazards | 1 | 18 | 29 | 15 | 39 | 16 | 6 |
| Increased food security | 4 | 35 | 17 | 1 | 11 | 39 | 7 |
| Other | 3 | 6 | 2 | - | 3 | 2 | 1 |
| Increased assets to facilitate livelihood strategies | - | 26 | 28 | 4 | 32 | 24 | 2 |

Source: Field data (2022)

The results (Table 4.9) shows that the DESDP generally had a positive impact on the livelihood outcomes of the respondents. There were significant improvements in income, access to resources, decreased vulnerability, and increased assets. Additionally, improvements were seen in health and well-being outcomes, and there were no negative outcomes reported in the food security category. However, there were some areas where the program did not have a significant impact, such as in the number of individuals experiencing positive outcomes related

to increased food security. Overall, the program was successful in improving the livelihoods of the individuals involved.

In explaining this, some residents asserted that they could attain their livelihood outcomes since they had the chance to pursue their livelihood strategy in a calmer environment without fear of high tide intrusion. In the words of the Assistant Project Contractor during the interview.

> *Residents can focus on pursuing their livelihood strategies more which is likely to trickle downto enable them to attain their livelihood goals directly and indirectly* (Assistant Project Coordinator, 2022).

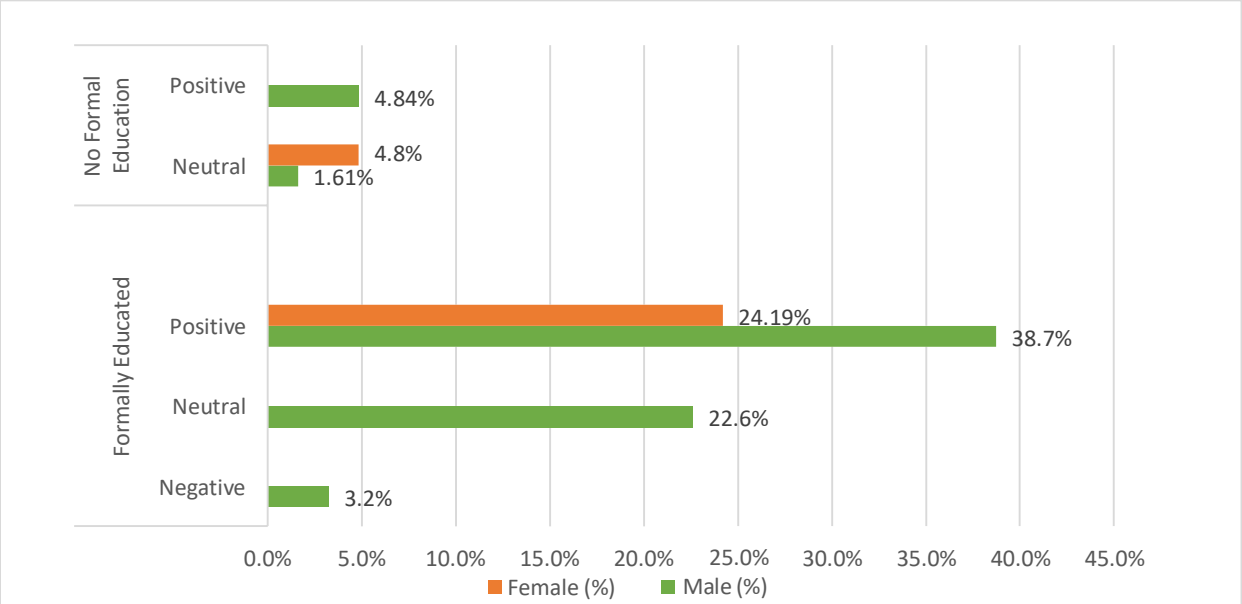
### 4.6 Effects of the Dansoman Emergency Sea Defence Project Phase One on the Livelihood of Residents in Glefe along Gender Lines

The study aimed to investigate how the construction of the DESDP affected the livelihood outcomes of residents living in Glefe, along gender lines, using the results 62 respondents who answered the questions from this section of the study. To achieve this, the variables depicting gender were delineated as education and sex. To aid in the analysis, sex and education were categorised under sub-variables. The education variable was categorised under formally educated (consisting of persons with primary, junior, and senior high school, technical and tertiary education) and those with no formal education. The category sex was denoted by male and female.



The results (Figure 4.34) indicated that the effects of the DESDP on the livelihood of males were more positive for formally educated males (38.7%), than females (24.19%). The results also indicate that 22.6% of formally educated males regarded the effect of the DESDP on livelihood as being neutral, with the remaining 3.2% stating that they were negatively affected

Figure 4.34: Effect of DESDP on Livelihood along gender lines




Source: Field data (2022) n=62

On the part of respondents with no formal education, the majority of the males indicated a positive effect on livelihood outcomes (4.8%), whilst the remaining females (4.8% and males (1.61%), indicated that the effects were neutral.

The responses, therefore, indicated that the DESDP had a more positive effect on the livelihood of males than females. To further expand on the results, the effect of sex on livelihood suggests that the construction of the sea defence system can have slightly differential effects on the livelihoods of men and women (Dehghani et al., 2018; Department for International Development, 1999). It is important to however, note that the effect of the DESDP on males does not necessarily indicate that the DESDP was entirely beneficial to their livelihood. Rather, it highlights the need to consider gender-specific impacts of development interventions, such as sea defence systems, to ensure that no group is disproportionately affected. A probe during

the fisherfolk FGD revealed that contradictory to the quantitative data, the effect of the DESDP on males was not entirely positive. According to the chief fisherman, the effect was more neutral;

> *The sea defence has helped with protecting our assets and reducing the impact of the high tides, but when it comes to going to fish, it has really worried us. Knowing very well that this place (Glefe) is a fishing area, they should have asked for our opinions before putting it up. Our women are happy because now, they can sell and get money, but we only benefit from the safety of our boats and the small money we make. We do not want to sound like we don't appreciate the help, we are only saying that, concerning the sea defence and our livelihood, the benefits are not so many, it is just okay.* (Chief Fisherman in FGD, 2022).

The response from a fishmonger was similar to that of the fishermen. According to her;

> *Because the men do not fish here like they used to, we cannot buy so much fish from them, unless we go to the other sides, or in the worst case, we end up at Makola to buy frozen fish which is not as sweet. We know it (the DESDP) is protecting us, but our work is suffering too* (A Fishmonger in FGD, 2022).

In summary, the results suggest that a gender-sensitive approach is needed to design and implement sea defence systems that consider the differential impacts on the livelihoods of men and women. The findings highlight the importance of considering factors, such as sex and educational status, in interventions aimed at improving livelihoods in areas affected by sea defence systems.

# CHAPTER FIVE

## SUMMARY OF KEY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

### 5.0 Introduction

This chapter presents the key findings, conclusions, and recommendations for assessing the effects of the DESDP on the livelihood of residents in Glefe in the Ablekuma West Municipality, Ghana. The summary of findings is presented according to the objectives, followed by the conclusion, and finalised with a presentation of recommendations.

### 5.1 Summary of Findings

The Dansoman Emergency Sea Defence Project, Phase One (DESDP) is a relevant engineering structure that serves as a key adaptation tool for addressing climate change effects and enhancing the resilience of vulnerable coastlines along Ghana's coast. The benefits of the DESDP are however cross-cutting, as it ranges from environmental and social benefits as well, such as safeguarding life and property. The study, in a bid to ascertain how an adaptation structure such as the DESDP affects livelihood, therefore assessed the Effects of the Dansoman Emergency Sea Defence Project on the Livelihood of Residents of Glefe, Accra, Ghana by examining the background characteristics of residents in Glefe, assessing their livelihood assets, strategies and outcomes and the effect of the DESDP on them, and providing a gender perspective to the effects of the DESDP on livelihood.



#### 5.1.1 Demographic Background of Residents of Glefe

The study showed that 66% of the 120 respondents were men and the majority of the respondents fell within the 26-35 years age bracket. The study also showed that a good number

of residents are within the single and married brackets after the probe on marital status. A higher number of the respondents had their level of education as JHS (23%) and SHS (22%) with 26% being fishermen. The results of the study also discovered that majority of the respondents had dependants under their care, with the least being one and highest being six. The study also asserted that the majority of the respondents are Ga, with most indicating that they are the heads of their households (majority being male).

### 5.1.2 Effects of DESDP on Livelihood Assets, Strategies and Outcomes

The results from the study indicate that the effects of the DESDP on livelihood assets varied amongst the different assets available to the residents in pursuing their livelihood. Out of the 5 capitals within the asset pentagon, Physical Capital was the most affected by the DESDP. The findings of this study also revealed that the effect of the DESDP on livelihood strategies was significant for fishermen, as their livelihood strategies depended on accessibility to the beach. The effect on fishermen led to an eventual change in the design of the structure from a sea defence wall to a groyne, to provide an avenue for the fishermen to fish close to the sea. With regard to the effect of the DESDP on livelihood outcomes, the major outcome that recorded a significant change was a decrease in vulnerability to shocks. Before the DESDP, residents indicated that the attainment of decreased vulnerability to shocks was low, but after the construction of the DESDP, the state of attainment of the same outcome was positive. On a general scale, the effect of the DESDP on livelihood outcomes are positive.

### 5.1.3 Effects of the Dansoman Emergency Sea Defence Project Phase One on the Livelihood of Residents in Glefe along Gender Lines

The study focused on gender perspectives and examined how the development of the DESDP affected the livelihoods of residents in Glefe, Ghana. The findings show that DESDP had a more positive effect on male livelihoods than it did on female livelihoods, particularly for males with

formal education. It is essential to note, though, that not all males necessarily benefited equally from the DESDP.

### 5.2 Conclusion

This study has confirmed assertions made in the study of the impacts of projects on livelihoods and the role livelihood assets, strategies and outcomes play in the response of residents to the effects of a project along the coast. Owing to the presence of the DESSP, residents have also asserted that the DESDP has been key in preserving livelihood assets used to pursue livelihood strategies. The nuances of the construction of the DESDP and how it particularly affected fishermen must be highlighted, as this is gradually forcing them to fish at other locations, which in turn affects how much access to fresh catch fishmongers and fish smokers have. The results also show that the effects of the DESDP were dire on the livelihoods of fisherfolk and individuals whose livelihoods depended on fishing activities. As seen in the findings, the DESDP has also been beneficial to safeguarding life and property at the coast but had minimal positive effects on the livelihoods of residents in Glefe. The analysis along gender lines revealed that sex and education have a notable influence on livelihoods. The livelihood of residents was measured using livelihood outcome as a measure of livelihood, considering that the goal of pursuing a livelihood strategy is to achieve an outcome. The study revealed that the DESDP did not factor in livelihood as a vulnerable variable, and therefore did not make room to address how local livelihood would be affected as much as it emphasised safeguarding property and the coastline. The study therefore emphasises the requirement for a gender-sensitive design and implementation of such interventions to prevent disparate effects on various gender groups. The study also shows that when designing interventions targeted at enhancing livelihoods in places impacted by coastal erosion, social aspects like sex and educational background should be taken into account.

### 5.3 Recommendations

The recommendations for this study are based on the findings from the study and existing trends in curbing coastal erosion with a focus on livelihood sustainability.

*Nature-Based Solutions*: A major factor to consider in future coastal defence projects will be to incorporate nature-based solutions as a coastal defence mechanism. A key concern raised by the residents included a constant mention of incorporating the planting of coconut trees along the coast to also serve as a breakwater. Further probes indicated that the planting of coconut trees was part of the initial design structure but was not fully pursued by the residents since they had limited access to land. A combination of hard and soft engineering methods by the key engineering and design stakeholders will go a long way to combat both high tides and coastal erosion, as well as have a livelihood sustainability co-benefit.

*Traditional Ecological Knowledge vis-a-vis Blue Economy:* Based on the responses from the study, a strategy for implementation, a merger of blue economy and incorporating local traditional knowledge garnered from lived experiences should be gradually introduced to the fishermen within Glefe and other coastal communities burdened with intrusive waves, high destructive tides, and coastal erosion to sustain local livelihood. The incorporation of local practices into the blue economy will enable a holistic approach that values local rights, values, and knowledge systems. This can be spearheaded by adaptation-focused civil society organisations and also amplified by the governmental representatives to the municipal assembly, to be escalated for discussions at the parliamentary level as well. By integrating traditional ecological knowledge, sustainable livelihoods, education, and partnerships, a blue economy can enable the transformation of thelocal fishing industry to support and sustain coastal livelihood whilst marine and coastal resources for the benefit of future generations.

*Proper Environmental and Social Impact Assessment:* Gender-sensitive environmental and social impact assessments should be conducted in implementing future projects where hard engineering structures are to be constructed to abate high tides and guard against coastal erosion by relevant authorities like the Environmental Protection Agency, and Environmental, Social and Gender experts. This will be key in guiding the design of these structures in line with local livelihood patterns and ensuring timely implementation of some of these coastal engineering projects whilst also ensuring livelihood sustainability. The assessment should also be conducted using a participatory approach to include beneficiaries in major project decision-making as it will help include their suggestions and concerns in the final project design and implementation process.

*Separation of Political interference in projects:* Future projects should be separated from political interference as it stalls implementation and can cause further havoc. In the case of the DESDP, there is a need for the construction of a second phase of the project which has stalled. The residents attributed this to the change in government, as the project contract was not renewed in the tenure of the sitting government to continue the second phase of implementation. The issue of weak intergovernmental transfer mechanisms tends to affect the full implementation of such developmental projects, especially along the coastal areas. Governmental agencies such as the Ministry of Works and Housing, who are involved in the implementation of coastal resilience infrastructure can further partner with environmental non-governmental organisations to develop bankable proposals to fund adaptation projects like the DESDP.

*Provision of Amenities:* The provision of social and economic amenities to facilitate livelihood should be incorporated into the construction of future coastal defence structures. The DESDP did not include road repair and other amenities for persons who had to move away for the DESDP to be constructed. It will be relevant to emulate the structure of the KSDP and incorporate the

provision of social and economic amenities for sustaining livelihoods and enhancing their living conditions.

## REFERENCES

Abeka, E. A. (2014). *Adaptation To Urban Floods Among the Poor in the Accra* (Issue December 2014).

Ablekuma West Municipal Assembly. (2020). *The Assembly | Ablekuma West*. http://abwma.gov.gh/mce

Addo, K. A., Addo, I. A., Appeaning Addo, K., Appeaning Addo, I., Addo, K. A., & Addo, I. A. (2016). Coastal erosion management in Accra: Combining local knowledge and empirical research. *Jàmbá: Journal of Disaster Risk Studies*, *8*(1), 1–10. https://doi.org/10.4102/jamba.v8i1.274

Adikah, R., Mensah, J. V., Amissah, A. A., & Mensah, J. (2020). Assessment of the Effects of Keta Sea Defence Project on the Livelihoods of the People in the Keta Municipality , Volta Region , Ghana. *International Journal of Geography and Regional Planning*, *6*(1), 147–159.

Aghladze, N. (2017). The Impact of Social Capital on FDI in Georgia. *European Journal of Economics and Business Studies*, *9*(1), 17. https://doi.org/10.26417/ejes.v9i1.p17-24

Almar, R., Stieglitz, T., Addo, K. A., Ba, K., Ondoa, G. A., Bergsma, E. W. J., Bonou, F., Dada, O., Angnuureng, D., & Arino, O. (2022). Coastal Zone Changes in West Africa: Challenges and Opportunities for Satellite Earth Observations. In *Surveys in Geophysics* (pp. 1–27). Springer Science and Business Media B.V. https://doi.org/10.1007/s10712-022-09721-4

Amankwah, E., Awafo, E., & Atta-Darkwa, T. (2020). Socioeconomic Impact of Development Projects on the Livelihood of Farmers: A Case Study of the Bui Dam Hydroelectric Project. *Journal of Geography, Environment and Earth Science International*, *February*, 34–44. https://doi.org/10.9734/jgeesi/2020/v24i130192

Amoako, C. (2017). Becoming Resilient? Incremental Learning and Flood Responses in Informal Settlements in Accra, Ghana. *ICIDA 2017 - 6th International Conference on Infrastructure Development in Africa*, *June*, 469–483.

Amoani, K. Y., Appeaning Addo, K., & Laryea, W. S. (2012). Short-term shoreline evolution trend assessment: A case study in Glefe, Ghana. *Jàmbá: Journal of Disaster Risk Studies*, *4*(1), 1–8. https://doi.org/10.4102/jamba.v4i1.45

Angnuureng, D., & Appeaning Addo, K. (2013). Impact of sea defense structures on downdrift coasts: The case of Keta in Ghana Evolution of the embayed section of the Elmina coastline View project Integrated and Sustainable Port Development in Ghana within an African Context View project. *Academia Journal of Environmental Sciences 1(6): 1*(6), 104–121. https://doi.org/10.15413/ajes.2013.0102

Anim, D. O., Nkrumah, P. N., David, N. M., Ofosu Anim, D., Nti Nkrumah, P., & Macpherson David, N. (2013). A rapid overview of coastal erosion in Ghana. *International Journal of Scientific & Engineering Research*, *4*(2), 1–7.

ANZDEC. (2009). *India: Sustainable Coastal Protection and Management PPTA Final Report* (Issue April).

Armah, A. K. (2005). *The Coastal Zone of Ghana: Vulnerability and Adaptation Assessment to Climate Change*.

Asiedu-Addo, S. (2021). Sea defence projects on course. *Graphic Online*.

Ayerteye, E. A. (2022). IJRISS) |Volume VI, Issue I. *International Journal of Research, and Innovation in Social Science*, 2454–6186.

Banerjee, A., & Chaudhury, S. (2010). Statistics without tears: Populations and samples. *Industrial Psychiatry Journal*, *19*(1), 60. https://doi.org/10.4103/0972-6748.77642

Bevacqua, A., Yu, D., & Zhang, Y. (2018). Coastal vulnerability : Evolving concepts in understanding vulnerable people and places. *Environmental Science and Policy*, *82*(November 2017), 19–29. https://doi.org/10.1016/j.envsci.2018.01.006

Boateng, I. (2012). An assessment of the physical impacts of sea-level rise and coastal adaptation: A case study of the eastern coast of Ghana. *Climatic Change*, *114*(2), 273–293. https://doi.org/10.1007/s10584-011-0394-0

Brian Keeley. (2007). Human Capital : How what you know shapes your life. In *OECD Insights* (pp. 102–105). https://doi.org/10.1007/978-90-481-9606-7_1

British Broadcasting Corporation. (2022). *Coastal Processes*. https://doi.org/10.4324/9780203430590

Bruun, P. (1988). The Bruun Rule of Erosion by Sea-Level Rise: A Discussion on Large-Scale Two- and Three-Dimensional Usages. *Journal of Coastal Research*, *4*(4), 627–648.

Business Ghana. (2022). *Govt invest GHC2.85 in coastal protection – Works Minister - BusinessGhana*. https://www.businessghana.com/site/news/general/265057/Govt-invest-GHC2-85-in-coastal-protection-Works-Minister

Cape Coast Oguaa. (2021). *70million dollar Cape Coast Sea defence project.....still ongoing*. https://m.facebook.com/Cape-Coast-Oguaa-454786941956880/videos/70million-dollar-cape-coast-sea-defence-projectstill-ongoing/287480189512105/

Casali, L. R. (2018). The Role of Social Capital in Fishing Community Sustainability: Case of Shelter Cove, Ca. In *The Faculty of Humboldt State University In*.

Chambers, R., & Conway, G. R. (1992). Sustainable Rural Livelihoods : practical concepts for the 21st Century. In *IDS Discussion Paper* (Vol. 296, Issue Brighton: Institute of Development Studies, University of Sussex, pp. 1–27). https://doi.org/ISBN 0 903715 58 9

Charlier, R. H., & De Meyer, C. P. (1989). Coastal defense and beach renovation. *Ocean and Shoreline Management*, *12*(5–6), 525–543. https://doi.org/10.1016/0951-8312(89)90029-5

Coastal Innovations. (n.d.). *Coastal Erosion*. https://doi.org/10.1007/978-1-4020-4399-4_65

CoastalWiki. (2002). Coastal Defences. In *Coastal Defences*. https://doi.org/10.4324/9780203187630

Codjoe, S. N. A., Appeaning Addo, K., Addoquaye Tagoe, C., Nyarko, B. K., Martey, F., Nelson, W. A., ... & Abu, M. (2020). The Volta Delta, Ghana: Challenges in an African Setting. *Deltas in the Anthropocene*, 79-102.

Creswell, J. W. (2019). *Research Design Qualitative, Quantitative and Mixed Research Approaches*.

Dehghani, M., Akbar, A., Azadi, H., & Sche, J. (2018). *Revealing the role of livelihood assets in livelihood strategies : Towards enhancing conservation and livelihood development in the Hara Biosphere*. *94*(May), 336–347. https://doi.org/10.1016/j.ecolind.2018.05.074

Department for International Development. (1999). Key Sheets for Sustainable Livelihoods. *Overseas Development Institute*, 1–4.

Dibajnia, M., & Nairn, R. B. (2005). *Cotonou Sea Defence Project, Benin, West Africa*. 3927–3939. https://doi.org/10.1142/9789812701916_0317

Dogbey, S. Y. A. O. (2015). *Analyzing Post Coastal Erosion Livelihoods After the Construction*.

Eko Atlantic. (n.d.). *The History of The Great Wall of Lagos - Eko Atlantic*. Retrieved 5 November 2022, from https://www.ekoatlantic.com/education/sea-wall/

Ellis, D., & Eden, M. (2022). *Materials for Coastal Engineering*. https://www.sandberg.co.uk/consultancy/geomaterials/coastal-engineering/

Ellis, F. (2000). *Rural Livelihoods and Diversity in Developing Countries*. Oxford University Press.

Eshun, I., Golo, H. K., & Dankwa, S. (2019). *Livelihood Strategies and Outcomes of Fisher Folks in Selected Rural Coastal Communities of Ghana*. *48*, 35–46. https://doi.org/10.7176/JCSD

Food and Agriculture Organization. (2008). An Introduction to the Basic Concepts of Food Security Food Security Information for Action. *EC - FAO Food Security Programme*, 1–3.

Ghana Statistical Service. (2021). *Ghana 2021 Population ad Housing census ,General report -Volume 3A*.

Ghana Statistical Service (GSS). (2014). Accra metropolitan. *Ghana Statistical Service*, 66.

Gibb, J. G. (1978). Rates of coastal erosion and accretion in New Zealand. *New Zealand Journal of Marine and Freshwater Research*, *12*(4), 429–456.

https://doi.org/10.1080/00288330.1978.9515770

Government of Ghana. (2017). *The Coordinated Programme of Economic and Social Development Policies (2017-2024): An Agenda for Jobs: Creating Prosperity and Equal Opportunity for All* (pp. 1–151).

Hawkson, E. E. (2015). *60 Million-dollar Sakumono Sea Defence Project completed - Graphic Online*. https://www.graphic.com.gh/news/general-news/60-million-dollar-sakumono-sea-defence-project-completed.html

International Labour Organisation. (2022). *Statistics on The Working-age Population and Labour Force*. ILO. https://ilostat.ilo.org/topics/population-and-labour-force/

Institute of Local Government Studies. (2010). *A Guide to District Assemblies in Ghana*.

Intergovernmental Panel on Climate Change. (2011). IPCC Special Report on Carbon Dioxide Capture and Storage. In *Environmental Science and Technology* (Vol. 45, Issue 13, pp. 5710–5716).

International Recovery Platform, & United Nations Development Programme. (2010). *Guidance Note on Recovery Livelihood* (pp. 1–71). IUCN. (n.d.). *Securing Coastal Livelihoods*.

Kantamaneni, K., Rice, L., Du, X., Allali, B., & Yenneti, K. (2022). Are Current UK Coastal Defences Good Enough for Tomorrow? An Assessment of Vulnerability to Coastal Erosion. *Coastal Management*, *50*(2), 142–159. https://doi.org/10.1080/08920753.2022.2022971

Keeley, J. (2001). Influencing Policy Processes for Sustainable Livelihoods: strategies for change. *Lessons for Change in Policy & Organisations No. 2*, 27.

Khan, H. A., & Korbel, J. (2008). *Challenges for Sustainable Development: Rapid Urbanization, Poverty and Capabilities in Bangladesh*.

Kingdom of The Netherlands. (n.d.). *Water, climate, and energy: the Netherlands and Australia | Australia | Netherlandsandyou.nl*. Kingdom of The Netherlands. Retrieved 19 April 2022, from https://www.netherlandsandyou.nl/your-country-and-the-netherlands/australia/and-the-netherlands/water-climate-and-energy.

Kismartini, & Yusuf, M. (2015). Stakeholders Analysis: Managing Coastal Policy Implementation in Rembang District. *Procedia Environmental Sciences*, *23*, 338–345. https://doi.org/10.1016/j.proenv.2015.01.049

Kleih, U., Alam, K., Dastidar, R., Dutta, U., Oudwater, N., & Ward, A. (2003). *Livelihoods In Coastal Fishing Communities, And the Marine Fish Marketing System of Bangladesh*.

Knutsson, P. (2016). The Sustainable Livelihoods Approach: A Framework for Knowledge Integration Assessment. *Human Ecology Review*, *13*(1), 90–99.

Kollmair, M., & Gamper, S. (2002). *The Sustainable Livelihoods Approach* (pp. 3–11). https://doi.org/10.1007/978-981-10-0983-9_5

Kraus, N. C., Hanson, H., & Blomgren, S. H. (1995). Modern functional design of groin systems. *Proceedings of the Coastal Engineering Conference*, *2*, 1327–1342. https://doi.org/10.1061/9780784400890.097

Kudiabor, P. K. (2012). *Glefe community faces wrath of global warming - Ghana Business News*. Ghana Business News. https://www.ghanabusinessnews.com/2012/07/16/glefe-community-faces-wrath-of-global-warming/

Kusimi, J. M., & Dika, J. L. (2012). Sea erosion at Ada Foah: Assessment of impacts and proposed mitigation measures. *Natural Hazards*, *64*(2), 983–997. https://doi.org/10.1007/s11069-012-0216-3

Larbi, R. T. (2017). *University Of Ghana College of Humanities Exposure to And Impacts of Flooding in Selected Urban Communities in Accra , Ghana : Examining the Implications for Building Resilience by Legon in Partial Fulfilment of the Requirement for The Award Of Ph.D. December*.

Mangor, K., Drønen, N. K., Kærgaard, H. K., Kristensen, S. E., & DHI. (2017). *Shoreline Management Guidelines*.

Massachusetts Office of Coastal Zone Management. (2013). *StormSmart Properties Fact Sheet 7: Repair and Reconstruction of Seawalls and Revetments What Are Seawalls and Revetments?*

Mensah, E. J. (2012). The Sustainable Livelihood Framework: A Reconstruction. *The Development Review – Beyond Research*, *1*(1), 6–25.

Mensah, J. J. V., Amissah, A. A., & Adikah, R. (2020). Assessment of the Effects of Keta Sea Defence Project on the Livelihoods of the People in the Keta Municipality, Volta Region , Ghana. *International Journal of Geography and Regional Planning*, *6*(1), 147–159.

Mentaschi, L., Vousdoukas, M. I., Pekel, J.-F., Voukouvalas, E., & Feyen, L. (2018). *Global long-term observations of coastal erosion and accretion OPEN*. *8*, 12876. https://doi.org/10.1038/s41598-018-30904-w

Merriam, S. B. (2009). *Qualitative Research: A Guide to Design and Implementation (Jossey-Bass Higher & Adult Education Series)*. 320.

Ministry of Environment Science Technology and Innovation. (2013). *Ghana National Climate Change Policy* (p. 88).

Ministry of Works and Housing. (n.d.). *Sector Strategic Medium Term Development Plan 2018-2021*.

Ministry of Works and Housing. (2019). *Ministry of Works and Housing - 2019 Meet the Press Highlights*.

Ministry Of Works and Housing. (2018a). *Medium Term Expenditure Framework ( MTEF ) 2018-2021* (p. 73).

Ministry Of Works and Housing. (2018b). *Medium Term Expenditure Framework ( MTEF ) For 2018 - 2021 Programme Based Budget Estimates*.

Møller-Jensen, Maya Agergaard, J., Andreasen, M. H., Oteng-Ababio, M., & Yankson, P. W. K. (2020). *Urban expansion and consolidation in Accra ' s peripheries : An examination of the entwinement of development and flood risk in four settlements Urban expansion and consolidation in Accra ' s peripheries :* (Issue December).

Mörner, N.-A., & Finkl, C. W. (2019). Coastal Erosion. In C. W. Finkl & C. Makowski (Eds.),

*Encyclopedia of Coastal Science* (pp. 444–451). Springer International Publishing. https://doi.org/10.1007/978-3-319-93806-6_373

Naadi, T. (2016). *Ghana's coastal erosion: The village buried in sand*. BBC Africa. https://www.bbc.com/news/world-africa-36257360

Nairn, R. B., Macintosh, K. J., Hayes, M. O., Nai, G., Anthonio, S. L., & Valley, W. S. (1998). Coastal Erosion at Keta Lagoon, Ghana Large Scale Solution to a Large-Scale Problem. *COASTAL ENGINEERING*, 3192–3205.

National Research Council. (1990). *Managing Coastal Erosion (1990)*. https://doi.org/10.17226/1446

National Research Council. (1993). Science and Stewardship in the Antarctic. In *Science and Stewardship in the Antarctic*. The National Academies Press. https://doi.org/10.17226/2223

National Research Council. (2008). Coastal Hazards : Highlights of National Academies Report. *Ocean Science Series*.

Nxumalo, K. K. S., & Antwi, M. A. (2013). Impact of Proactive Land Acquisition Strategy on Physical Capital Livelihood of Beneficiaries in Dr. *Journal of Human Ecology*, *44*(2), 161–169. https://doi.org/10.1080/09709274.2013.11906654

Olympio, G. F. A., & Amos-Abanyie, S. (2013). Effects Of Shoreline Erosion on Infrastructure Development Along the Coastal Belt of Ghana : Case of Nkontompo Community. *Journal of Science and Technology (Ghana)*, *33*(3), 39–50. https://doi.org/10.4314/just.v33i3.5

Organisation for Economic Co-operation and Development. (2017). *Demography - Working age population - OECD Data*. OECD. https://data.oecd.org/pop/working-age-population.htm#indicator-chart

Ostrom, E. (1999). *Social capital: a fad or a fundamental concept?* 172–214. https://doi.org/10.1042/bst0050978

Owusu-Adjapong, E. (2018). *Oil and Gas Production in Ghana : Blessing or Curse ?* 1–3.

Pilarczyk, K. (2011). *Hydraulic And Coastal Structures in International Perspective*. https://doi.org/10.1142/9789814360579_0002

Poku-boansi, M., Amoako, C., Owusu-Ansah, J. K., & Cobbinah, P. B. (2016). *Climate variability and communities' vulnerability along Ghana's coastline*. *2014*.

Prasetya, G. (2001). Chapter 4: Protection from coastal erosion. *Coastal Protection in the Aftermath of the Indian Ocean Tsunami: What Role for Forests and Trees? Proceedings of the Regional Technical Workshop, Khao Lak, Thailand, 28–31 August 2006*, 103–132.

Quagrainie, K. K., & Chu, J. (2019). Determinants of catch sales in Ghanaian artisanal fisheries. *Sustainability (Switzerland)*, *11*(2). https://doi.org/10.3390/su11020298

Reid, R. T. (2009). Ancient Cities Lost to the Seas |. *Smithsonian Magazine*.

Roberts, C., Danquah, J. A., Roberts, C. O., & Appiah, M. (2021). Effects of Decline in Fish Landings on the Livelihoods of Coastal Communities in Central Region of Ghana Effects of Decline in Fish Landings on the Livelihoods of Coastal Communities in Central Region of Ghana. *Coastal Management*, *0*(0), 1–19. https://doi.org/10.1080/08920753.2021.1967562

Roth, F., & Gustafsson, C. (2021). *Policy Brief: Healthy coastal ecosystems are crucial to mitigate climate change*.

School of Oriental and African Studies London. (2021). *Unit 1 Rural Livelihoods: Importance and Definitions causes . In Livelihoods : Unit 1 Rural Importance and*. Study Material. https://www.soas.ac.uk/cedep-demos/000_P535_SRL_K3736-Demo/unit1/page_12.htm

Swiss Virtual Campus (SVC). (2013). *DFID's Sustainable Livelihoods Approach and its Framework*. Globalisation and Livelihood Options of People Living in Poverty (GLOPP). http://www.glopp.ch/B7/en/multimedia/B7_1_pdf2.pdf

Tasantab, J. C., Gajendran, T., von Meding, J., & Maund, K. (2020). Perceptions and deeply held beliefs about responsibility for flood risk adaptation in Accra Ghana. *International Journal of Disaster Resilience in the Built Environment*, *11*(5), 631–644. https://doi.org/10.1108/IJDRBE-11-2019-0076

U.S. General Services Administration. (2016). *Limestone: Characteristics, Uses and Problem*. https://www.gsa.gov/node/88304?Form_Load=88341

UNDP. (2017). Application of the Sustainable Livelihoods Framework in. *United Nations Development Programme*, 1–21.

United Kingdom Department for International Development (DFID). (2001). *Sustainable livelihoods guidance sheets*.

United Nations. (2007). *Percentage Of Total Population Living in Coastal Areas Oceans, Seas, and Coasts Coastal Zone Core indicator*.

United Nations Climate Technology Centre and Network. (2016). *Sea walls | Climate Technology Centre & Network*. https://www.ctc-n.org/technologies/sea-walls

University of Ghana. (2022). *Prof. Kwasi Appeaning Addo Delivers Inaugural Lecture | University of Ghana*. https://www.ug.edu.gh/news/prof-kwasi-appeaning-addo-delivers-inaugural-lecture.

van der Meer, J. W. (2017). Geometrical design of coastal structures. *Dikes and Revetments: Design, Maintenance, and Safety Assessment*, 161–175. https://doi.org/10.1201/9781315141329

Vousdoukas, M. I., Ranasinghe, R., Mentaschi, L., Plomaritis, T. A., Athanasiou, P., Luijendijk, A., & Feyen, L. (2020). Sandy coastlines under threat of erosion. *Nature Climate Change*, *10*(3), 260–263. https://doi.org/10.1038/s41558-020-0697-0

Western Regional Coordinating Council. (2021). *Minister For Works and Housing Inspects Ongoing Works in the Sector – Western Regional Co-Ordinating Council*. https://wrcc.gov.gh/minister-for-works-and-housing-inspects-ongoing-works-in-the-sector/

Williams, A. T., Rangel-Buitrago, N., Pranzini, E., & Anfuso, G. (2018). The management of

coastal erosion. In *Ocean and Coastal Management* (Vol. 156, pp. 4–20). Elsevier Ltd. https://doi.org/10.1016/j.ocecoaman.2017.03.022

World Bank Group. (2021). *Fighting Coastal Erosion in Keta Area*.

Wu, G., Li, L., Ahmad, S., Chen, X., & Pan, X. (2013). *A Dynamic Model for Vulnerability Assessment of Regional Water Resources in Arid Areas: A Case Study of Bayingolin, China*. https://doi.org/10.1007/s11269-013-0334-z

Yusoff, M. M. (2020). Improving the quality of life for sustainable development. *IOP Conference Series: Earth and Environmental Science*, *561*(1). https://doi.org/10.1088/1755-1315/561/1/012020

# APPENDIX OF DATA COLLECTION INSTRUMENTS

## APPENDIX 1

## AN ASSESSMENT OF THE EFFECTS OF THE DANSOMAN EMERGENCY SEA DEFENCE PROJECT (DESDP) ON THE LIVELIHOOD OF RESIDENTS OF GLEFE, ACCRA, GHANA

Questionnaire for Respondents

**Greetings**

This study is conducted by Valerie Kplorm Aku Nutakor from the Institute of Statistical, Social and Economic Research (ISSER) - University of Ghana in partial fulfilment of the award of a Master of Arts Degree in Development Studies. The purpose of this study is to Assess the Effects of the Dansoman Emergency Sea Defence Project (DESDP) on the Livelihood of Residents of Glefe, Accra, Ghana. Kindly note that your participation is voluntary, and you are free to withdraw at any point during the interview. All responses from this interview will be confidential and solely collected for academic purposes.

May I have your consent to administer the questionnaire? 1. Yes 2. No (End data collection)

Thank you for your cooperation.

Please answer the following questions with a **tick [√]** where appropriate.

**SECTION A: BACKGROUND CHARACTERISTICS**

1. Name: …….

2. Age: .....

3. Ethnicity:

a) Akan [ ] b) Ewe [ ] c) Ga [ ] d) Ga-Adangme [ ] e) Guan [ ] f) Hausa [ ]

g) Other (Please specify): ……...

4. Gender: a) Male [ ] b) Female [ ]

5. Level of education:

a) No formal education [ ] b) Primary school [ ] c) Junior high school [ ] d) Senior high school [ ] e) Technical/Vocational f) Tertiary [ ] g) Other [ ]

(specify).....

6. Marital status: a) Single [ ] b) Co-habiting [ ] c) Married [ ]

d) Separated/ Divorced [ ] e) Widowed [ ]

7. What is your position in the household?

a) Head of household [ ] b) Spouse of household [ ] c) Child of household [ ]

d) Other (please specify).....

8. Occupation

a) Fisherman [ ] b) Fishmonger [ ] c) Government Worker (Civil Servant) [ ]

d) Trader [ ] e) Unemployed [ ] f) Other [ ] (Specify): .....

9. How many children do you have? .....

10. How many dependants under 18 years do you cater for? ……

11. How many years have you lived in Glefe? ……

12. Whose house are you currently residing in?

a) My own house I built b) Family house c) Rented house d) Other [ ].....

**SECTION B: Livelihood Asset Pentagon and Effects of the Dansoman Emergency Sea Defence Project on Livelihood Assets**

13. What physical capital livelihood assets are available to you? Kindly Tick [√] only those that are applicable to you.

a) Road Infrastructure [ ] b) Electricity [ ] c) Levees and seawalls [ ] d) Land (for farming, trading etc.) [ ] e) Health / Educational Facilities [ ] f) Canoe or fishing boats

g) Fishing tools (hook and line, fishing nets etc.) h) Other (please specify) .....

*14.* What human capital livelihood assets are available to you? Kindly Tick [√] only those that are applicable to you.

a) Access to Educational Facilities [ ] b) Training and Apprenticeship opportunities [ ]

c) Access to healthcare [ ] d) other [ ] specify……

*15.* What social capital livelihood assets are available to you? Kindly Tick [√] only those that are applicable to you.

a) Sense of belonging [ ] b) Conflict [ ] c) Reciprocity [ ] d) Family [ ]

e) Friends [ ] f) Occupational groupings [ ] g) Church groupings

h) School groupings [ ] i) Other [ ] specify.....

*16.* What financial capital livelihood assets are available to you? Kindly Tick [√] only those that are applicable to you.

a) Investments [ ] b) Savings facilities [ ] c) Occupational property [ ] d) Loans [ ]

e) Insurance f) Other [ ] specify.....

*17.* What natural capital livelihood assets are available to you? Kindly Tick [√] only those that are applicable to you.

a) Sea [ ] b) Land [ ] c) Rivers [ ] d) Lagoon [ ] e) Sea salt deposits []

f) Other [ ] specify ……

18. Has the construction of the DESDP affected your livelihood assets?

a) Yes

**b)** No **(Skip to Section C)**

*19.* Which of the following capital assets has it affected? Kindly Tick [√] only those that are applicable to you.

a) Physical capital [ ] b) Human capital [ ] c) Social capital [ ] d) Financial capital [ ] e) Natural capital [ ]

20. On a scale of 1 to 5 (where 1 denotes Not Affected (**NA**), 2 denotes Mildly Affected (**MA**), 3 denotes Affected (**A**), 4 denotes Highly Affected (**HA**) and 5 denotes Extremely Affected (**EA**)) please tick in Table 1, the level of effect the DESDP has had on the various livelihood assets.

***Table 1: Effects of DESDP on livelihood assets***

| | **LIVELIHOOD ASSET** | **NA (1)** | **MA (2)** | **A (3)** | **HA (4)** | **EA (5)** |
|---|---|---|---|---|---|---|
| (i) | Physical capital | | | | | |
| (ii) | Human capital | | | | | |
| (iii) | Social capital | | | | | |
| (iv) | Financial capital | | | | | |
| (v) | Natural capital | | | | | |

*21.* Please **Tick [√]** to indicate your take on the following statements in the Table 2. (Where *1= Strongly agree (**SA**), 2 = Agree (**A**), 3 = Not applicable (**NA**), 4 = Disagree **(D)**, 5= Strongly disagree (**SD**))*

***Table 2: Effects of DESDP on number of and access to livelihood assets***

| | **Statement:** *The construction of the DESDP has……* | **SA** (1) | **A** (2) | **NA** (3) | **D** (4) | **SD** (5) |
|---|---|---|---|---|---|---|
| (i) | improved the number of physical capital to sustain livelihood | | | | | |
| (ii) | improved my access to physical capital to sustain livelihood | | | | | |
| (iii) | improved the number of human capital to sustain livelihood | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| (iv) | improved my access to human capital to sustain livelihood | | | | | |
| (v) | improved the number of social capital to sustain livelihood | | | | | |
| (vi) | improved my access to social capital to sustain livelihood | | | | | |
| (vii) | improved the number of financial capital to sustain livelihood | | | | | |
| (viii) | improved my access to financial capital to sustain livelihood | | | | | |
| (ix) | improved the number of natural capital to sustain livelihood | | | | | |
| (x) | improved my access to natural capital to sustain livelihood | | | | | |

**SECTION C: Livelihood Strategies and Effects of the Dansoman Emergency Sea Defence Project on Livelihood Strategies**

22. What livelihood activities did you practise before the construction of the sea defence?

Please specify:

a) Fishing [ ] b) Fish mongering [ ] c) Smoking Fish only [ ] c) Trading [ ]

d) Government Worker (Civil Servant) [ ] e) Unemployed [ ] f) Other [ ] (Specify):

.....

23. Has your livelihood strategy changed since the construction of the DESDP?

**a)** Yes [ ] **(Please answer 24 and 25).**

**b)** No [ ] **(Skip to question 26)**

24. Has the construction of the DESDP been beneficial to sustaining your livelihood?

a) Yes [ ]

b) No [ ]

25. Kindly input the answer in the Table 3.

Please **write** to indicate your take on the **statement in c** in the table below. (Where *1= Completely (**C**), 2 = Partially (**P**), 3 = Not at All (**NAA**))*

**Table 3: Changes in livelihood Strategy**

| a. Before the construction of the DESDP I was a …. (e.g., *fisherman*) | b. After the construction of the DESDP, I am now a …… *(e.g., baker)* | c. Is the change in livelihood solely based on the construction of the DESDP? |
|---|---|---|
| | | 1. Yes<br>2. No |

**SECTION D: Livelihood Outcomes and Effects of the Dansoman Emergency Sea Defence Project on Livelihood Outcomes**

26. What livelihood outcomes do you seek to attain per your livelihood strategy/ strategies?

a) Improvement in health and well-being [ ] b) Increased food security [ ]

c) Increased access to resources [ ] d) Increase in income [ ]

e) Decrease in vulnerability to shocks and hazards [ ] f) Increased assets to facilitate livelihood strategies [ ] g) Other [ ] (Specify): .....

27. Has the construction of the DESDP affected the attainment of your livelihood outcomes?

a) Yes [ ]

b) No [ ]

28. What has the effect of the construction of the DESDP been on your livelihood outcomes?

a) Positive [ ]

b) Neutral [ ]

c) Negative [ ]

29. What was the attainment of the livelihood outcomes in question 27 before the construction of the DESDP? Please **Tick [√]** to indicate your take on the following statements in the Table 4.

(Where 1 = *Positive (**P**), 2 = Mid-Attainment (**M-A**), 3 = Low (**L**), 4= Negative /Loss (**N**))*

***Table 4: Level of Attainment of Livelihood outcomes before DESDP***

| | **LIVELIHOOD OUTCOMES** | **P** **(1)** | **M-A** **(2)** | **L** **(3)** | **N** **(4)** |
|---|---|---|---|---|---|
| (i) | Improvement in health and well-being | | | | |
| (ii) | Increased food security | | | | |
| (iii) | Increased access to resources | | | | |
| (iv) | Increase in income | | | | |
| (v) | Decrease in vulnerability to shocks and hazards | | | | |
| (vi) | Increased assets to facilitate livelihood Strategies | | | | |

| | | | | | |
|---|---|---|---|---|---|
| (vii) | Other [ ] (Specify): ..... | | | | |

*30.* What was the attainment of the livelihood outcomes stated in question 27 after the construction of the DESDP? Please **Tick [√]** to indicate your take on the following statements in Table 5. (Where 1 = *Positive (**P**), 2 = Mid-Attainment **(M-A)**, 3 = Low (**L**), 4= Negative /Loss (**N**))*

***Table 5: Level of Attainment of Livelihood outcomes before DESDP***

| | **LIVELIHOOD OUTCOMES** | **P (1)** | **M (2)** | **L (3)** | **N (4)** |
|---|---|---|---|---|---|
| (i) | Improvement in health and well-being | | | | |
| (ii) | Increase food security | | | | |
| (iii) | Increased access to resources | | | | |
| (iv) | Increase in income | | | | |
| (v) | Decrease in vulnerability to shocks and hazards | | | | |
| (vi) | Increase assets to facilitate livelihood strategies | | | | |
| (vii) | Other [ ] (Specify): ..... | | | | |

**SECTION E: Gender Dimensions to the Effects of the DESDP Construction on Livelihood**

31. Do you think gender plays a role in access to livelihood assets?

**a)** Yes [ ] **(if yes proceed to Q.31i)**

**b)** No [ ] **(if no proceed to Q.32)**

c) I've not considered that

31i. If yes, how does gender play a role in your access to livelihood assets?

.....

.....

.....

.....

32. Do you think gender plays a role in your choice of livelihood strategy?

**a)** Yes [ ] **(if yes proceed to Q.32i)**

**b)** No [ ] **(if no proceed to Q.33)**

c) I've not considered that

32i. If yes, how does gender play a role in your choice of livelihood strategy?

.....

.....

.....

.....

33. Do you think gender plays a role in what you regard as a livelihood outcome?

**a)** Yes [ ] **(if yes proceed to Q.33i)**

**b)** No [ ] **(if no proceed to Q.34)**

c) I've not considered that

33i. If yes, how does gender play a role in your choice of livelihood outcome?

.....

.....

.....

.....

34. Any other Comments

.....

.....

.....

.....

# APPENDIX 2

## INTERVIEW GUIDE

This study is conducted by Valerie Kplorm Aku Nutakor from the Institute of Statistical, Social and Economic Research (ISSER) - University of Ghana in partial fulfilment of the award of a Master of Arts Degree in Development Studies. The purpose of this study is to Assess the Effects of The Dansoman Emergency Sea Defence Project on The Livelihood of Residents of Glefe, Accra, Ghana.

Kindly note that your participation is voluntary, and you are entitled to withdraw at any point. All responses from this interview will be confidential and solely collected for academic purposes only.

Thank you for your cooperation.

May I have your consent to conduct this discussion? 1. Yes 2. No (End interview)

**SECTION A: Background and Demographic Characteristics**

1. Kindly provide some information on the following demographics (Your name, age, number of years served in office, level of education, marital status, and your official title).

**SECTION B: Additional Questions for Sidalco Project Assistant**

1. What has been your experience with residents and particularly fishermen within the community in implementing this project? (Probe into the different reactions and experiences gleaned from implementing the project)
2. How was the community involved in the implementation of the project? (Employing from the community etc.-state the number)?

3. In your opinion, how does the construction of the DESDP affect livelihoods? Especially with regards to Glefe?
4. What challenges have you faced so far with implementing the DESPD?
5. How will you describe the responses from Residents during the implementation of the project along gender lines?
6. What are your recommendations/concerns regarding the DESPD and its sustainability?
7. Any other comments?

**SECTION C: Common Questions for Assemblymember and NADMO Officer**

1. Kindly provide a brief history of the coastal erosion and high tide situation in Glefe?
2. How will you describe the benefits of the DESPD, especially on the livelihood of residents?
3. How will you describe the challenges of the DESPD, especially on the livelihood of residents?
4. Kindly provide insight into how the residents were engaged before and during the project implementation.
5. What challenges have you faced during the course and completion of the project?
6. Any further comments?

**SECTION D: Additional Questions for the NADMO Officer**

7. Kindly give insight on how often the coastal erosion situation in Glefe has been captured as a developmental concern to the Assembly?
8. In your opinion, how has the DESDP affected the livelihood of residents, especially considering the type of strategies they engage in?

# APPENDIX 3

## FOCUS GROUP DISCUSSION GUIDE

This study is conducted by Valerie Kplorm Aku Nutakor from the Institute of Statistical, Social and Economic Research (ISSER) - University of Ghana in partial fulfilment of the award of a Master of Arts Degree in Development Studies. The purpose of this study is to Assess the Effects of The Dansoman Emergency Sea Defence Project on The Livelihood of Residents of Glefe, Accra, Ghana**.**

Kindly note that your participation is voluntary, and you are entitled to withdraw at any point. All responses from this interview will be confidential and solely collected for academic purposes.

May I have your consent to conduct this discussion? 1. Yes 2. No (End interview)

Thank you for your cooperation.

**SECTION A: Background Characteristics**

1. General Background of the respondent (Respondent Name, Age, Level of education, Marital status, Occupation, Number of years resident in the community, position in the group/household, household size number of children under 18 years).

**SECTION B: Main Questions**

2. Kindly tell me about the sea erosion, how it started, your experiences and its effects?
3. How has the sea defence project prevented flooding and erosion within the community?
4. How will you describe some of the lifestyle changes the project has brought to the community?

*Livelihood*

*These are the strategies or activities you actively engage in as a means of support or sustenance for yourself and your household.*

5. Can you describe the state of your livelihood assets, strategies, and outcomes before andafter the construction of the sea defence? (Lived experiences)
6. How has the sea defence been challenging to pursuing livelihood?

*Livelihood assets*

*The livelihood assets are the different resources you have access to and therefore use, to gain an income or sustenance.*

*Physical Capital:*

7. Which physical assets (such as road, electricity, and water supply accessibility) did youhave access to before and after the construction of the DESDP?
8. How have the physical assets you have, helped support and sustain your livelihood?

*Natural Capital*

9. Which natural assets did you have before and after the construction of the DESDP that aided in sustaining your livelihood? And what level of access did you have to these resources?
10. How do the existing laws restricting fishing in the ocean/ trading along the coast affect your livelihood? (Customary, government laws)

*Human Capital*

11. Which human capital assets did you have before and after the construction of the DESDP that aided in sustaining your livelihood? And what level of access did you have to schools, training opportunities and health facilities to improve your livelihood before and after the construction of the DESDP?

12. How will you describe the trend in changes relating to the number of persons who used to help you pursue your livelihood strategy before and after the DESDP?

*Financial Capital*

13. Which financial capital assets did you have access to that aid in sustaining your livelihood? And how will you describe the nature of access to credit facilities and the modes of saving before and after the project?
14. What form of compensation did you receive as a result of the construction of the DESPD?

*Social Capital*

15. Kindly describe the level of engagement and social support you received from the implementers during the project and elaborate on how your concerns were heard and addressed with respect to the construction of the DESDP?
16. Briefly describe how the DESDP has affected communal and social bonds?

**Livelihood strategies and alternative livelihood sources**

Livelihood strategies *refer to the combination of activities or particular activity one can engage in, to achieve one's livelihood goals.*

17. What livelihood activities do you practice and what were your reasons for choosing them?
18. What were your main sources of livelihood? And what can you say about the sustainability of your livelihood before and after the DESDP?

**Livelihood outcomes**

*Livelihood outcomes refer to the goals one wants to achieve through your livelihood activity, to improve on your quality of life.*

19. What are your livelihood goals? And how has the DESDP helped to improve the various assets that enhance the attainment of your livelihood goals?
20. Kindly describe how the project has either led to more income, reduced vulnerability, and improved livelihood outcomes?

**Gender dimension**

21. How will you describe the level of interest and consideration of gender during the DESDP construction?
22. In your opinion, how will gender dynamics play a role in determining your choice of livelihood?? (male/female, power dynamics, old/young)
23. How have gender dynamics influenced your level of access to livelihood assets and realising your livelihood goals?
24. Any other comments?

……

……

……