Social capital and household response to coastal erosion and flooding in Ghana: Empirical case studies on Keta and Ada

Sule Ayannor Issaka

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Sule Ayannor Issaka

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Berichterstatter: Prof. Dr. Boris Braun

Prof. Dr. Peter Dannenberg

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Foreword

First and foremost, I would like to thank God for his protection, guidance, and sustenance throughout my study at the University of Cologne. When I graduated from my Joint master's program in 2017, my main wish was to gain admission into a Ph.D. program. When I finally got the opportunity for this study, it wasn't without some challenges, but I was fortunate to receive the support of some notable persons throughout the whole process.

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I dedicate this work to my late mother,

my late brothers,

and all loved ones of blessed memory

Summary

The impacts of coastal hazards on both lives and property in rural coastal communities of the Global South have been explored by varied researchers from different disciplinary backgrounds. However, research on the role of resources, both material and non-material, embedded in social networks in boosting the abilities of rural coastal communities of the Global South to respond to coastal hazards is still rudimentary. Using mixed methods of in-depth interviews and a household survey with structured questionnaires in Keta and Ada along the southeastern coast of Ghana, this study examined the various coping and adaptation strategies by households towards coastal erosion and flooding. The study also examined the sources of local social capital, and how local social capital influences coping and adaptation strategies toward coastal erosion and flooding. The study further examined the sources of translocal social capital and how translocal social capital influences coping and adaptation toward coastal erosion and flooding. Lastly, the study examined the role of physical and cultural features such as proximity and ethnicity in influencing outmigration as a coping and adaptation strategy towards coastal erosion and flooding.

The results indicate coping and adaptation towards coastal erosion and flooding is a routine activity by the people of both areas which is carried out on a seasonal basis mostly based on traditional knowledge. At the household level, coping and adaptation strategies are similar and can fall under retreat, protection, or accommodating strategies based on the situation of a particular household. They are also influenced by the level of social capital of the household. For individuals, however, occupation significantly influences the choice of coping and adaptation strategies as it is relatively easy for fishermen to out-migrate and continue their fishing activities in their new destinations. This cannot be said to be the same for the farmers who mostly prefer to stay and deal with the situation on-site.

The findings also show the role of family structure in influencing social capital as the existence of close ties among extended family relations both within and outside of the community fosters the existence of bonding (local) social and translocal social capital as well. The existence of a recognized traditional authority also fosters the prevalence of local social capital. These findings contribute to the present-day theorization of social capital by showing the roles of traditional institutions in shaping social capital.

The findings reveal that the long history of out-migration in both areas and the increased access to modern communication technologies have nurtured a strong base of translocal networks which serve as sources of translocal social capital. Per the findings of this study, out-migration is not only a coping and adaptation strategy but also a basis for the existence of translocal networks and translocal social capital which in turn influences other coping and adaptation strategies towards coastal erosion and flooding. For instance, financial support received from people who out-migrated from both areas and are living in other parts of the country and outside the country is used for the renovation/reconstruction of houses damaged/destroyed and also for purchasing basic needs during and after flood events.

The findings of this study suggest that policymakers should consider strengthening rural coastal communities' capacity to harness the resources available in their social networks to enable them to cope with and adapt to coastal hazards. This is very important considering that state agencies in both areas are heavily under-resourced and cannot effectively tackle issues of coastal erosion and flooding. The findings are also important in guiding policy formulation and implementation on the triggers of out-migration in both areas with corresponding impacts on coping and adaptation strategies and the overall development of the area. For instance, tackling coastal erosion and flooding will significantly reduce the outmigration of the youth in both areas.

Zusammenfassung

Die Auswirkungen von Küstengefahren auf Leben und Eigentum in ländlichen Küstengemeinden des Globalen Südens sind bereits von verschiedenen Disziplinen untersucht worden. Jedoch ist der Kenntnisstand zur Rolle der in sozialen Netzwerken eingebetteten materiellen und immateriellen Ressourcen, welche die Fähigkeiten ländlicher Küstengemeinden des Globalen Südens stärken, auf Küstengefahren zu reagieren, noch recht rudimentär. Mit Hilfe eines Methodenmix aus Tiefeninterviews und einer auf Fragebögen basierenden Haushaltsbefragung in Keta und Ada an der Südostküste Ghanas untersucht diese Studie verschiedene Bewältigungs- und Anpassungsstrategien von Haushalten gegenüber Küstenerosion und Überschwemmungen. Vor allem fragt sie danach, wie Sozialkapital entsteht und wie es lokale Bewältigungs- und Anpassungsstrategien gegenüber Küstenerosion und Überschwemmungen beeinflusst. Schließlich analysiert die Studie die Rolle physischer und kultureller Merkmale wie räumliche Nähe und ethnische Zugehörigkeit bei der Beeinflussung der Abwanderung aus den von Küstenerosion und Überschwemmungen betroffenen Gebieten.

Die empirischen Befunde deuten darauf hin, dass die Bewältigung von und die Anpassung an Küstenerosion und Überschwemmungen jährlich wiederkehrende Routinen der Menschen sind, die auf saisonaler Basis und meist auf der Grundlage überlieferten Wissens erfolgen. Auf der Ebene der Haushalte sind die Bewältigungs- und Anpassungsstrategien in beiden Untersuchungsräumen ähnlich und können je nach der Situation eines bestimmten Haushalts Rückzugs-, Schutz- oder Anpassungsstrategien umfassen. Jedoch werden diese Strategien durch das Niveau des Sozialkapitals eines Haushalts signifikant mitbestimmt. Auf individueller Ebene beeinflusst der Beruf der Betroffenen die Wahl der Bewältigungs- und Anpassungsstrategien, da es beispielweise für Fischer relativ einfach ist abzuwandern und ihren Fischfang am Zielort fortzusetzen. Dies gilt aber nicht für Kleinbauern, die es meist vorziehen zu bleiben und mit der Situation vor Ort zurecht zu kommen.

Die Ergebnisse belegen die prägende Rolle der Familienstruktur, da das Vorhandensein enger Beziehungen zwischen den Großfamilien sowohl innerhalb als auch zwischen lokalen Gemeinschaften das Entstehen von bindendem (lokalem) Sozialkapital und translokalem Sozialkapital fördert. Auch das Vorhandensein traditioneller Autoritäten begünstigt die Entstehung von lokalem Sozialkapital. Die Ergebnisse zeigen aber ebenfalls, dass die lange Geschichte der Abwanderung aus beiden Gebieten und der verbesserte Zugang zu modernen

Kommunikationsmitteln eine starke Basis für translokale Netzwerke geschaffen hat, die als Quellen für translokales Sozialkapital dienen. Nach den Ergebnissen dieser Studie ist die Abwanderung nicht nur eine Bewältigungs- und Anpassungsstrategie, sondern auch eine Grundlage für die Stärkung translokaler Netzwerke und translokalen Sozialkapitals, die wiederum andere Bewältigungs- und Anpassungsstrategien gegenüber Küstenerosion und Überschwemmungen begünstigen. So wird beispielsweise die finanzielle Unterstützung von Menschen, die aus beiden Gebieten abgewandert sind und in anderen Teilen Ghanas oder sogar außerhalb des Landes leben, für die Renovierung und den Wiederaufbau von zerstörten oder beschädigten Häusern sowie für den Erwerb von Artikeln des täglichen Bedarfs während und nach Überschwemmungen verwendet.

Die Ergebnisse dieser Studie legen nahe, dass die politischen Entscheidungsträger darauf abzielen sollten, die Fähigkeit ländlicher Küstengemeinden zu stärken sowie die in sozialen Netzwerken generierbaren Ressourcen für das Management von und die Anpassung an Küstengefahren zu nutzen. Dies ist wichtig, weil die staatlichen Behörden stark unterfinanziert sind und die Probleme der Küstenerosion und Überschwemmungen nicht umfassend angehen können. Die Ergebnisse können auch bei der Formulierung und Umsetzung politischer Maßnahmen gegen die Abwanderung helfen, mit entsprechend positiven Auswirkungen auf Bewältigung und Anpassung und sowie die Wirtschaft und die soziale Entwicklung der Gebiete. So kann beispielsweise die Bekämpfung von Küstenerosion und Überschwemmungen die Abwanderung jüngerer Menschen in beiden Gebieten deutlich verringern.

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List of abbreviations

AAP	African Adaptation Program
AEDA	Ada-East District Assembly
CEANA	Council of Ewe Associations of North America
GDP	Gross Domestic Product
GFDRR	Global Facility for Disaster Reduction and Recovery
GHC	Ghana Cedis
GSS	Ghana Statistical Service
IFRC	International Federation of Red Cross and Red Crescent Societies
IPCC	Intergovernmental Panel on Climate Change
KMVFMA	Keta Municipal Vegetable Farmers and Marketers Association
KSDP	Keta Sea Defense project
KRS	Keta Resettlement Scheme
LSC	Local Social Capital
NADMO	National Disaster Management Organization
RCN	Resielient Cities Network
SDP	Sea Defense Project
SPSS	Statistical Package for the Social Sciences
SLR	Sea Level Rise
TLSC	Translocal Social Capital
UNEP	United Nations Environment Programme
UNESCO	United Nations Education, Scientific, and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change

Chapter 1
Introduction

1.1 Background to the study

Coastal communities in the Global South are the most vulnerable to coastal environmental disasters such as erosion and flooding as a significant share of their populations lives along risk-prone coastlines (Baills et al., 2020; Bott et al., 2020; Kayaga et al., 2020). The major coastal hazards challenging communities of the Global South include storm surges and hurricanes, flooding, erosion, subsidence, ecosystem degradation, and sea-level rise (SLR) (Hofmann, 2021; Lam et al., 2016; Leaman et al., 2021). For instance, the number of coastal dwellers living at risk of floods in Africa is expected to increase from around 13 million in the year 2000 to 26 million by 2030. This will lead to increased vulnerability along African coastlines due to the double impacts of rapid urbanization and coastal hazards (Alves et al., 2020; Baills et al., 2020; Delilah et al., 2020; Hillmann et al., 2020; Kayaga et al., 2020). Though the causes of many of these hazards are mostly due to natural processes they are aggravated by human actions such as urbanization, inadequate land-use planning, lack of investment in infrastructure, and weak and incomprehensive coastal hazards mitigation policies (Hofmann, 2021; Leaman et al., 2021; Nurzaman et al., 2020).

Coastal environmental hazards are found to have tremendous impacts on both lives and property in communities of the Global South (Bott et al., 2020; Coe & Pauli, 2020; Kayaga et al., 2020; Peth et al., 2018). How affected people and those at risk are able to respond to these disasters in terms of coping and adaptation mechanisms to mitigate impacts on lives and property is a question of interest for researchers and policymakers alike. It has been established that the resilience of a household or community depends on its coping and adaptation capacities (Crichton et al., 2020; Mavromatidi et al., 2018; Nurzaman et al., 2020). There is, therefore, the need for these capacities to be identified in designing interventions for disasters. Identifying and strengthening the adaptive capacities of communities and households might boost their abilities to bring to bear physical and social resources to cope with and adapt to coastal environmental hazards including erosion and flooding (Aragón-Duran et al., 2020; Bott et al., 2021; Parsons et al., 2016; Quandt, 2021). The three main classifications for coping and adaptation strategies to coastal natural hazards are the scientific, engineering, and traditional approaches (Fabiyi & Oloukoi, 2013). The first two approaches are expensive and technical beyond the capabilities of most community dwellers, and thus communities do look up to the central government for the execution of such projects (ibid).

In rural communities of the Global South where the effective support of state institutions is not guaranteed, most coping and adaptation initiatives are bone by the community members

themselves with social capital playing a crucial role (Dasanayaka & Matsuda, 2021; Hagedoorn et al., 2019; Weir et al., 2017). The traditional and community-based coping and adaptation strategies are developed based on accumulated and passed-down experiences, local technologies, and indigenous knowledge (Newsham & Thomas, 2011). However, policymakers still tend to concentrate on only financial and physical capital in mapping out coping and adaptation options for vulnerable communities neglecting the important role of social capital in this process (Paul et al., 2016). This study seeks to find out how resources embedded in social networks of associations, neighbors, and extended family relations of the people both within and outside the community influence their response to, or coping and adaptation strategies to coastal erosion and flooding. Social networks in this context refer to networks of relations, neighborliness, association memberships, family relations, tribe mates, workmates, and religious body membership that household members share with others and that connect people within the community and also with the outside world beyond the community (see also Podolny, 2001). 'Respond' in this context is used as an umbrella term for coping and adaptation strategies to coastal erosion and flooding. Coping in this context is conceptualized as the short-term behavior of individuals and households in other to minimize the impacts of coastal erosion and flooding (Bott & Braun, 2019; Dasanayaka & Matsuda, 2021). Adaptation on the other hand is a more permanent or long-term behavioral and technological innovation toward the impacts of coastal erosion and flooding (Dasanayaka & Matsuda, 2021; Fitton et al., 2021). Community in this context refers to a group of households within the study area with well-defined boundaries, leadership, a name, and common coastal hazards that differentiate it from other areas (see for instance Colclough & Sitaraman, 2005).

To realize the maximum benefits of social capital in the response to natural environmental hazards such as coastal erosion and flooding, there is a need for the identification and nurturing of the various types of social capital in that community. Very important in creating and nurturing social capital are cultural and physical factors such as ethnicity and the geographic location of an area (Singer et al., 2015). For instance, translocal social capital thrives well in ethnic groups that transcend national boundaries such as the Ewes of the Volta Region of Ghana than in an ethnicity with a confined coverage within one country (see for instance Dotse, 2011; Goldbach & Schlüter, 2018). Similarly, the positioning of an area close to the borders of other regions or countries is also crucial in fostering the growth and exchange of both local and translocal social capital. An

example of this has been illustrated in a study by Hillmann et al. (2020b) at Keta which is situated close to Ghana's border with Togo where easier cross-boundary movements among relations are found to lead to the establishment and nurturing of social capital.

The sections below elaborate on the significance, objectives, research questions, and outline of the study.

1.2 Statement of the problem

The coastal belt of Ghana, approximately 6.5 % of the country's total landmass houses about 25 % of its total population and 80 % of its industrial establishment (Addo et al., 2020; Jonah et al., 2016). However, the coast of Ghana is also noted for coastal environmental changes and disasters such as erosion, flooding, subsidence, and shoreline retreats (Jonah et al., 2016; Owusu-Daaku & Rosko, 2019). While erosion, shoreline retreat, and subsidence could be described as continuous gradual processes, flooding on the other hand is a seasonal problem in coastal Ghana as a rainy season hardly comes to pass without an incidence of flooding (Asumadu-Sarkodie et al., 2015; Codjoe et al., 2017a; Logah et al., 2017). The coast of Ghana is experiencing coastal retreat which is caused by erosion along the central down to the eastern portions of the coast (Fitton et al., 2021; Freduah et al., 2018). The situation is particularly severe in places near the mouth of the River Volta. Settlements, infrastructure, and agricultural activities are under the threat of the eroding coast (Addo et al., 2018; 2020). Coastal erosion as a result of lateral changes in the position of Ghana's coastline has impacted negatively on the socio-economic livelihood of the people, valuable cultural heritage, and tourism (Fitton et al., 2021). Coastal erosion has therefore been noted as probably the most severe gradual onset environmental problem along the coast of West Africa and especially Ghana (Amenuvor et al., 2020). Some of the evidence of erosion along the coast of Ghana includes the washing away of the coconut palm trees which are typical features of Ghanaian beaches, and the destruction of important infrastructure, landmark buildings such as the Fort Kongenstein, houses, and roads (Owusu-Daaku & Rosko, 2019). Undercuts and scarps indicating the eating into the land by wave action and sediments are also typical indications of coastal erosion in Ghana (ibid).

Coastal flooding due to high tides is also a common phenomenon in coastal communities in Ghana especially from July to November which coincides with the peak of the rainy season (Ankrah, 2018). Coastal flooding in already poor coastal communities of the country has already

impacted severely on both lives and property for several decades with the situation along the south-eastern coastline of the country aggravating since the constructions of Tema harbor and the Akosombo Dam in 1962 and 1965 respectively (Addo et al., 2018; Ankrah, 2018; Evadzi et al., 2018). Considering the devastating impacts of coastal erosion and flooding along the coastline of Ghana, coastal dwellers result in several coping and adaptation mechanisms to help mitigate the impacts of these hazards on both lives and property (Goldbach, 2017; Hillmann et al., 2020b). The state and its development partners have also responded to these menaces by constructing sea defense systems to help secure the coastlines from further erosion and to boost the adaptation strategies of the coastal dwellers (Owusu-Daaku & Diko, 2017; Owusu-Daaku & Rosko, 2019).

Several studies have been conducted by researchers from different disciplinary backgrounds regarding how the coastal dwellers along the coast of Ghana are coping with, and adapting to these coastal hazards (Catharina et al., 2020; Evadzi et al., 2018; Fitton et al., 2021; Freduah et al., 2018; Jayson-Quashigah et al., 2019). However, very little work has been done concerning the importance of both local and translocal social capital in coping with and adapting to coastal erosion and flooding. Human interrelationships within a society are considered instrumental to the smooth functioning of such a society, an example is collective action during emergencies to adverse impacts (Masud-All-Kamal & Monirul, 2018). It has however been established that the response by communities to natural environmental hazards is contextual and dependent on varied local conditions (ibid). For instance, during the 1995 heat wave in Chicago, more deaths were found to be likely in poorer African-American communities with lesser social capital and organizational space than in equally poor neighboring Hispanic communities (Aldrich & Meyer, 2015).

There have been numerous studies on how social capital influences coping and adaptation to coastal hazards in rural coastal communities of the Global South (Dasanayaka & Matsuda, 2021; Hagedoorn et al., 2019; Weir et al., 2017). However, this is not the same in the West African context. This study, therefore, seeks to explore how both local and translocal social capital accessible to the people of Keta and Ada along the south-eastern coast of Ghana influence their coping and adaptation strategies towards coastal erosion and flooding. The findings of this study will, therefore, contribute to the literature considering that literature on how rural coastal

communities maximize resources in their social networks to respond to natural environment hazards in the West African setting is scanty.

1.3 Research goal and objectives

The main aim of this study is to analyze how households and community members make use of available local and translocal social networks to enable them to respond adequately to coastal erosion and flooding both before and during the hazard to reduce the impacts on lives and property. Specifically, the study seeks to:

1. investigate how local and translocal networks are established and sustained
2. find out the resources people derive from their network of relations both within and outside their communities
3. examine the impacts of resources derived from social networks both within and outside of the community in coping and adapting to coastal erosion and flooding
4. find out how cultural and physical differences influence and modify networking, coping, and adaptation strategies to coastal erosion and flooding

1.4 Research questions

The following research question will help achieve these goals:

1. What are the main coping and adaptation strategies to coastal erosion and flooding?
2. What are the various associations, both formal and informal within the community that the people belong to?
3. What resources do the people derive from their networks of relations, neighbors, tribemates, and associations both within the community and outside the community or village?
4. How do the people stay connected with their relations and tribe mates outside of their village?
5. How do resources in social networks both within and outside the community or village influence how households respond to the impacts of coastal erosion and flooding by households?

6. How do physical and cultural features such as proximity and ethnicity influence coping and adaptation strategies?

1.5 Significance of the study

The recent Global Assessment Report by the United Nations Office for Disaster Risk Reduction (UNDRR) has indicated increasing scales and rates of natural disasters (UNDRR, 2022). The report added that this has led to more people either killed or affected by natural disasters in the last five years as compared to the previous five years with poorer communities of the Global South being the worst hit due to their reliance on fragile infrastructure, inadequate state response, and poor housing. This calls for increased research into boosting the coping and adaptative capacities of poorer rural communities of the Global South towards natural environmental hazards. Very crucial in enhancing the coping and adaptive capacities of rural coastal dwellers is enhancing their abilities to identify and develop their social networks and utilize the resources embedded in these networks during times of hazard to minimize impacts on lives and property (Fitrinitia & Matsuyuki, 2022). More research work, therefore, needs to be channeled into enabling rural coastal dwellers of the Global South to identify and utilize the resources embedded in their social networks to boost their coping and adaptation capacities towards coastal hazards.

A review of the literature on social capital in the context of hazard research has shown that only 10 % of 195 related publications between 1998 to 2015 focused on preparation before the onset of the disaster (Meyer, 2018). Out of the 10 %, the focus is mostly on evacuation before sudden-onset hazards such as hurricanes and cyclones (ibid). This assessment has been confirmed during the review of literature in the course of this study as about 80 % of the more than 60 publications concerning the role of social capital in disaster response only looked at how social capital influences coping and adaptation strategies during the hazard with less focus on the coping and adaptation strategies at the preparatory stage. This gives a limited perspective on the application of social capital in disaster response as social capital is found to be relevant in every stage of the disaster management cycle (Babcicky & Seebauer, 2017). This work, therefore, contributes to the literature by looking at the relevance of social capital before the onset of coastal floods, during, and after coastal erosion and flooding.

Moreover, most of the literature on the role of social networks in coping and adaptation to coastal hazards in rural communities of the Global South focuses on rapid-onset disasters such as floods,

cyclones, and hurricanes (see for instance Ahmed & Mcdonnell, 2020; Aragón-Duran et al., 2020; Codjoe et al., 2017; Parodi et al., 2021), with less emphasis on mostly slow-onset hazards such as erosion. Looking at both coastal erosion and flooding is useful for both study areas in Ghana where these two hazards are almost inseparable in terms of causal factors (Codjoe et al., 2017b; Hillmann & Spaan, 2017).

Conceptually, this work is one of the rare studies (see for notable exemption: Bott, 2020), that combine both the local and translocal perspectives in investigating how rural coastal communities of the Global South respond to coastal environmental hazards. The findings of this work will therefore contribute to the literature in conceptualizing the application of social capital in disaster response in rural communities of the Global South but this time from a West African perspective where literature on the application of social capital on natural environmental hazard response and management is still rudimentary. This will enable us to compare the situation from a West African perspective with those of other parts of the Global South considering the difference in physical and social-cultural conditions.

Finally, the 2022 mid-year policy review presented to the Parliament of Ghana by the Minister for Finance on 25th July 2022 has stated that,

"Government continued with works to protect the coastal settlements against beach erosion and flooding to protect lives, livelihoods, and properties from tidal wave erosion. These works have also protected some strategic assets of national importance, such as the Aboadze and Takoradi Thermal Power Stations and the Cape Coast Castle. Furthermore, the projects have created calm beaches and landing sites to boost fishing and enhance economic activities in the project communities" .... the motion for the second reading of the Ghana Hydrological Authority Bill, 2021 was moved for the establishment of the Ghana Hydrological Authority, whose mandate will, among other things, include the development of a comprehensive Drainage Master Plan to mitigate the effects of flooding and the protection of our coastlines (Ministry of Finance, 2022 pp. 58).

This is an indication that more resources and focus at the state level are being directed towards protecting coastal areas with engineering approaches with fewer efforts directed towards bottom-up coping and adaptation strategies. Current and future research works, therefore, need to be channeled into highlighting the importance of community-based coping and adaptation strategies

in supplementing the efforts of state institutions in alleviating the impacts of coastal hazards on coastal dwellers and the role of social capital in this process.

1.6 Organization of the study

This study is divided into ten chapters.

Chapter 2 provides a general overview of the nature of coastal erosion and flooding in Ghana and their impacts on lives and property. The chapter also discusses the various coping and adaptation mechanisms by the people towards coastal erosion and flooding and also the response by the state and its development partners towards coastal erosion and flooding, i.e. the construction of the sea defense systems.

Chapter 3 is dedicated to the conceptual underpinnings of the study. The chapter first reviews the literature on social capital as a theoretical concept, and then the application of social capital in natural environmental hazard research. Based on the review and discussion of the existing literature, the chapter presents the conceptual framework for the study and then concludes with the guiding hypothesis for the study.

Chapter 4 deals with the research methodology and the study areas. The chapter provides details on how both the qualitative and quantitative data were collected, processed, and analyzed. The chapter further provides background information on both study areas and the selected study communities, and the nature of coastal erosion and flooding in both areas.

Chapter 5 marks the beginning of the presentation of the results. Here, empirical findings on the various coping and adaptation strategies of the people of Keta and Ada are presented. This comprises findings from in-depth interviews, household surveys, and secondary data. This then leads us to the subsequent chapters where the impact of social capital on the various coping and adaptation strategies is presented.

Chapter 6 presents the empirical results and discussions on the sources of both local and translocal social capital in Keta and Ada. This includes findings on the various networks of relations both within and outside the society and the resources that people derive from, the social groups that people belong to both within and outside the village, and the resources people derive from their

memberships. This chapter will therefore provide the reader with details on the main sources of local and translocal social capital for the people of Keta and Ada.

Chapter 7 presents empirical results and discussions on how individuals and households in Keta and Ada utilize the resources derived from both local and translocal networks to enable them to cope with and adapt to coastal erosion and flooding. This includes how resources, both tangible and non-tangible derived from social networks are used to prepare for and minimize the impacts of coastal erosion and flooding, and the importance of collective action toward coping and adaptation strategies.

In Chapter 8, the main findings presented are discussed in relation to previous findings and the formulated hypothesis. This will serve as a recap of the results and discussions in the results chapters.

Chapter 9 concludes the main points or findings, the implications on policymaking and implementation are stated, and suggestions for further research are made. The limitations of the study and the lessons learned are also made known in this chapter.

Chapter 2
Coastal erosion and flooding in Ghana causes and coping and adaptation strategies

2.1 Coastal erosion and flooding in Ghana causes and coping and adaptation strategies

This chapter provides a detailed overview of the nature of the Ghanaian coastline, the causes of coastal erosion and coastal flooding, and their impacts on the lives and property of the coastal dwellers. The chapter finishes with a discussion of the various coping and adaptation strategies by the coastal dwellers to coastal erosion and flooding and the role of the state and its development partners in this process. In this study, both coastal erosion and flooding shall be looked at simultaneously as both hazards occur concurrently with the same causal factors in the study areas.

2.2 The coastline of Ghana

The Bight of Benin which cuts across the coast of Ghana is a highly dynamic coastline (Hagedoorn et al., 2021). The rate of coastline retreat in this area has increased also threatening the almost 31 % of the region's population living in big cities such as Lagos, Accra, Abidjan, and Lome (Alves et al., 2020; Anthony et al., 2019). These cities also inhabit most of the region's industrial establishments and a wide range of ecosystems that people depend on for their well-being (Alves et al., 2020; Aman et al., 2019). The change of a coastline depends on numerous factors which include natural processes such as tidal and wave actions, sea currents, geology, geomorphology, and rainfall patterns (Siripong, 2010; Thoai et al., 2019; Xu et al., 2016). However, coastline changes are also influenced by human actions such as the removal of coastline sand for construction purposes (sand winning), urbanization, and the construction of coastline protection structures (Li et al., 2018; Siripong, 2010; Tan et al., 2022). The Bight of Benin, a portion of the West African coastline that includes the coastline of Ghana used to be relatively stable until human interference byways of the construction of huge dams mostly for hydro-electric power and deep seaports and sand winning (Abessolo et al., 2019; Anthony et al., 2019; Guerrera et al., 2021).

Boateng et al. (2017) have indicated that 36 % of Ghana's 540 km of coastline is highly vulnerable to sea-level rise and its associated hazards such as coastal erosion and flooding. The coastline of Ghana can be divided into three segments namely the Western coastline, the Central coastline, and the Eastern coastline (see Fig. 1). The Western coastline can be described as a low-energy coastline as compared to the Central and Eastern coastlines which are medium to high-energy coastlines with the height of the wave sometimes exceeding one meter of the surf zone (Armah & Amlalo, 1998; Boateng, 2012; Ly, 1980). The Western and Central portions of the

coastline are found to be low to moderately vulnerable to coastal hazards such as erosion and flooding (Anim et al., 2013; Jonah et al., 2016; Oteng-Ababio et al., 2011). This is mainly due to the hard geology of the area coupled with a high relief of the backshore which significantly reduces the advancement of the coastline landward (Ly, 1980). Most portions of the coast east of the Tema harbor are however highly vulnerable to coastal hazards such as erosion and flooding. This has been attributed to the soft geology and the low-lying terrain of the area (Wiafe et al., 2017; Dovie, 2017; Jayson-Quashigah et al., 2013).

2.3 Causes of coastal erosion and coastal flooding in Ghana

Ly (1980) associated the erosion along the central and eastern portions of Ghana's coastline with the construction of the Akosombo dam which began in 1961 and was completed in 1965. The completion of the construction of the dam is found to have reduced the supply of sediments to the littoral budget from the Volta River which is estimated to be about a 60 % reduction in the Volta River's original sediment supply before the construction of the dam (Bollen et al., 2011; Ly, 1980). The trapping of sediments behind the Akosombo dam has also been blamed for the rate of flooding along the Volta Delta (Hagedoorn, 2020a). The findings indicated that the reduction in sediment supply to the Volta Delta has increased the vulnerability of local communities to erosion and flooding, especially during high tides. Subsequent studies have buttressed the above notion of the impacts of the Akosombo dam in aggravating coastal erosion and flooding along the Central and Eastern coastlines of Ghana (see for instance Addo et al., 2020; 2018; Anim et al., 2013; Boateng, 2009; Hagedoorn, 2020a; Jonah et al., 2016).

Another engineering work that contributes to erosion and flooding along the Eastern Coast of Ghana is the construction of the Tema harbor which was completed in 1962 (Allersma & Tilmans, 1993). The damming of water by the harbor is said to have increased the pressure of the waves along the south-eastern coastline including areas such as Ada and Keta (ibid). Subsequent findings by Angnuureng et al. (2019) also indicated that the construction of the harbor has led to the interruption in the transport of littoral sediments which leads to the accumulation of sand in the western portion of the coastline and intensive erosion on the eastern side.

The coastal management strategy in Ghana which focused on protecting high-risk areas with hard physical structures byways of sea defense systems has also been pointed out as one of the causes of coastal erosion and flooding in Ghana (Boateng, 2012; Fitton et al., 2021). The current coastal

management system in Ghana has not yet integrated options that make room for wider natural processes and sustainability in the long term (Jonah et al., 2016). The construction of hard physical sea defense structures tends to stabilize the rate of coastal erosion at the places where such structures are constructed but often intensifies the rate of erosion at the downdrift (Alves et al., 2020; Fitton et al., 2021; Owusu-Daaku & Diko, 2017; 2019). This phenomenon is much more specific for the groynes where the water is dammed behind the groyne increasing the strength and speed of the waves towards the downdrift.

Sea level rise due to changing climate conditions has also been pointed out as one of the causes of coastal erosion and flooding in Ghana and is envisaged to cause about 20 meters of further erosion in the low-lying Volta Delta by 2050 (Fitton et al., 2021; Hagedoorn, 2020a; Luna & Young, 2019). For instance, the results of a sea level-sensitive analysis by Boateng (2012) have shown that over 70 % of the total frontage of the eastern coast of Ghana could be submerged by a sea-level rise of 1 m more than 10 km inland. Unfortunately, most coastal dwellers lack enough knowledge of sea-level rise and its impacts on coastal hazards such as erosion and flooding (Evadzi et al., 2018). The coastal dwellers in communities of the Global South, therefore, still prefer to live closer to the sea where their sources of livelihood are based despite indications from scientific findings of increasing sea level rise with its associated consequences on coastal communities (ibid).

Also, the increasing physical developments due to urbanization in most coastal areas in Ghana have increased in multiple folds the menace of sand winning in coastal communities in Ghana (Evadzi et al., 2018; Jonah et al., 2021). For instance, commercial sand winning is found to be the main cause of coastal erosion along the Elimina, Cape Coast, to Moree coastlines (Jonah & Adu-Boahen, 2016). Jonah (2014) also found that all sandy beaches that paraded the Elimina, Cape Coast, to Moree coastlines are sites for intensive sand winning while the rocky beaches along the same coastline are used for quarrying thereby intensifying the rate of erosion there. Water also accumulates in the dug-outs created as a result of sand winning and can spill over during high tides into nearby communities causing flooding. Sand winning in some coastal communities can also be linked to youth unemployment that pushes the teeming unemployed youth into such activities to earn a living (Addo et al., 2018). Closely related to the menace of sand winning is the harvesting of coastline stones or pebbles for construction purposes which breaks down the soil texture and thus makes it easily erodible.

Finally, a recent study by Darko et al. (2021) has attributed the menace of coastal erosion and flooding along the coastline of Ningo-Prampram in the Greater Accra Region of Ghana to the deforestation of coconut trees and mangrove forests along the coastline. The findings show that coconut trees and mangroves once played an important role in carbon sequestration and defense mechanisms against coastal flooding and erosion. Similar findings by Boafo et al. (2014) have indicated that about 60 % of the natural ecosystems have been lost leading to a drastic decline in the vegetation and shrub cover along the Kokrobite-to-Bortianor coastline. This is to make way for settlements, hotels, and resorts thereby increasing the potential for both gradual and sudden onset coastal hazards (ibid). Overharvesting of coastal vegetation for firewood and charcoal is also found to be aggravating the menace of coastal erosion and flooding along the eastern coastline and the Volta Delta (Addo et al., 2018; Angnuureng et al., 2019).

2.4 Impacts of coastal erosion and flooding in Ghana and coping and adaptation strategies

Since the 1960s, coastal erosion in Ghana is estimated to have destroyed 5,000 houses displacing several thousands of households, destroying livelihoods, and triggering out-migration from affected areas (Darko et al., 2021; Fitton et al., 2021; Hagedoorn et al., 2021; 2020a). A specific example is Nkontompo, along the Western coast in Sekondi-Takoradi where about a third of the build-up area that once boasted of about 117 buildings has been lost due to coastal erosion since the 1960s (Alves et al., 2020; Aniston, 2020; Codjoe et al., 2020). Roads, transmission lines, and other installations in coastal communities such as Glefe, Nungua, and La all within the Greater Accra Region are also found to be under severe threat of coastal erosion due to the increasing erosion of the coastline in those areas (Amoako, 2016; Kayaga et al., 2020; Nii et al., 2020).

Coastal erosion has for several decades hampered the economic development of the country as the coastline of Ghana inhabits about 60 % of the country's industrial establishments, and major cities such as Accra, Tema, Secondi, Takoradi, and Cape Coast (Luna & Young, 2019). The socio-economic activities of the coastal dwellers are hampered by erosion such as the loss of habitats and arable lands (Anim et al., 2013; Codjoe et al., 2020; Kayaga et al., 2020). For instance, coastal erosion has for several decades destroyed the landing places for fishing boats in coastal communities with its corresponding impact on the main activities of the people there which is fishing (Ankrah, 2018; Evadzi et al., 2018; Goldbach, 2017). Still, on fishing, coastal erosion has led to the destruction of fishing nets in communities where the drag-net fishing method is applied,

thereby worsening the already precarious situation of the poor fisherfolks (Freduah et al., 2018; Nii et al., 2020; Otoo, 2018). Floodwaters do lead to the total loss of anchored fishing canoes by carrying them deep sea or their destruction by hitting them against each other during high tides thus complicating the woes of the already poor fisherfolks (Goldbach & Schlüter, 2018b). Coastal floods have also been the major cause of the contamination of drinking water and water for domestic use, food items, and the overall pollution of the environment that leads to the breakout of diseases such as cholera and malaria in coastal communities all over Ghana (Darko et al., 2021; Tasantab et al., 2020). Agricultural activities have also been affected leading to a reduction in crop harvest and increasing food insecurity in rural coastal communities through the eroding of farmlands thus the continuous dwindling of farm plots in the affected communities (Aniston, 2020; Aryee & Apoh, 2018). Flood waters also destroy crops through the intrusion of salt water and the force of the water leading to low crop yield (Almoradie et al., 2020). The increasing impacts of coastal erosion on agriculture and fishing which are the main sources of livelihood for the rural coastal dwellers have drastically reduced the outputs from both sectors and have thus contributed to sand winning as an alternative livelihood source despite its negative impacts on the environment (Addo et al., 2018). The impacts of coastal erosion and flooding on the tourism sector are also worth mentioning. A study on shoreline change on the coastline of Teshie in the Greater Accra Region by Otoo (2018) has revealed that due to coastal erosion, the sand along the beaches has been lost exposing rock surfaces that have hitherto affected recreational activities on these beaches. The threat of coastal erosion and flooding to hotels, resorts, and other tourism facilities is also hampering the sector (Sagoe-Addy & Appeaning 2013).

Coastal erosion and flooding are again increasingly leading to the disappearance of the rich heritage sites dotted along the coastline of the country some of which the United Nations Education, Scientific, and Cultural Organization (UNESCO) designated World Heritage Sites (Boateng, 2012). Examples include the disappearance of Forts Prinzenstein and Kongenstein in Keta and Ada respectively and the gradual diminishing of Ramsar sites such as the Muni-Pomadze lagoon (see for instance Davies-Vollum & West, 2015). The destruction of historical and cultural monuments in Ghana due to coastal erosion has affected the tourism industry and thus revenue generation in such areas (Aryee & Apoh, 2018; Boateng, 2012; Nii et al., 2020). UNESCO has outlined the various ways by which changing climatic conditions will affect the cultural heritage of coastal communities such as the corrosion of traditional material cultures and

historical monuments, archaeological sites, cultural landscapes, and the abruption of traditional ways of life (Boateng, 2012; Rockman, 2015).

Another impact of coastal erosion and flooding is the destruction of coastal vegetation such as mangroves and coconut plants (Johnson, 2020). The destruction of coastal mangroves due to coastal erosion and flooding also affects the lives of the people, other plant species, and animals as these mangroves not only serve as habitats for several plant species and animals but also provide other ecosystem services such as spawning and breeding places for fishers, recreation, and traditional medicine from plants which are crucial for the survival of humans and other organisms (Asare, 2019; Dali, 2020). The destruction of mangroves and coconut plants along the coast of Ghana has also made coastal areas more vulnerable to further erosion flooding and other coastal hazards as mangroves and trees protect the coastline against these hazards (see also UNEP, 2014).

Some notable coping and adaptation strategies by coastal dwellers towards coastal erosion and flooding in Ghana include out-migration, the modification of building styles, and the relocation of buildings and houses away from the coastline (Addo et al., 2018; Codjoe et al., 2020; Goldbach, 2017). Households affected by flooding do temporarily seek shelter in churches, schools, and other public buildings, or from their neighbors whose houses are not affected or are relatively safe (Danso & Addo, 2017; Tasantab et al., 2020). Closely related to seeking refuge from neighbors is the transferring by affected households of important belongings such as documents and certificates, electrical gadgets, clothing, and cooking utensils to safer grounds (Danso & Addo, 2017; Tasantab et al., 2020). They also tie their valuables high up against the rooftop or place them on high elevations such as piles of bricks to prevent them from being destroyed by the floodwaters (Ahadzie et al., 2021). Other coping and adaptation strategies include filling up the compound with sand, raising the height of beds by placing bricks under them to prevent the floodwaters from reaching, and barricading houses/buildings with sandbags in anticipation of coastal flooding (Addo et al., 2018; Adiku, 2018; Ahadzie et al., 2021; Fredrick et al., 2016; Mensah & Ahadzie, 2020). The state has also responded through the construction of sea defense systems and resettlement schemes such as the Keta and Ada sea defense systems, and the Keta resettlement scheme (Boateng, 2012; Danso & Addo, 2017; Freduah et al., 2019; Hagedoorn 2020a; Mensah & Ahadzie, 2020; Tasantab et al., 2020). The government of Ghana has been advised to consider shifting its attention from reacting to floods with the use of coping strategies and rather implement measures geared toward the proactive management of flood risk (Almoradie

et al., 2020; Boateng et al., 2017; Tasantab et al., 2018, 2020). This is because the usual reactive measures by ways of coping strategies do not deal with or try to tackle the underlying or main causes of flooding nor does it prepare vulnerable communities for anticipated floods (Boateng & Wiafe, 2017; Tasantab et al., 2018). Some of the proactive and long-term flood risk management strategies that Ghana needs to consider especially for the coastal communities include the construction of levees or storm drains to protect high-risk areas, improvement in early warning systems that will ensure timely alerts and possible evacuations before floods, affordable housing schemes that will move vulnerable households out of high-risk areas, and also the creation of buffer zones that will protect and expand wetlands that will trap floodwaters and prevent them from reaching households (Tasantab et al., 2018).

Chapter 3
Conceptual framework

3.1 The translocal social capital conceptual framework

The 'translocal social capital framework' (based on Bott et al., 2020), is a combination of two different concepts, the social capital concept, and the concept of translocality.

3.2 Social capital as a theoretical concept

Bourdieu (1986: pp. 248–249) defined social capital as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition". He added that social capital is imminent in relationships, and provides important support to members during times of need. Bourdieu (1986) explained that the stable relationship that exists between people is not only a source of honor but also a reputation among the group members which is a necessity for the building and maintenance of trust. Coleman on the other hand has integrated the ideas of Loury (1977, 1987) and Granovetter (1985) in his conceptualization of social capital (see Hauberer, 2010). Coleman (1988: p. S98) defined social capital as a "variety of entities with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors whether persons or corporate actors within structures". He pointed out that the resources embedded in these social structures are a form of capital wealth for the individuals within the structure. In an attempt to differentiate social capital from the other forms of capital, Coleman (1995) noted that both human and physical capital can be seen as private goods because it is people who invest in them that benefit from them. However, social capital has the characteristic of a public good because not only those who invest reap the benefits of social capital but also all actors in the social structure (see Coleman, 1988). Putnam (2000: p. 19) viewed social capital as the "Connections among individuals, social networks, and the norms of reciprocity and trustworthiness that arise from them". He developed his concept of social capital based on the ideas of Coleman. His main argument is that individuals derive value from social networks because social contacts influence the productivity of both individuals and groups just as much as human and physical capital does (see also Hauberer, 2010). He added that social capital comprises both the individual and a collective aspect because individuals generate relationships with others for their own interests. The three elements of social capital according to Putnam (2001; 2000) are trust, networks of civic engagement, and norms of reciprocity. According to Putnam, informal social networks are built on the basis of mutual sympathy such as friendship while formal social

networks are based on official memberships. In terms of norms of reciprocity, Putnam referred to Coleman's concept of norms where social norms are equated to the transfer of actions that control the rights of an actor from that of another actor.

Some other notable pioneering definitions of social capital can also be seen in the works of scholars such as Adler & Kwon (2002), Cohen & Prusak (2001), and Lin, Fu, & Hsung (2001). For instance, Adler & Kwon (2002) noted that social capital derives its sources from the particular social structure within which an actor finds him or herself. They defined the concept as "the goodwill that is engendered by the fabric of social relations and that can be mobilized to facilitate action". Examples of this goodwill include forgiveness, sympathy, and trust which we receive from acquaintances and friends (ibid). In simple terms, you benefit from these services by virtue of your belonging or membership in a particular social structure. Lin et al. (2001) defined social capital as investments that are made in social relations with the expectation of some returns. They explained that individuals do interact and network with others in order to generate some profit. According to Lin et al. (2001), there are four major reasons why the resources embedded in social networks have the potential to foster group action. (1) It facilitates information flow among individuals, groups, and organizational hierarchy, (2) social ties or networks tend to exert some influence on the 'agents' who plays important roles concerning the 'actors', (3) the social-tie resource of an individual might be regarded by an organization as a certification for the social credentials of the individual which will also determine his/her access to resources via their social networks/relations, and (4) social networks or relations are expected to reinforce the identity or recognition of the individual, social group, or organization. Social capital has been defined by Cohen & Prusak (2001 p. 4) as "the stock of active connections among people: the trust, mutual understanding, and shared values and behaviors that bind the members of human networks and communities and make cooperative action possible".

The above definitions of social capital agree on three fundamental aspects. First, social capital is a form of capital. It is fungible and invested in relationships either consciously or unconsciously. It provides indirect benefits that facilitate the production of an ultimate good that is consumable. Second, social capital is embedded in human relationships but not a tangible product posed by a single individual. It is created through investment in human relations. Third, social relations are created for the sake of one particular purpose but can also be appropriated for another purpose (see also Glanville & Bienenstock, 2009).

Drawing from the above definitions, social capital in this study connotes the resources (both tangible and intangible) that individuals and households derive from their networks of family ties, neighbors, friends, association members, and tribemates both within and outside of their community or village.

3.3 Forms of social capital

There are three main forms of social capital namely bonding, bridging, and linking social capital (Adler & Kwon, 2002; Granovetter, 1985; Woolcock, 2001). Bonding social capital exists among homogeneous populations, that is people whose background is the same such as family members, friends, and neighbors (Adler & Kwon, 2002; Putnam, 2000; Woolcock, 2001). Bonding social capital can be found in high-density relationships where the individuals in the social network know each other and interact frequently (Claridge, 2018). Bridging social capital exists between people with similar socioeconomic status but from different locational, occupational, and ethnic backgrounds (Adler & Kwon, 2002; Woolcock, 2001). In the words of Claridge (2018), "Bridging social capital is a type of social capital that describes connections that link people across a cleavage that typically divides society (such as race, class, or religion)". Pelling & High (2005) also added that bridging social capital is found among people with a common or shared interest but contrasting or diverse social identities. Linking social capital is however described as external such as with those in higher positions or having broad societal influence (Woolcock, 2001). Linking social capital has also been defined as a product of 'vertical' relationships with the major feature being power and positional differences (Claridge, 2018). Commenting on the types of social capital, Masud-All-Kamal & Monirul (2018) concluded that, a homogenous community depends more on bonding social capital while a heterogeneous community depends more on bridging and linking social capital. It must however be emphasized that social networks do not constitute social capital per se but rather the social capital is derived from the resources that social networks provide access to (Callois & Aubert, 2007).

3.4 Networks and resources in the context of social capital

There is a consensus among social capital scholars regarding the relevance of the structure of social networks in the production of social capital. The term 'networks' according to Podolny (2001) refers to the pipes linking actors through the flow of resources (e.g., information,

knowledge). Adler & Kwon (2009) defined social networks as "the informal face-to-face interactions or membership in civic associations or social clubs" (p. 97). Putnam also used the term to refer to the internal ties that exist in a particular society. Notable characteristics of networks in the context of social network analysis include homogeneity, density, and structural holes and bridges (ibid). Hawe & Shiell (2000) also added that the social networks from which social capital is derived are either dense or loose and also depend largely on whether the actor is concerned about his/her relationship with relatives or group members or interactions among social institutions. One can therefore argue that social networks are the key elements for interactions among people and groups which establish the foundation for the creation of social capital (see also Adler & Kwon, 2009). As Putnam (2004) indicated, the principal elements of social capital such as cooperation and trust would be developed through repeated interactions by the actors or people involved and supported by community institutions. Newman & Dale (2005) added that these social networks are multidimensional in terms of structure. In summary, social networks, therefore, serve as conduits for the flow of resources in the form of social capital.

All known scholarly works on social capital emphasize the relevance of resources embedded in social networks that constitute social capital. One might therefore ask what these resources are. Bourdieu (1986) used the term resource to represent the other forms of capital such as cultural, financial, and physical, either tangible or intangible. Coleman's (1990) view of a resource is mostly intangibly such as effective norms, trust, and obligations. A prominent definition of the term in the context of social capital has been given by Lin (2001) when she noted that "social resources may include material goods, such as land, houses, car, and money and symbolic goods such as education, memberships in clubs, honorific degrees, nobility or organizational titles, family name, reputation, or fame" (p. 43). In the theory of social resources, the word 'resource' connotes the power, wealth, and status of a particular society. Therefore, in an attempt to analyze social capital, important considerations are given to not only the amount but also the variety of the characteristics of the people that an individual has ties with (Viedma, 2003).

3.5 The concept of translocality and translocal social capital

For the past three decades, translocality, translocalism, or the translocational framework has captured the attention of researchers from varied backgrounds who have the desire to explore the population mobility dynamics and socio-spatial interconnectedness (see for example Appadurai,

1995; Bott et al., 2020; Greiner & Sakdapolrak, 2013; Peth et al., 2018; Zoomers & Westen, 2011). For instance, Appadurai (1996) has noted that connections of people should be de-territorialized and this can be achieved through translocality. He argued that territorial boundaries should not be seen as the requirement for a locality and that the contemporary life of a locality is being divided along spatial boundaries, mostly beyond geographical boundaries and thus the concept of statehood. Greiner & Sakdapolrak (2013) also noted that "the term usually describes phenomena involving mobility, migration, circulation, and spatial interconnectedness not necessarily limited to national boundaries". In the view of Zoomers & Westen (2011), the interconnectedness that produces translocalism could be in the form of spatial, social, or capital.

The main focus or central idea of the concept of translocation has to do with the entire notion of mobility and flows of both people and resources and how these movements produced interconnectedness that varies in terms of scales (see for instance Avelino et al., 2020; Bott et al., 2020; Schöfberger, 2018). These translocal interconnectedness or networks are also produced by both the mobile and non-mobile segments of the population in a given place, (Greiner & Sakdapolrak, 2013). Steinbrink (2009) has also stipulated that the actions of people structure translocality and it is in turn being structured by translocality. Translocal networks, therefore, serve as network loops for the various actors involved (Greiner, 2011). Through established translocal networks, socio-economic resources such as financial remittances, ideas, and decisions are channeled from the urban migrants to the rural ones, and the feedback on the impact of these resources in the rural areas is again transmitted back to the urban migrants thus either improving or worsening their translocal capital (ibid).

Very important in the conceptualization of translocality is the concept of social space (Steinbrink, 2007), as social space is regarded as the genesis or starting point to conceptualize translocality. Social space has therefore been defined as the focal point for social interrelationships that exist among the various actors (Steinbrink, 2007), and it is independent of national borders. In relation to this notion of space, Cohen (2016) described translocalism as the social space linking communities, people, and their networks in distant places. In translocalism, it is also important to acknowledge the crucial role of the interaction of structures and agencies such as proximity and ethnicity in the flow of resources such as remittances (Levitt, 1998). In a study by Danzer & Ulku (2011) on their analysis of the impact of ethnicity on the integration and economic success of Turkish immigrants in Germany, and Berlin for that matter, they found that ethnicity and family

networks positively impact the economic success of new migrant settlers. In terms of the impact of distance on the flow of social capital, Rohregger (2006) has found that the distance to one's village has an impact on how often villagers who migrated to the city visit their villages and thus the support they give to their relations back home as well.

3.6 Social capital and response to natural environmental disasters

Several scholars have highlighted the significance of social capital in the management of natural environmental hazards in all three phases, preparedness, response, and recovery stages (Aldrich & Sawada, 2014; Alger, 2003; Kumari & Frazier, 2021). The incorporation of the principles of social capital into the management of natural hazards has arguably increased resilience and reduced the vulnerability of communities to hazards (Aldrich & Meyer, 2015; Smith et al., 2012). Social capital is for instance found to be relevant before the disaster strikes. Lo & Chan (2017) have found that the presence of vibrant social networks increases the desire to prepare against expected extreme weather events among people. Social capital is found to facilitate the quick dissemination of information, and physical and financial assistance during disasters (Chan et al., 2019). It has been argued that norms of reciprocity, trust, and social networks which are forms of social capital a sense of obligation to society that motivates people to act collectively in times of crisis (Masud-All-Kamal & Monirul, 2018). According to Elliott & Pais (2012), affected people do not respond to environmental disasters as isolated individuals but rather "as members of overlapping forms of social affiliations". Community participation can help community members to better decide on and prepare for anticipated hazards and recovery strategies (Kumari & Frazier, 2021). Adger et al. (2018) also emphasized that the relationship that exists between actors and established institutions is important in the adaptation process as it shapes the ability of affected people to act collectively in adapting and recovering from the impacts of disasters.

Social capital also facilitates the fast recovery of societies from disasters through the mobilization of community resources for quick response to hazards (Bott & Braun, 2019; Braun & Aßheuer, 2011; Islam & Walkerden, 2014; Paul et al., 20116). Aldrich (2011) has found that in post-disaster situations, the role of survivors, non-governmental organizations, and state institutions is required to enable them to pull resources together, make risky financial decisions, and coordinate activities geared toward the recovery of affected communities. He added that there might also be the desire from evacuees to return but will have to wait on the information of re-functioning institutions such

as childcare centers, religious organizations, schools, markets. In the same vein, returnees might again want to be sure they wouldn't be the only ones living in the whole block without the company of their friends, neighbors, priests (ibid). Kumari & Frazier (2021) have suggested that, though social capital is relevant in all the phases of the disaster management cycle, the significance of social capital and specifically social organizations has historically mainly been manifested in the post-disaster recovery phase.

Social capital, therefore, conceptualizes a community´s capacity to organize itself to achieve economic and social goals which also includes managing natural environmental disasters (Chan et al., 2019). Social capital, based on the norms of trust and reciprocity is for instance found to simplify the processes of loan application by community members and also facilitate their abilities to adopt new technologies that increase their adaptation capacities (Liang et al., 2017). Social capital, therefore, has the potential to nurture community connectedness, providing community members with an informal 'safety net', and increasing their access to resources that boost their coping and adaptation efforts to natural hazards (Bott & Braun, 2019; Masterson et al., 2014). Aßheuer et al. (2013) noted that social support that vulnerable people can easily access during times of need is the main benefit of social capital. Social capital, therefore, aids in the fast recovery of communities from natural disasters without totally depending on the government or state institutions for the rebuilding of communities (Bott et al., 2020; Braun & Aßheuer, 2011; Chan, 2015; Kumari & Frazier, 2021). Social capital is therefore crucial for the adaptation of communities to the impacts of natural environmental hazards as the adaptive capacity of the members of a community depends on the ability to act collectively Alger (2003). In this regard communities that are mostly dependent on local resources are historically found to have managed resources on which their lives depend by acting collectively (ibid).

3.7 Social capital and the translocality concepts combined

The early works on translocality by cultural geographers and anthropologists have emphasized the connectivity between both cultural and physical space such as through migration, transportation, and the media (Kytölä, 2016; Pieterse, 1995). One key feature of translocality is 'connectedness' between locals in which both the 'local' and the 'global' are regarded as important parameters for the thriving of socio-cultural activities (Kytölä, 2016). The term is widely used to connote a socio-cultural representation of a globalized world characterized by the movement and exchange of

people, goods, ideas, and services where changes and happenings in one place affect another (Beyond & Asia, 2018). It has been pointed out that applying the concept of translocality to the study of the response to natural and environmental hazards has the potential of overcoming a rather narrow and spatial bias perspective while still maintaining the importance of a specific location or space (Bott et al., 2020). As Bott et al. (2020, p. 2) put it, "the translocality approach combines notions of locality and mobility, takes into account geographies of inter- and intra-regional interrelations, and allows thus for a better understanding of socio-spatial dynamics".

Though still at the rudimentary stage, some scholars have applied the concept of translocality in coping and adaptation to natural environmental hazards in rural communities of the Global South (see for example Banerjee et al., 2016; Bilegsaikhan et al., 2017; Bott et al., 2020; Peth, 2014; Sakdapolrak et al., 2016; Schöfberger, 2018). Combining the concept of translocality with social capital in the areas of environmental hazard research allows for the development of an integrated conceptual framework for analyzing how affected households and individuals of the Global South make use of resources derived from social networks both within and outside of their communities to respond adequately to natural environmental hazards.

3.8 Conceptual framework

In an attempt to develop a conceptual framework for analyzing how households utilize both local and translocal social capital to cope with and adapt to the impacts of coastal erosion and flooding, this study adopted 'the framework of translocal social capital as a resource for responding to natural hazards and environmental change' by Bott et al. (2020), and the translocal social network relations analytical model in the context of social vulnerability by Steinbrink (2007) and then modified them for the study. This is shown in Figure 1 below. Steinbrink (2007) explained that the vulnerable actor's conceptualization of an action during a disaster is geared toward minimizing risk. This, according to him is done in two ways: 1. The economic distribution of risk, where different economic strategies combined diversify the economy to create a broader income portfolio that compensates or absorbs any potential economic or income risk. 2. The social distribution of risk, is a form of 'informal social security system' for members where the economic risk of a disaster is spread within available social networks.

This new proposed framework "Framework for analyzing the impacts of both local and translocal social capital on coping and adaptation to coastal erosion and flooding" which is tailored for the

case study of coping and adaptation strategies along the Southeastern coastline of Ghana represents an elaborate version of the two above-mentioned frameworks. This framework is based on identified resources embedded in social networks that influence coping and adaptation strategies in both study areas. Per the scope of this framework, households (with the individuals nested in them) represent the key actors for coping and adaptive strategies carried out mostly based on passed-down knowledge with social capital (both local and translocal) having significant influence in the whole process. The coping and adaptive capacities of households can therefore be said to vary based on the level of social capital available for a particular household which in turn depends on the household's level of social networks. Also important in shaping local social capital in both areas is the homogeneous nature of the society. The role of the traditional authority specifically in influencing social capital also deserves recognition in this framework.

In terms of structure, the flow of the analysis in this framework first of all represents the various networks of relations available for each household/individual within the community and various local social capital derived from these networks and their impacts on mostly short-term coping strategies. This is followed by the interactions between households/individuals in one community and other communities outside the village, the resources they derive from these interactions, and how this influences mostly long-term adaptation strategies.

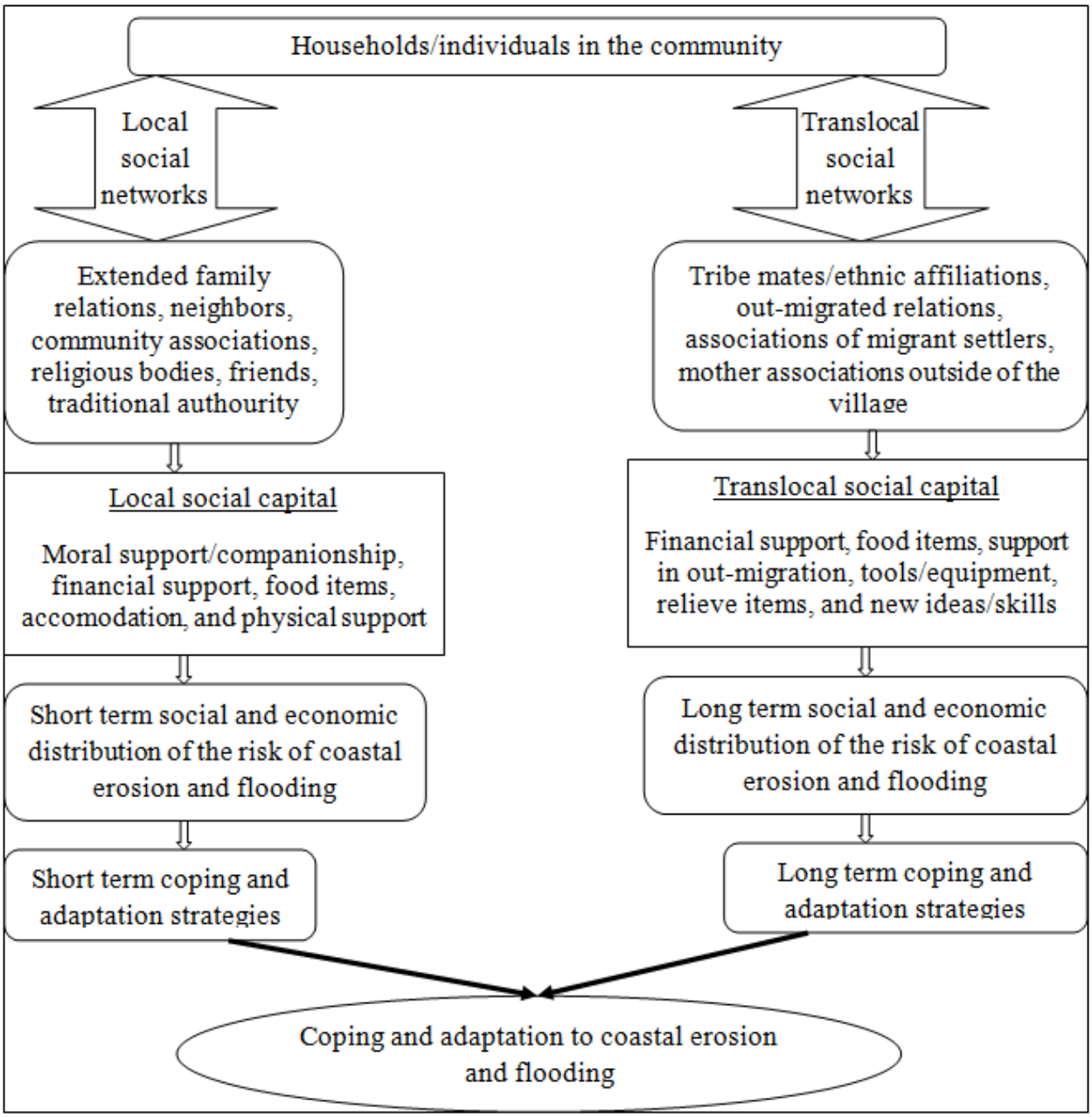


Fig. 1: Framework for analyzing the impacts of both local and translocal social capital on coping and adaptation to coastal erosion and flooding. Adopted and modified from Bott et al. (2020) and Steinbrink (2007).

In the above framework, local social networks or ties between households/individuals and their neighbors, friends, external family members, and members of associations within the community serve as sources of local social capital (specifically bonding and linking) that comes in the forms of financial support, food items, companionship, and physical support offered by non-affected neighbors to flood victims so they can convey their valuables to safer places. This leads to the

short-term distribution of the risk originating from coastal erosion and flooding across the various local social networks thus reducing the impacts of hazards on those affected. This allows for mainly short-term coping strategies.

Also, translocal networks that exist between households and individuals and their tribemates, ethnic affiliations, out-migrated relations, and associations of migrant settlers outside of the village produce translocal social capital through 'bridging and linking ties' in the forms of financial support, food items, information on the route and travel options to aid out-migration, tools, and equipment, and new ideas of doing things. This leads to a long-term distribution of the risk originating from coastal erosion and flooding across the various translocal social networks thereby reducing the long-term impacts of coastal erosion and flooding on the affected people. It also leads to economic diversification such as business transactions across the translocal networks that can compensate for the potential risk in the income of the embedded actors by broadening their income portfolio and thus boosting their coping and adaptation capacities in the long run. All these will foster mainly long-term adaptation strategies.

The main advantages of the above-proposed framework to the study of social capital and how it influences coping and adaptation strategies in both areas are as follows:

1. This framework presents a concise structure of the interplay between local and translocal social capital in influencing coping and adaptation strategies.

2. The framework can also be applied to other coastal communities of the West African subregion based on similarities in social and physical structures. This gives the framework a wider applicability.

Considering the above merits of this framework, and though it is specifically designed for the case study areas, it can apply (with possible adjustments) to interdisciplinary research that especially focuses on coping and adaptation to natural environmental hazards and the role of social capital in rural communities of the Global South.

3.9 Working hypotheses

Based on the above review, I deduce the following working hypotheses/assumptions for the study:

H1: Resources derived from social networks improve the capacities of people and households to prepare for, respond to, and recover from the impacts of coastal erosion and flooding.

H2: Local social capital facilitates collective action toward many societal problems including coastal erosion and flooding.

H3: Physical factors such as proximity and cultural factors such as ethnicity influence the level of translocal social capital of a place.

H4: The existence of translocal networks between people and their ethnic affiliations or tribe mates in other places facilitates out-migration as a coping and adaptation strategy to those places.

Chapter 4
Research design, methodology, and study areas

4.1 Research design, methodology, and study areas

This chapter begins by providing an inside into the framework of methods used in this study. The chapter elaborates on the mixed method approach and why it was used in this study. The chapter proceeds to give a detailed account of the specific methodologies used, the data collection procedures during fieldwork, and how the data was recorded and analyzed. The chapter then concludes with an introduction to both study areas, and the situation concerning coastal erosion and flooding. I also will elaborate on how local households are coping and adapting to the hazards.

4.2 Overall research design:

This study employed mixed methods, where both the qualitative and quantitative methods were combined for the collection of data. The mixed methods design is known "to provide a broader and complete vision of a problem" (Ririn, 2020). Using mixed methods also makes it possible to overcome the limitations that come with using only qualitative or quantitative methodologies, thereby enabling the research to collect richer information than each of the two methods would have achieved when used alone (Pearce, 2016; Ririn, 2020). For instance, the qualitative method as a stand-alone has been criticized for its rather small sample sizes, arbitrary sample selection, and lack of representativeness thereby raising questions on the generalization of results, and testing causal models (Ivankova & Creswell, 2009). The quantitative method on the other hand has been criticized for its neglect of the particular social context within which actors draw meaning from their actions, and its inability to capture details that are sometimes embedded in the body gestures of the respondents (Ririn, 2020). In a nutshell, using the mixed method in a study to some extent brings together the advantages or strengths of both the qualitative and quantitative methodologies that compensate for the respective weaknesses of both methods (Jogulu & Pansiri, 2011; Pearce, 2016).

The research activities (qualitative and quantitative studies) were carried out in a step-by-step approach. The qualitative study (in-depth interviews) was first carried out, which was followed by the design and administering of the questionnaire for the household survey. One major challenge in using the mixed method in this study was making sure that the households that participated in the interviews also participated in the survey. This challenge was however overcome by recording the GPS addresses of each household that participated in the in-depth interviews and then using

those addresses during the survey to locate and include the households that took part in the in-depth interviews.

4.3 Qualitative methods

For the qualitative data, a total of 36 in-depth interviews from 10 communities (5 in Keta and 5 in Ada) were conducted from the 5th of March, 2019 to the 15th of May 2019. A community in this context refers to a sub-unit of a village with close neighborliness where the people share the same social amenities, face the same threats from coastal erosion and flooding, and practice the same coping and adaptation strategies towards both hazards. Respondents included Chiefs/Council of elders, fishermen, fishmongers, farmers, officials of the National Disaster Management Organization (NADMO), assemblymen, leaders of fishermen associations, leaders of fishmongers associations, leaders of farmers associations, and politicians (Metropolitan/District Chief Executives). The rest of the interviewees included agricultural extension officers and household heads/members in the coastal communities. The local communities in the areas of Ada and Keta from which participants were drawn are listed in Table 1. These communities were selected based on the severity of their situation in terms of exposure to coastal erosion and flooding as was witnessed during preparatory field visits and upon consultations with NADMO officials, chiefs, and Metropolitan/District assembly officials for both Keta and Ada. These communities have been living under the threats of coastal erosion and flooding for decades and the impacts of both hazards can be clearly seen in each of the communities. To create a balance for comparative analysis between the communities and to find out the impacts of state intervention on curbing both hazards, other factors were also considered in selecting the communities such as the type of hazard the community is facing, and the presence or absence of a sea defense system.

Table 1: Basic attributes of study communities in both study areas

	Name of Community	Study area	Hazard type	Type of sea defense
1	Azizanya	Ada	Coastal flooding	Groynes
2	Azizakpe-Kewunya	Ada	Coastal flooding and erosion	No sea defense
3	Otrokpe	Ada	Coastal erosion	Groynes
4	Akplabanya	Ada	Coastal erosion and flooding	No sea defense
5	Anyakpo	Ada	Coastal erosion and flooding	No sea defense
6	Keta central	Keta	No more applicable due to sea defense	Revetment
7	Vodza	Keta	Coastal flooding	Revetment
8	Kedzi	Keta	No more applicable due to sea defense/resettlement area	Revetment
9	Blekusu	Keta	Coastal flooding	Groynes
10	Wugah-Zumanya	Keta	Coastal erosion and flooding	No sea defense

Source: Fieldwork (2019).

All selected communities are dotted along the coastlines of both Keta and Ada, except for Kewunya-Azizakpe which is an island in the Volta estuary.

Before the commencement of each interview, it was made clear to the respondents that their participation was purely voluntary and that their responses would only be used for scientific purposes. The average time for each interview was one hour. Interviews were conducted with the help of one research assistant each for the two study areas. These assistants who are university graduates are also locals of the areas and translated the questions to non-English speaking respondents. A one-day workshop was organized with each of the research assistants to go through the interview guide with them and explain the aims and objectives of the study. All 'technical' terms were explained to the understanding of each research assistant. This was to ensure that each research assistant could translate the questions to the non-English speaking respondents without too much loss in meaning. Interviews were recorded with an audio device and the responses were transcribed later. The transcribed interviews were then coded under themes for easy description. This method was to collect detailed sensitive and context-related information from the respondents.

4.4 Quantitative methods

For collecting quantitative data, a household survey with structured questionnaires was carried out from the 5th of March, 2020, to the 5th of May, 2020. A total of 400 households, 200 each from

Keta and Ada, were covered with a 99 % response rate. All ten communities, five from Keta and five from Ada, were covered (Table 1). In the case of Keta, where the communities were almost of the same size, an even distribution of the number of households covered per community was applied (N = 40).

However, in the case of Ada, where some communities were disproportionately bigger than others, the number of households covered by the survey per community also varied accordingly as more households were covered in the relatively bigger communities than the smaller ones (table 2). The households were selected through a random walk across the community and based on the availability of a respondent in the house.

The definition of a household in this context is people who live and eat together under the same roof (see Bott et al., 2020). The target person in the household for the interview was the household head, male or female. In the absence of a household head (usually the main earner), any available adult household member was interviewed. A conscious effort was made to balance the representation of males and females. Questionnaires were administered with the help of two research assistants each per study area. While in the case of Ada, the research assistant for the qualitative data collection was maintained and an additional person was hired, in the case of Keta both research assistants for the quantitative survey were hired afresh. All research assistants are once again locals, university graduates, and can speak both English and the local languages. A two-day workshop was conducted for the research assistants to explain each question to them as stated in the questionnaire, 'technical terminologies, and the objectives of the study. This is to enable them to understand the meaning of each question in the questionnaire to avoid misinterpretations of questions from the respondents. Before the commencement of the survey in each household, the motives for the study were clearly explained to the participant, and their consent was sought. The average time for administering each questionnaire was one hour and twenty minutes. The data were analyzed with the SPSS software. Other sources of data for this study include secondary data from state institutions such as the Metropolitan and District Assemblies, and the National Disaster Management Organization (NADMO). See also Table 3 and Figure 2 below for some basic characteristics of the households.

Table 2: Number of households per community covered during the quantitative survey (N = 400)

Keta			**Ada**		
	N	%		N	%
Wugah-Zomayi	40	10	Akplabanya	50	12.5
Keta Central	40	10	Anyakpo	41	10.3
Vodza	40	10	Otrokpe	40	10
Kedzi	40	10	Azizanya	49	12.3
Blekusu	40	10	Azizakpe	20	5

Source: Fieldwork (2020)

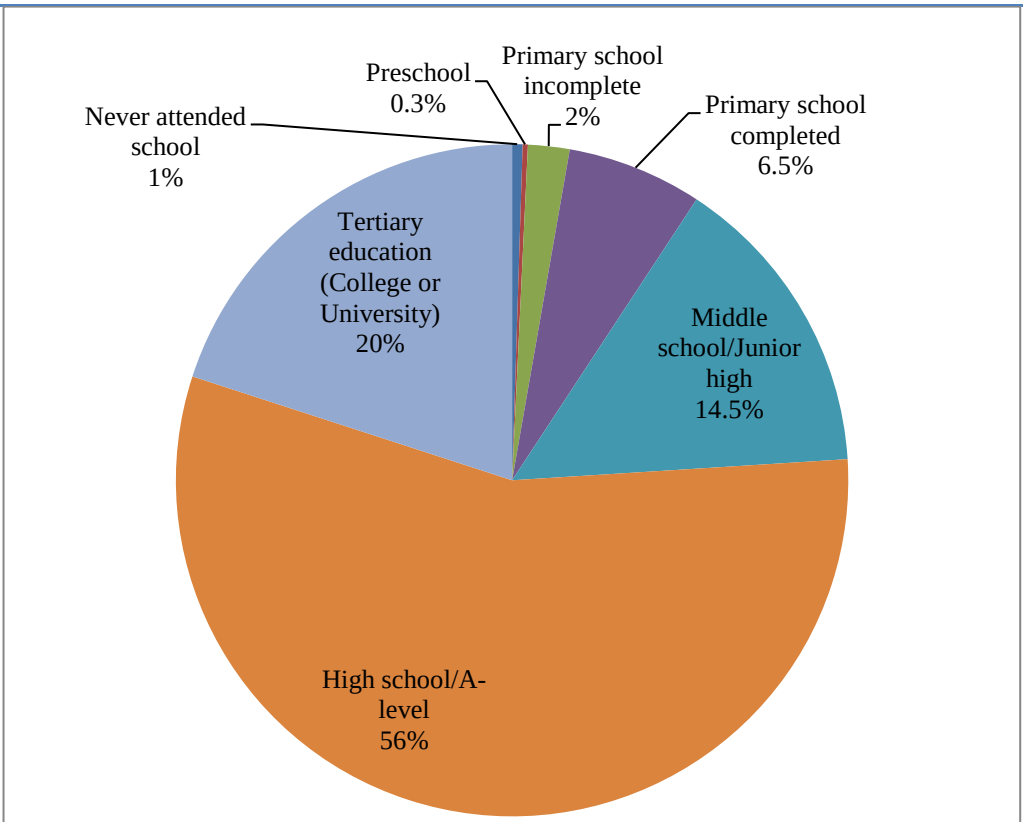
Table 3: Some basic characteristics of the respondents

Variable	N	Minimum	Maximum	Mean	Std. Deviation
The age range of respondent	400	18	94	46.06	14.838
Number of people who live in the household	400	1	40	11.32	7.924
Number of female members who live in a household	400	0	24	4.84	3.767
Number of male members who live in a household	400	0	18	4.33	3.038

Variable	**Frequency**	**Percent**
Male	192	48
Female	208	52
Children living in the household	364	91
Parents living in the household	390	98
Grandparents living in the household	168	42
Households with members who were born outside the village	168	42

Source: Fieldwork (2020)

Highest level of formal education in the household



Ethnic groups present in households

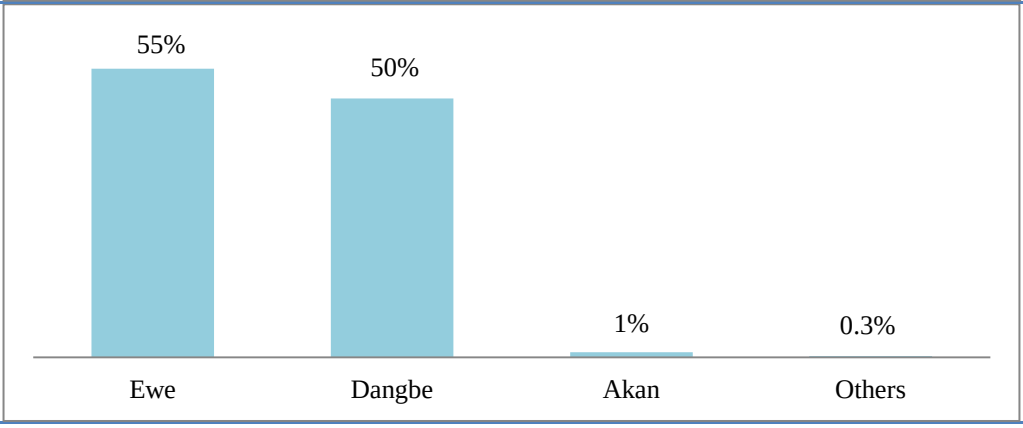


Fig. 2: Some basic characteristics of interviewed households

Source: Fieldwork (2020)

The percentage of female respondents (52 %) slightly exceeds that of the male (48 %). The ethnic composition of the households indicates Ewe speaking households exceed the Dangbe-speaking households by a 5 % margin. All these figures correspond with the figures of the population and housing census by the Ghana Statistical Service in terms of the actual population and ethnic composition of the study areas thereby making the data reliable and fit for purpose.

4.5 Data analysis

4.5.1 Qualitative data analysis

For the qualitative data, the transcribed interviews were first coded into major themes. During this stage of coding, both theoretical and thematic codes were generated. This means a section of the codes was derived directly from the interview data representing the views of interviewees representing the thematic codes as it is in the case of the inductive research approach (see for instance Thomas, 2003). Other codes were also generated based on the theoretical concept (local and translocal social capital) for the study as it is in the case of the deductive research approach (see also Soiferman, 2010). These two types of coding produce both conceptualized knowledge and perspectives that go beyond that (Sakdapolrak et al., 2016). Attention was given to recent developments in the narratives that differ from already existing ones in the literature. In a nutshell, the qualitative data analysis was characterized by three major activities; reading the transcripts, finding meaning in the narratives, and putting those meanings under codes for easy identification. These codes relate to the main research questions that the study seeks to answer and the main aim and objectives of the study. Also taken into consideration in the analysis of the qualitative data are already existing literature relevant to this study, reports from the National Disaster Management Organization (NADMO), the National Population and Housing Census Data by the Ghana Statistical Service (GSS), and documents from the respective Municipal and District assemblies in both study areas.

4.5.2 Quantitative data analysis

The quantitative data on the other hand was processed and analyzed with the SPSS and Microsoft Excel. This was done after entering the data into SPSS and cleansing it. This provides a first-hand and general descriptive overview of the results even before further complex statistical analyses were done on SPSS as per the demand of each objective of the study.

4.5.2.1 Dependent variables

Based on the findings from the in-depth interviews, the following dependent variables were deduced. The dependent variables comprise a selection of coping and adaptation strategies that relates to local and translocal social capital. These include out-migration, modification of housing styles, relocating houses further inland, pumping out water with a water pump, barricading houses

with sandbags, and filling the compound with sand. Here, out-migration, though could also be an independent variable, is treated as a dependent variable as it was found to be a notable coping and adaptation strategy to coastal erosion and flooding based on literature and the findings of the in-depth interviews of this study. These are shown in detail in Table 10 of Chapter 6.

4.5.2.2 Independent variables

The independent variables for analyzing the impacts of both local and translocal social capital on coping and adaptation to coastal erosion and flooding were again selected based on the findings of the in-depth interviews. The in-depth interview results indicate a relationship between these variables and coping and adaptation strategies. They include financial support, food items, skills, a sense of being accepted, information, trust, and shelter/accommodation. The rest includes jobs, support in fishing, support in trading, and support to acquire land. These are again shown in detail in Tables 9 and 12 of Chapters 6 and 7 respectively.

4.5.2.3 Unit of analysis

A clear delineation of the boundary and focus of the analysis of a research work constitutes an integral component of scientific work (Pham, 2020). The analytical unit of a research work connotes the 'what' or 'who' that the generalization of the analysis is made on (Mason et al., 2004). In this study, the household is the principal unit of analysis. The definition of a household in the context of this study has already been given in the introductory chapter as people living and eating under the same roof. This by extension includes temporal members but with constant connections to the household unit in terms of resources and decision-making. This definition also conforms with the UNO's concept of a household for census purposes and data collection in Africa (Randall et al., 2015). In the Ghanaian context, this definition also applies to the collection of census data by the Ghana Statistical Service. The generalization of the analysis in this study is based on the data derived from the household survey and the in-depth interviews.

4.5.2.4 Analytical approach

The analysis of the quantitative data comprises a first stage of descriptive analysis followed by a second stage of bivariate analysis. The descriptive analysis provided a general overview of the characteristics of households and respondents and a detailed description of the various coping and adaptation strategies and the sources and forms of local and translocal social capital. The bivariate

analysis (Chi-square test of independence) aims to find out the correlation and strength of the relationship between coping and adaptation strategies to coastal erosion and flooding and available local and translocal social capital (see for instance Mchugh, 2013).

4.6 The study areas

This section of the chapter provides an overview of the study areas and the nature of coastal erosion and coastal flooding specifically in these areas. Both study areas were selected because they are among the hot spots of coastal erosion and flooding in Ghana (see Jayson-Quashigah et al., 2019). Also, the nature of the social structure and economic conditions of both areas makes the findings applicable to other rural coastal communities along the coastline of West Africa.

4.6.1 Study area 1; Keta

Keta, a Municipality in the Volta Region of Ghana is situated in the delta of the Volta River, sitting in between the Gulf of Guinea and the Keta lagoon on a relatively narrow sand ridge (Kortatsi et al., 2009; Roelvink et al., 1995; Yeboah & Egyir, 2020). The narrow sand bar that Keta sits on is about has a total surface area of about 1,086 km^2 and about 2.5 km in width, between the Atlantic Ocean to the south and the Keta lagoon to the north (Yeboah & Egyir, 2020). About two-thirds of the Keta District is covered by water with the largest water body being the Keta lagoon which covers an estimated land area of 330 km^2, and a Ramsar site allows for artisanal fisheries which constitute an important livelihood source for the people of the area (Agbekpornu et al., 2016).

The municipality according to the Ghana Statistical Service (2014) has a total population of 147,000 with more than half (53.6 %) being female. The main occupations of the people of the Municipality are agriculture, fishery, salt farming, trading, and the exploitation of mangroves for firewood (ibid). Keta is an important agricultural zone that prides itself as the major producer of shallots in Ghana (Yeboah & Egyir, 2020). Though fishing is still an important economic activity in the area, the reduction in fish stock in the waters of the area over the years due to factors that include overfishing has pushed most people into agriculture, predominantly into the cultivation of shallots, onion, okra, carrots, and pepper (Agbekpornu et al., 2016; Nii et al., 2020). The production of cash crops is predominantly rain-fed during the rainy season and irrigated during the dry season (Codjoe et al., 2020).

The Anlo-Ewe ethnicity who are said to have migrated into the area from Notie in Togo is the predominant ethnic group in Keta (98 %) as is the case in the larger Volta Region of Ghana of which Keta Municipality is a part (Dotse, 2011; Ghana Statistical Service, 2014). Keta has a pre-colonial history as a port town and thus an important marketplace that used to attract traders from other regions of Ghana and neighboring Togo and Benin (Hillmann et al., 2020b). The booming economic activity in Keta, however, witnessed a downturn after the opening of the Tema harbor in 1962, the relocation of the capital of the Volta region from Keta to Ho in 1968, and the Aliens Compliance Order of 1969 that saw the expulsion from Keta of foreigners (ibid). Figure 3 below shows a map of the study areas and study communities.

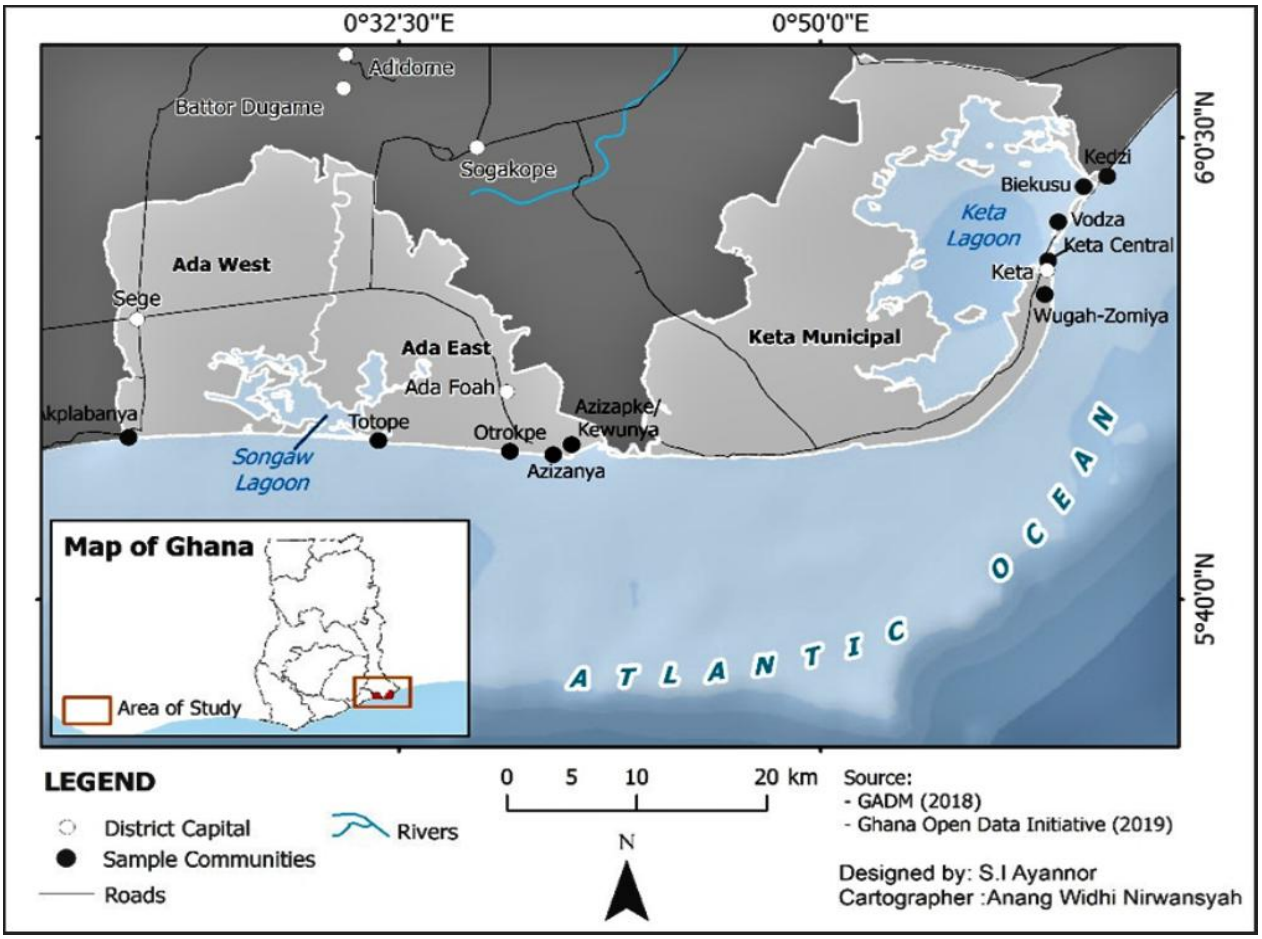


Fig. 3: Map of the southeastern coastline of Ghana showing the study areas and communities

4.6.2 The situation in Keta concerning coastal erosion and flooding

Contrary to early predictions in the 1960s that the Keta area including Anloga would become a hub for industrialization and massive infrastructural development following the discovery of oil, this dream was shattered due to the witnessing of intensive erosion along the coastline of the area (Akyeampong, 2001). The impacts of coastal erosion on the coastal communities of Keta are enormous. Between 2005 and 2017, a total of 77 houses were found to have been destroyed (as shown in picture 'a' in figure 3 below) due to coastal erosion in just one coastal community (Fuvenah) in Keta (Addo et al., 2018). Coastal erosion has led to the loss of forest covers, arable land, and the traditional creek and clam fishing by women (Hillmann et al., 2020b). Coastal erosion has also led to the destruction of the natural landing sites for fish which has negatively impacted the fishery business and thus increased poverty in the Keta area (Addo et al., 2018). Almost a third of the landmass of Keta has been lost due to coastal erosion (Hillmann & Ziegelmayer, 2016). The remains of Fort Prinzenstein in Keta (as shown in picture 'c' in Figure 3 below) are a clear indication of how coastal erosion has robbed Ghana of its historical monuments (see also Aheto & Jonah, 2016; Aryee & Apoh, 2018).

Flooding is also an almost annual event occurring during the peak of every rainy season (between June to September) along the coastline of Keta (Hillmann & Ziegelmayer, 2016). For instance, tidal flooding in Keta (as shown in picture 'd' in figure 3 below) which occurred in September 2021 has led to the destruction of the homes of about 300 households and left more than 2000 persons displaced (National Disaster Management Organization (NADMO), 2021). A similar event in 2011 also led to the displacement of some 685 persons, and in 2008, 90 houses were destroyed by tidal floods in Keta (Addo et al., 2018). Besides the impacts of the construction of the Akosombo Dam as previously discussed, most of the sediments from the Volta River were transported to the eastern portion of the Volta estuary culminating in the formation of beach ridges which resulted in erosion of the Keta areas due to sediment supply from the river into the sea (Angnuureng et al., 2019; Nairn et al., 1999). Sand winning (as shown in picture 'b' in figure 3 below) for construction purposes is a rampant phenomenon along the coastline (Addo et al., 2018). Water collects into the dug-outs as a result of sand winning and eventually overflowing its banks into nearby communities during high tides to cause flooding. Sand winning also makes it relatively easier for strong waves to collect loose sand particles along the coastline causing intensive erosion (Addo et al., 2018; Jayson-Quashigah et al., 2019). Strong waves along the

coastline of Keta and attributed to the construction of the Tema harbor upstream are also blamed for the rate of erosion and flooding in Keta (Botwe et al., 2017). The strong waves that hit the coastline of the area remove rock boulders leading to erosion. The water also splashes over the banks into the communities to cause flooding (ibid). In an attempt to curb the menace of coastal erosion and flooding and also boost the adaptation strategies of the people there, the government of Ghana started the construction of the Keta Sea Defense project in the year 2001 (Jayson-Quashigah et al., 2013). This is the largest sea defense project along the Volta Delta (Roest, 2018). Some communities have so far been protected by either groynes or a revetment, with construction currently ongoing at Blekusu in Keta. There are also land reclamations in some sections of the coastline to compensate for the already lost land due to coastal erosion and also to make room for the growing coastal population (Roest, 2018). These are shown in Figure 4.

Fig. 4: Pictures a, b, and c were all taken during my fieldwork in 2019. Picture 'a' shows an abandoned structure due to the impact of flood waters at Keta, picture 'b' shows men collecting sand along the coast into a truck for construction purposes along the coastline of Wugah in Keta, picture 'c' shows the remains of Fort Prinzenstein which has been partly lost to coastal erosion along the coastline of Keta central, picture 'd' shows the incidence of tidal floods in Keta on November 7, 2021.

However, the sea defense project (the groynes to be specific) is found to be leading to intensive erosion in the downdrift communities as already discussed in chapter two (see for instance Boateng, 2009; Kusimi & Dika, 2012).

4.6.3 Study area 2: Ada

Ada Foah, as it is officially called is a coastal town just 100 km east of Accra, located in the East Dangbe District of the Greater Accra Region (Bollen et al., 2011). Administratively, the area is divided into the Ada East and Ada West Districts. The Ada East District shares boundaries with the Ada West District to the west, the South Tongu District to the east, to the north the Central Tongu District, and the Gulf of Guinea to the south (Cudjoe & Kwabla Alorvor, 2021). It is also bounded by the Volta River in the Southeastern part which meets the sea between Kewunya-Azizakpe and Azizanya to form the Volta estuary. The Ada West district on the other hand shares boundaries to the east with the Ada East District, to the north with the South Tongu and North Tongu Districts, to the west with the Ningo Prampram and Shai Osudoku Districts, and to the south with the Gulf of Guinea (Ghana Statistical Service, 2014). Ada Foah has a coastline of 45 kilometers which extends from Wekumagbe in the West and Azizanya in the East (Kusimi & Dika, 2012). The Ada East District has a total population of about 72,000 and a land area of 289,783 km^2 (Ghana Statistical Service, 2014). The Ada West District on the other hand has a total population of about 76,000 and a land area of 323.721 km^2 (ibid). The Ada area is a low-lying plain, a part of the Accra plains (Cudjoe & Kwabla Alorvor, 2021).

The Dangbe, which is a part of the Ga-Adangbe ethnic group of the people of the Greater Accra Region is the major ethnic group of the people of Ada-Foah and they speak ‘Ada’ (Aryee & Apoh, 2018). With an average rainfall of about 762 mm per annum, the leading sources of livelihood in the area are fishing, agriculture, and salt mining (Owusu-Daaku & Rosko, 2019). Vegetables such as onions, shallots, carrots, tomatoes, cabbages, pepper, and okra together with other food crops are mainly cultivated (Codjoe et al., 2017a). Sand and gravel winning, and oyster shell harvesting are also important livelihood sources in Ada (Kusimi & Dika, 2012). The women are predominantly into fish mongering and petty trading with the tourism and hospitality industry in the area also providing some jobs to the youth there (Codjoe et al., 2017a).

4.6.4 The situation in Ada concerning coastal erosion and flooding

Records from the Ada East District Assembly (AEDA) have indicated that, since the 1940s, the ocean has advanced about 110 meters inland along the coastline of the area (Aryee & Apoh, 2018). Shoreline erosion in Ada is estimated at 2 meters per year while sea level rise also poses a threat in the area (Boateng et al., 2017). Coastal erosion in Ada has led to the destruction of old marketplaces, homes, graveyards (the old European graveyard at Ada-east), schools, administrative buildings, and farmlands (Boateng et al., 2017; Nii et al., 2020). These are shown in Figure 5 below.

Fig. 5: All the above pictures were taken during my fieldwork in 2019. Picture 'a' shows the harvesting of coastline stones for construction purposes along the coastline of Akplabanya in Ada-West, picture 'b' shows the abandoning of a structure along the coastline of Otropke in Ada-East due to the impact of coastal flooding, picture 'c' shows renewed erosion on reclaimed land (a part of the sea defense project) along the coastline of Otopey-Ada, and picture 'd' shows the gradual erosion of coconut trees along the coastline of Azizakpe-Ada.

The coastline of Ada has been earmarked as a hotspot for coastal flooding along the Volta delta of Ghana by several researchers (Alves et al., 2020; Addo et al., 2020; Codjoe et al., 2017a; Kusimi & Dika, 2012). Coastal flooding is in Ada said to have tremendous impacts on the lives and socio-economic activities of the people there which causes out-migration (Addo et al., 2018; Codjoe et al., 2017a). Figure 4 shows the situation concerning coastal erosion and flooding in Ada.

Coastal erosion and flooding in Ada have also been attributed to natural processes such as sea-level rise, but exacerbated by human factors such as the construction of the Akosombo dam and Tema harbor, sand winning, and the sea defense project (Alves et al., 2020; Bollen et al., 2011; Evadzi et al., 2018). For instance, the construction of the Akosombo dam is found to have led to a reduction in the high velocity of the Volta River as it transports sediments from the upstream to the Ada portion of the coastline leading to coastal erosion (Aheto & Jonah, 2016; Kusimi & Dika, 2012). On the other hand, another finding through a grain size analysis of beach sediments has shown that before the construction of the dam, the Western Coast of the Ada areas never received sand from the Volta River, thereby implying that the construction of the dam has little to do with coastal erosion in that section of the coastline (Kusimi & Dika, 2012; Roest, 2018). There are therefore conflicting accounts concerning the impacts of the dam on the rate of erosion on the coastline of Ada-Foah. As already pointed out in chapter two, the sea defense project is found to mitigate the rates of coastal erosion and flooding at the location of construction in Ada but re-directs the current to adjacent communities causing havoc there (Aryee & Apoh, 2018; Bollen et al., 2011). The demolishing of the remains of Fort Kongensten in Ada to make way for the construction of the sea defense system is yet another clear sign of the impact of coastal erosion on the cultural heritage of Ghana (see also Aryee & Apoh, 2018).

The commencement of the second-largest sea defense project along the Volta Delta in Ada in 2010 is aimed at mitigating both coastal erosion and flooding in the area (Roest, 2018). The groynes just as in the case of Keta are also found to be causing severe erosion in the downdrift communities (Owusu-Daaku & Rosko, 2019).

Following this chapter are the result chapters which are presented in accordance with the research questions that the study seeks to answer as stated in the introductory chapter.

Chapter 5
Impacts of coastal erosion and flooding and coping and adaptation strategies in Keta and Ada

5.1 Impacts of coastal erosion and flooding and coping and adaptation strategies

This chapter presents empirical results on the impacts of coastal erosion and flooding and the various coping and adaptation strategies by households towards both hazards in Keta and Ada. The chapter begins by highlighting the impact of coastal erosion and flooding on lives and property in both areas before diving deep into the coping and adaptation strategies by households in both areas toward these hazards. Households in both study areas have for several decades been utilizing several coping and adaptation strategies to reduce the impacts of coastal erosion and flooding on lives and property.

5.2 Impacts of coastal erosion and flooding at the household level - Empirical results

To find out whether coastal erosion and flooding still pose a threat to lives and property in both areas despite state interventions byways of the sea defense project and the resettlement scheme, respondents were asked during the household survey of the major events that affected their households within the last five years. The results, as shown in figure 6 below indicate that coastal erosion and flooding are among the top four events that affected households in both areas within the past five years. Respondents noted they experienced flooding for an average of 20 times (though with varying degrees) during the rainy season within the past five years. When respondents were asked how high the level of flood waters in front of their houses was within the last five years, 39 % noted ankle-high, 31 % noted knee-high, and 4 % noted chest-high (this again varies from one flood to another). Respondents were again asked how often flood waters become a problem within the last five years and the result is also shown in Figure 6 below. With regards to how respondents perceived the rate of coastal erosion in both areas within the past five years, 28 % of the respondents think the rate of coastal erosion is very fast, 31 % think it is fast, and 19 % think it is moderate. The respondents noted during the in-depth interviews that both coastal erosion and flooding intensified about a decade ago. A female household in Blekusu (Keta) stated: "*Those days that my parents were alive nothing like this happened. It was recently that the sea started disturbing ….."*. An Assembly member of Keta Central lamented that, to date, flood waters in the area can rise to waist-level in the peak rainy season (July to August) and can last for over a month, especially in areas closer to the lagoon. The regent of Vodza also added that *"the water level could be as high as the knee level or your tie between 2 to 2.5 feet and stays between 2 weeks and sometimes even up to three months."* The respondents in Azizanya and

Azizakpe in Ada also lamented about the increasing rate of coastal floods in the area in recent times which they attribute to spillage from the Akosombo dam and the impact of the Songor Lagoon. There are also visible signs of renewed intensive erosion along the coastlines of communities in Ada such as Totopey, Otrope, and the old District Assembly area despite the presence of the sea defense walls. In a related study, Codjoe et al. (2020) have found that in recent times, increases in the intensity of rainfall during the rainy season along the Volta Delta have led to frequent floods that threaten lives and livelihoods, degrade the environment, displace households, and loss of property. Appeaning et al. (2020) also found increasing rates of coastal erosion along the eastern estuarine shoreline of the Volta Delta in recent times with Keta and Ada among the hotspots.

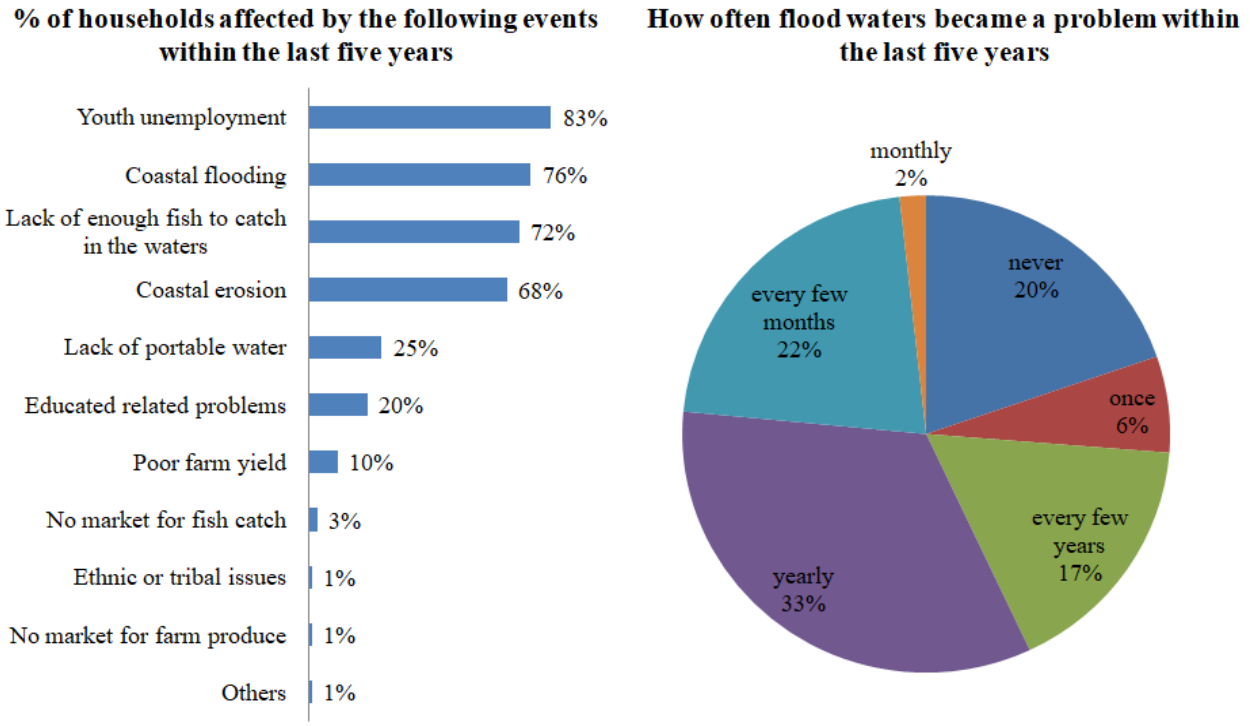


Fig. 6: Households affected by negative events within the last five years / how often flood water became a problem within the last five years

Source: Fieldwork (2020).

The results of this study suggest that the impacts of coastal erosion and flooding on lives and property persist to some extent even after major state interventions such as the construction of the sea defense system and the resettlement scheme. To find out the impacts of coastal erosion on physical property and sources of livelihood, respondents were asked the following questions:

Which of your following properties were lost/destroyed due to coastal erosion and flooding within the last five years? Have important facilities such as schools and hospitals ever been closed due to erosion or flooding? The results are shown in Figure 7 below.

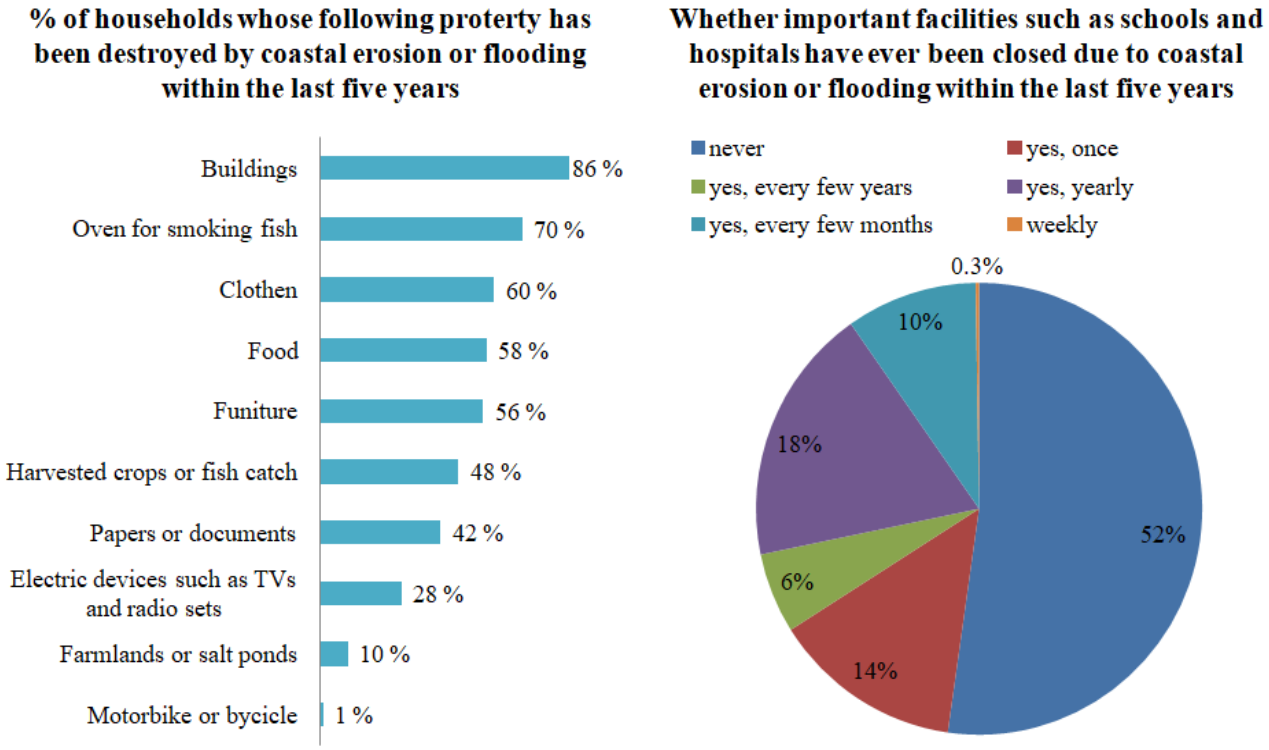


Fig. 7: Property of respondents/households lost due to coastal erosion and flooding over the past five years / whether important facilities were closed due to erosion or flooding

Source: Fieldwork (2020).

Still, on the survey results, 77 % of respondents attributed diseases such as diarrhea, malaria, lung diseases, skin diseases, and food poisoning that affected household members within the last five years to flooding.

5.2.1 Qualitative results on the impacts of coastal erosion and flooding

Perceived impacts on fishing

According to the results of the in-depth interviews, coastal erosion has caused some of the fishermen living close to the sea to abandon their houses and to re-settle at places far away from the coast. This according to the interviewees increased the distance they needed to commute from their new settlements to the coast for fishing thus resulting in the loss of precious time. AKA

Acid, a fisherman along the coastline of Wugah in Keta noted during the interviews that "*we don't live here anymore (along the coast) due to the eroding coastline. And before you walk from where we live to pick up your fishing net along the coastline before you go fishing is a waste of time. As a result, most of the net owners sold out their nets."* This development according to him has rendered most fishermen jobless as there is no arable land for them to venture into agriculture as an alternative source of livelihood. The respondents also noted coastal erosion has led to an increase in the cost of their fishing activities. For instance, more people need to be employed to help them pull out their nets from the sea due to the presence of the sea defense system. The fishmongers also have their share of the impacts of coastal flooding and erosion on their businesses. A fishmonger along the coast of Blekusu at Keta lamented that she wished she could start selling maize or groundnuts but due to lack of finance, she is not able to do so. She stated that the floods mostly occur in the middle of the night and hence take them by surprise. She noted that floods do come when they are asleep and do carry the smoked fish that they left in the smoking oven and domestic animals into the sea. The NADMO director of Keta added that coastal erosion and flooding are "killing" the economic activities of the Municipality. This according to him is because every economic activity within the Municipality revolves around fishing. In his words:

> Because in Keta per se, there is no major economic activity other than fishing. Fishing is their main source of livelihood. So anytime there is a disturbance from the sea (flooding) then you realize every economic activity comes to a standstill and when you go to the market you realize people come to the market and they are not buying. When there is fish then you see people in the market but when there is no fish then you realize the market is empty. So the entire economic activity of Keta revolves around fishing and the flooding also has an impact on the amount of fish catch and thus the economic activities of this area (01001, 02/2019).

A fishmonger along the coast of Totope in Ada also lamented that "*you know we have to dry the fishes on a mesh wire before we finally smoke it. In the period of flooding the seawater sometimes carries away the fishes we dry which bring financial loss to us."* She again noted that the process of fishmongering gets even more tedious in times of coastal flooding. This, according to her is because the flood waters will always quench the fire in the ovens making it difficult for them to smoke their fresh fish. She added that this has been a source of a financial burden to almost every fishmonger in the District. A fisherman along the coast of Otrokpe in Ada also narrated how

coastal flooding hinders their fishing activities. He noted; *"During the peak season for flooding we cannot go fishing, our women can also not smoke fish so economically life becomes really difficult. We sometimes virtually begin experiencing famine during the peak seasons of the flooding."* He added that they are therefore unable to continue supporting their children in school leading to poor attendance and sometimes drop-outs from school during this period. This, he noted, has significantly affected education within the District over the years.

The chief fisherman of Akplabanya in Ada noted that the high tidal waves around the period either collide the fishing canoes against each other leading to damage or destruction or sometimes carry these fishing canoes away into the deep sea beyond retrieval. He noted that it cost around ₵ 12,000.00 to build or buy a new fishing canoe and thus beyond the purchasing power of most of these fishermen. They are always left with no canoe for fishing rendering them unemployed. These results support the findings by Hagedoorn et al. (2021) who found that the fishermen along the Volta Delta including Keta and Ada can no longer anchor their fishing boats to the many coconut trees that used to parade the coastline as these coconut trees have already been eroded making it difficult for landing by the fishing boats returning from the sea. Their findings added that the contamination by salt water from the sea during flooding has made the soil saline and no longer suitable for the construction of fishing ovens. Owusu-Daaku & Diko (2017b) have also found that rising sea levels have over the years threatened the livelihood sources of the fisherfolks in Ada by destroying fishing infrastructure including docking stations and reducing fish yield.

Perceived impact on agriculture

Coastal flooding in Keta has always been a hindrance to the agricultural activities of the area. The flood waters according to respondents during the in-depth interviews do not only destroy their farms but also kill and sometimes carry their livestock away. Another impact of flooding on agricultural activities especially with regards to farms located along the banks of the Keta Lagoon is that the flood waters contaminated with the high salt content of the lagoon burn and destroy the crops. The Director of Agriculture in the Keta Municipality noted that the monetary value of the destruction caused by coastal flooding in a year can be up to $500,000. However, the secretary of the Umbrella of the Vegetable Farmers Association of Keta noted that flooding along the coast of the sea is rather good for farming activities because after the flooding is over, the land becomes more fertile leading to a massive yield. He stated that:

> The floods last between one to three months, between June to August. So when the floods are over, the land becomes very fertile and I can tell you it is something we expect and pray for every year. We don't need more water to irrigate our farms and the yield is always very good after the floods. It is something we expect and pray for. Even as we sit today we are praying for the floods (01002, 02/2019).

Farming in the area is also significantly affected by coastal erosion. The Development Planner of Keta pointed out that, if you talk to the indigenes they will tell you about three-quarters of the total land of Keta is in the sea. So the people are finding it very difficult to engage in farming because the land is not there at a time when the sea is no longer producing enough fish. Agriculture in Ada has also not been spared of the impacts of coastal erosion and flooding. The Chief fisherman of Akplabanya in Ada-West noted during the in-depth interviews that initially, they used to engage in some farming alongside fishing. But as the cropping season coincides with the peak season of the floods, the people are used to waking up the next morning to realize their entire farms have been flooded and all the crops destroyed. The farmers most often will need to do re-cropping after the floods subside and this increases their cost of production. It also extends the length of the cultivation period leading to a prolonged shortage of food and sometimes famine. It also reduces the number of times the farmers can cultivate on the same piece of land within a season from at least two to one which ultimately reduces food availability and income from the sales of surplus food items in the area. All these, according to him have been major threats to food security in the area. Hagedoorn et al. (2021) also found that coastal erosion and flooding along the Volta Delta disrupt farming activities and sometimes the crops are completely eroded thereby affecting food security in the area (see also Codjoe et al., 2020).

Perceived impact on physical property

The findings of the in-depth interviews have also shown that several physical structures and infrastructures such as land, houses, schools, roads, churches, marketplaces, historical monuments, hospitals, police stations, palaces, bridges, and many others have already been eroded. An estimated three to four miles of the total landmass of Keta has been lost to coastal erosion. As the Development Planner of Keta puts it, "*But for the construction of the sea defense system, the entire municipality should have been in the sea by now."* A female household head along the coast of Blekusu noted that "*before flooding and erosion began, this is not how my*

house was, the sea washed away the greater part, even these coconut trees used to be 12 in number..." A fishmonger along the coast of Blekusu in Keta also lamented that;

> My house was located behind many other houses but the sea destroyed all of them leaving no other house in front of mine. It may be between 12 to 15 years now because I was having my first child at that time who even fell into the floodwater but I was able to rescue her. Lots of houses have been destroyed and washed away (02001, 02/2019).

The Development Planner of Keta noted during the in-depth interviews that because of the lack of land in Keta for people to build their houses due to coastal erosion, some of them are moving to the Akatchi areas to build their houses. He added that the Keta Municipal Police Station had to be relocated from its previous location at Keta Central to the present location because the previous one had already been eroded by the sea. The Assemble member of Keta Central also commented that formally Keta was the provincial capital of the Volta Region and thereby used to host important infrastructure such as hospitals, a post office, and other office buildings that have all been eroded by the sea. He added that even the main road leading to Aflao was eroded and several coconut plantation houses were all destroyed by the sea.

Half of Fort Prinzestein in Keta Central has been lost due to coastal erosion and the fort, according to the respondent used to be about 5 to 6 miles away from the sea. The office of the Ada-Foah District Assembly which was said to be about three miles away from the sea is now just about sixty meters away from the sea despite some amount of land reclamations due to the sea defense project. Other notable critical infrastructures and historical monuments of Ada that have already been lost to sea erosion include the Ada-Foah old market, the old European graveyard, an uncountable number of family houses famous among them is the Ocansey Family House, prisons, schools, and churches. The Pentecost Church at Ada-Foah has currently been abandoned as part of it was eroded and the remaining part was saved by the construction of the sea defense system. According to the District Chief Executive of Ada-Foah, there are plans to relocate the offices of the District Assembly from their current location further inland due to the threats of coastal erosion and flooding. Lots of coconut trees that used to line up along the coast of Ada-Foah have all been eroded by the sea leaving just a handful of them.

The mangrove forests of those days along the coast are also no longer there due to coastal erosion. The chief of Totope lamented "*Our natural monuments have all been eroded. The Dutch*

Cemetery is down there but is almost eroded off". He added that in addition to the above is the loss of personal belongings and even valuable assets such as land documents, certificates, cooking utensils, and even food items to the flood waters. Other gadgets such as radio sets, television sets, and DVD players are either completely carried away or become damaged after contact with the flood waters. As the floods mostly come at night, the people of the area are used to waking up to realize their valuables have been taken out of their rooms into the deep sea by flood waters. In a related study, Hagedoorn et al. (2021) have found that households who live close to the coastline of the Volta Delta experience increased financial burden due to damages to houses and other belongings caused by coastal erosion and flooding. Codjoe et al. (2020) have found that the inundation of settlements and farmlands along the lower Volta Delta has prompted the government and NGOs to roll out measures aimed at boosting the adaptation capacities of households. Roest (2018) has also noted that the loss of a chunk of the landmass of Keta to the sea has prompted the construction of the Keta Sea Defense Project (KSDP) to protect the remaining land from further erosion.

Perceived impacts on the daily livelihood of the people

Coastal flooding according to the findings of the in-depth interviews also affects the daily livelihood of the people and their ability to move freely. According to AKA Acid, a household head at Wugah in Keta, the floodwaters also affect their daily movements. He noted that during flooding, one cannot move out of their home and when one is outside and there is flooding then one cannot also come back home. "*Our children can't also go to school. Sometimes on their way to school during flooding, they take off their school uniforms and pass through the floodwaters. When they get to an area with less water then they wear their school uniform and then proceed to school*" he lamented. Coastal erosion and flooding are also found to be major sources of stress and depression for the affected people. The affected people are always left without help, as interventions from the Central Government are always delayed and most often not enough. A household head in Ada also added that flooding affects the daily and household chores of the people which include even cooking. The entire household including the inside of their rooms is always occupied by flood waters and the people just have to live in it until it retreats. This, according to the respondents always makes life unbearable and also leads to the outbreak of diseases such as cholera. These results confirm the findings of a previous study by Owusu-Daaku & Onzere (2019) who found that 43 % of respondents along the Volta Delta of Ghana are going

through stress due to insufficient food to feed the family all year round as a result of coastal hazards.

5.3 Coping and adaptation strategies to coastal erosion and flooding

The IPCC has in 2014 spelled out three categories of coping and adaptation strategies for coastal communities toward coastal environmental hazards. These include protection, accommodating, and managed retreat strategies (Wong et al., 2014). The accommodating strategies imply adjustments or changes in human behaviors both in terms of activities and infrastructure (Wong et al., 2014). Examples include modifying building styles, insurance programs, and planning land use (ibid). Bott & Braun (2019) have called for serious consideration of accommodating strategies in rural communities of the Global South where these strategies are carried out more than envisaged. Hauer et al. (2020) also noted that accommodating adaptation strategies are so far the most feasible in coastal communities of the Global South as they are less expensive when compared to extensive protection strategies plus they are widely adopted across the world. Factors such as special attachment to the current location, financial constraints, and sometimes the lack of land push some households to resort to 'accommodating strategies' (Bott & Braun, 2019). However, when the accommodating practices are not enough to alleviate communities of the impacts of coastal hazards, the state intervenes to protect coastlines from further recession and also to safeguard lives and property.

The protection strategy seeks to secure the coastline and protect lives, property, and infrastructure from the impacts of coastal hazards through measures that comprise both hard and soft protection approaches (Wong et al., 2014). The hard protection approach refers to the construction of hard engineering structures such as land reclamation, sea defense walls, and sea dykes whiles the soft protection approach includes measures such as enhancing the vegetation of the coast and beech nourishment (ibid). It has been argued that protecting the coastline with hard engineering structures such as walls, levees, and artificial islands can be of benefit in resource-reach areas such as mega-cities but has its limitations because sustained rapid sea level rise will hinder the infrastructure extension within the available period (Haasnoot et al., 2021). In situations where both the accommodating and protection strategies did not provide the required results in terms of saving lives and property from the impacts of coastal hazards, the retreat strategy is considered.

The retreat strategy is usually seen as the last resort and seeks to relocate settlements to safer grounds or facilitate out-migration from high-risk areas (Griggs & Griggs, 2016). Retreat options are therefore less desirable as compared to the accommodating and protection strategies (ibid). Retreat strategies are either managed (planned) or unmanaged. The managed retreat strategy is a well-coordinated and purposeful relocation of settlements away from the coastline by the government (Hino et al., 2017). This could come at a considerable cost to the government in countries where property is mostly owned by individuals or the private sector (ibid). This can be said to be the situation in Keta and Ada where 62 % of the houses covered during my household survey are owned by the inhabitants. A major factor that is key to the success of a government-masterminded managed retreat exercise is land availability further inland that will host the new settlements (Hauer et al., 2020). The unmanaged retreat on the other hand comprises out-migration, the creation of buffer zones, self-relocation by households, and the down-zoning of flood-prone areas (ibid).

The first research question that this study seeks to answer is: What are the main coping and adaptation strategies to coastal erosion and flooding? To answer this question, respondents were asked questions during the household survey such as: How do you always get rid of flood waters from your rooms? Have you ever made changes to your housing style due to the impacts of coastal erosion and flooding? If yes, then which of the following ways? How many times have you shifted your house further inland due to the eroding coastline? Which of the following practices do you think will completely stop or minimize the rate of coastal erosion in this area? Which of the following practices do you think will minimize the impacts of coastal erosion and flooding on lives and property? Did some of your household members out-migrate within the last five years to other places? How many people left your household within the last five years and migrated to other places? And, what are the reasons behind their decision to out-migrate? The findings of this study have shown the prevalence of all strategies (accommodating, protection, and retreat) for coping and adaptation to coastal erosion and flooding in both areas. These are discussed below.

5.3.1 Accommodating strategies

The following accommodating coping and adaptation strategies are utilized by households towards coastal erosion and flooding in both areas:

Filling in the compound with sand

The survey results have shown that not too many households (2 %) fill their compounds with sand in preparation for the approaching rainy season to prevent the collection of flood waters in their compounds and also for flood waters to easily flow out of the compound. Respondents also pointed out during the in-depth interviews that after constructing their houses or at the beginning of the rainy season, they try to fill their compounds with the sand from the beach to increase the elevation of their compounds. This will prevent floodwaters from entering their compounds and rooms at the least provocation (see Cudjoe & Alorvor, 2021). According to the respondents, though this is sometimes through communal labor, most often they hire women to do the filling. The women according to the respondents fetch the sand from the beach and carry it on their heads to do the filling. This according to them is a tedious job and expensive as well. According to a household head along the coast of Wugah in Keta, it sometimes takes them up to a year (with breaks in between) to fill their compounds with sand to a level that they think is okay. He noted that they always fill their compounds up to a height of between one-and-half to two feet. This practice, though a coping and adaptation strategy, but also tantamount to sand winning and thus causing coastal erosion and flooding in the area (see also Codjoe et al., 2020).

Modification of housing styles

The results indicate that households indulge in several forms of modifying their housing styles to minimize the impacts of coastal erosion and flooding. The results of the household survey indicated that 24 % of the households have made changes to the materials that their houses were built with due to the impacts of coastal erosion and flooding within the last five years. These changes are mostly from either wood or daub to concrete bricks because the latter is more resistant to the impacts of erosion and flooding. This is shown in Table 4 below.

Table 4: Changes in housing forms due to coastal erosion and flooding (% of households)

From	To	%
From mud/daub	Sand and cement cretes/concrete (block)	12
Wooden kiosk	Mud/daub	3
Wooden kiosk	Sand and cement cretes/concrete (block)	4
Mud/daub	Sand and cement cretes or wooden	2
Coconut branches/leaves	Sand and cement cretes/concrete (block)	8
Sand and cement cretes/concrete (Block)	Branches/leaves of coconut	1
Mud/daub	Palm branches/leaves	2

Source: Fieldwork (2020).

For instance, in Ada-East, and for the residents of Azizakpe, an island of Volta Lake, and also at Azizanya, which shares a boundary with both the Volta Lake and the sea, the residents constructed most of their houses with either daub or palm thatches. Some rather use coconut or palm thatches to construct fence walls around their houses. They noted that their choice for daub instead of cement and sand houses is because the latter easily corrodes due to the salt breeze from the sea rendering such houses weaker and easily collapsing during flooding. A related study by Evadzi et al. (2018) has found that some households along the coast of Keta use low-cost materials to construct their houses to minimize cost in the event of destruction by coastal flooding or erosion. The chief of Azizanya in Ada noted "*Initially, we used to build bigger houses, but due to the way the sea has been destroying our houses, we have stopped building such houses but rather prefer to house ourselves in thatches of palm."* The District Chief Executive for Ada-Foah mentioned that things get more complicated in some of the islands that have been sold to private developers leaving the indigenous people with no rights to permanent structures. In a related study on indigenous knowledge and adaptation practices in Totope-Ada, Cudjoe & Kwabla Alorvor (2021) found that some people prefer to roof their houses with thatch rather than aluminum roofing sheet because the latter easily corrodes as a result of the breeze from the sea.

This is however not the case in Keta as the results of the household survey indicate that all 12 % of houses built of daub are located in Ada with none in Keta. This could be due to the nature of the soil in Keta which is predominantly sandy with no clay or loam soil which are the suitable soil types for the construction of daub houses (see also Hillmann & Spaan, 2017). Respondents also

pointed out that they have started increasing the height of the foundation of their buildings not only to prevent the floodwaters from getting in easily but also to make their buildings more resistant to the floodwaters. They now make sure the foundations of their new houses or buildings are at least 2 meters above the level of the ground to make them less susceptible to floodwaters. These foundations always have concrete castings of stones, sand, and cement. It must, however, be emphasized that the change in housing style by way of materials is found to be one of the major causes of coastal erosion and flooding in both Keta and Ada. Sand winning in both areas has increased drastically in both Keta and Ada as almost all new buildings within the area are from sand and cement cretes which utilize sand fetched from the coastline. This has a corresponding response to the rate of erosion and flooding along the coasts of Keta and Ada (see Addo et al., 2018; Hagedoorn, 2020b). Below in Figure 8 are pictures of some of the strategies mentioned above.

Fig. 8: Picture ‘a` shows houses of the resettlement scheme at Kedzi-Keta, picture ‘b` is a temporary house built of palm thatch and palm leaves at Azizanya-Ada, picture ‘c`, shows the use of sandbags to barricade a building in Kewunya-Azizakpe in Ada and picture ‘d’ shows a new style of constructing an oven for smoking fish high above the ground. All pictures were taken by the author during the fieldwork in 2019.

Constructing smaller canals/waterways

The results of the in-depth interviews have shown that one way by which households prepare for the approaching rainy season is by constructing smaller canals or waterways to serve as paths for the flood waters back into the sea. This, according to the respondents aids in the easy and quick retreat of the flood waters enabling the place to dry up quickly so that life can return to normalcy. A fisherman and household head at Totokpe in Ada noted that they constructed these canals mostly in front of their fish smokers even before the rains set in to avoid the flood waters from collecting into their fish smokers. According to the chief fisherman of Wugah in Keta, sometimes their surroundings are occupied by flood waters for several weeks and the community members always have to use hoes to create pathways for the stagnant flood waters so the water can flow back into the sea (see also Cudjoe & Alorvor, 2021).

Raising the heights of beds/placing belongings on a raised surface

Another common practice by the people of the area in the event of flooding is to lay about three to four cement blocks on each other and put their beds on them to increase the height of the beds beyond the reach of the floodwaters. They also lay the blocks on each other to form a table-like surface in their rooms high enough beyond the reach of the floodwaters where they put their belongings (see Cudjoe & Alorvor, 2021). They also sometimes put their belongings on top of the roofs of their buildings to prevent them from being destroyed or smuggled away by the flood waters. This will enable the affected people to manage the situation as the floodwaters last. This has been one of the major ways by which the people in flood-prone areas of Keta prepare for the floods during the rainy season as the flooding, according to the respondents mostly occurs at night and thus takes them by surprise. A fisherman and settler along the coast of Wugah in Keta noted that *"sometimes the water destroys our belongings such as wardrobes, TVs, and others. Sometimes you wake from sleep you realize the entire room is flooded".*

Modification of fish smoking ovens

Another 'accommodating' coping and adaptation strategy among the fishmongers in particular according to the findings of the in-depth interviews is the modification of traditional ovens used in smoking the fish. Respondents noted that they have changed the way they construct their ovens for fish smoking from the traditional structures made of daub to structures built of sand and

cement bricks as the latter is more resistant to coastal erosion and flooding. They also noted they have increased the height of these ovens to make them high enough beyond the reach of floodwaters to prevent their fish from always being carried away by floodwaters. The process of drying the fish is also now done on elevated platforms to avoid their catch being carried away by floodwaters. The chief fisherman of Akplabanya in Ada West added during the in-depth interviews that, the women changed their smoking structure which used to be dugouts on the ground to tall standing structures in the quest to reduce the impact of the flood. The wife of the chief fisherman of Blekusu, a fishmonger by profession noted that she only raised the height of the structure so that the high waves would not destroy her fish catch. A fishmonger at Totokpe in Ada East summarized this by saying "*We used to dry our fish in a mesh wire which we place on the floor. But now, we place the mesh at a higher height, sometimes on the roof. Our fish smokers too have been transformed from daub structures to cement ones and are a little higher than previous ones.*" (see also Hagedoorn et al., 2021).

Ploughing along the slope

The farmers, specifically those along the banks of the Keta lagoon, according to the findings of the in-depth interviews plough their farms along the slope to enable the free flow of the floodwaters back to the sea or lagoon. They noted that whenever they plow across the slope and in the event of high tides, the floodwaters sweep their crops into the sea and lagoon due to the nature of the slope of the land in some areas. They rather plough along the slope and sow or plant their crops on the raised beds leaving the sunken beds empty to serve as pathways for the floodwaters into the sea or lagoon. The secretary of The Umbrella Group of the Keta Municipal Vegetable Farmers and Marketers Association (KMVFMA) noted that this is a common practice to avoid not only the seedlings but manure or fertilizer as well from being washed away into the sea or lagoon. Commenting on this, the Keta Municipal Director for agriculture noted that:

> Sometimes the spaces in between the beds also serve as pathways for the floodwaters. So some people raise the height of their beds to make sure the water can pass through the sunken part easily. The sunken or valley part of the bed also serves as the pathway to the farm. Because here they don't have the luxury of space as land is very scarce. This is your bed and next to it is another person's bed in that order (01003, 2019).

Alternating the types of crops for planting

The farmers in this area indicated they also alternate the type of crops cultivated on a piece of land. They plant early-yielding crops that will be harvested before the floods set in to prevent their crops from being damaged by the floodwaters. A study on the biophysical and socio-economic determinants of cropping systems in communities of the lower Volta by Ayamga (2019) has indicated that one adaptation strategy applied by the farmers in these areas is the diversification of crops. Cudjoe & Kwabla Alorvor (2021) also found that the farmers of Totope have started substituting the cultivation of maize with shallots and pepper due to the intrusion of salt-bearing floodwaters on their lands during flooding which has led to a reduction in maize yield.

In addition to the above coping and adaptation strategies, households indulge in several strategies for getting rid of stagnant flood waters in rooms such as pumping with a water pump (5 % of responses), perforating walls to serve as a passage for water (27 % of responses), and scooping/ collecting with a container (36 % of responses). With regards to the perforation holes in walls of buildings to serve as a passage for stagnant floodwaters, the findings of the in-depth interviews have shown that, though successful in helping them get rid of the floodwaters in their rooms, this is however not a good practice for the lifespan of their buildings as it weakens the foundation and the eventual collapse of the building.

5.3.2 Protection Strategies

The findings of this study have shown that the main protection strategy for coping and adaptation to coastal erosion and flooding in both study areas is the sea defense system.

The Keta and Ada sea defense projects

To reduce the impacts and also boost the coping and adaptation capacities of the people of both Keta and Ada to coastal erosion and flooding, the Government of Ghana in collaboration with bilateral partners commenced the construction of the Keta and Ada sea defense projects which began in 2000 and 2004 in Keta and Ada respectively (sample pictures in figure 9 below). In the case of Keta, the first phase of the construction started in the year 2000 and was completed in 2004. Beneficiary communities based on information from the NADMO in Keta include Keta Central, Atopko, Vodza, and Kedzie. There is currently (as of the time of this study) a continuation of the project in Blekusu within Keta Municipality. However, a vast number of

communities stretching from Anlogah up to the boundary with Ada-Foah are yet to receive their share of the sea defense project. In the case of Ada, though some communities had theirs constructed earlier than others, the entire project was completed in 2015. Beneficiary communities include Totope, Otrokpe, the old District Assembly area, Anyakpo, and Azizanya. The Keta and Ada sea defense projects can be broken down into two different types of coastal protection structures: revetments and groynes (see also Owusu-Daaku & Rosko, 2019). However, there was always a process of the land reclamation project that preceded the construction of any of these two. The results of this study have indicated that the sea defense system has contributed significantly to reducing both coastal erosion and coastal flooding in the areas where they are constructed. 80 % of respondents acknowledged the importance of the sea defense system in minimizing the rates of coastal erosion and flooding in both areas. Commenting on the relevance of the SDP, the NADNO Director of Keta stated emphatically, "*But for the construction of the current sea defense project, Keta would have been history by now."* In the words of the Assemblymember for Keta Central:

> I will say although we can't challenge nature, the sea defense has been able to protect life and property up till now. Before the construction of the sea defense wall, many houses had been eroded by the sea. But since after the construction of the sea defense, there hasn't been any such incidence again. Since 2004 no flooding and no sea erosion (along the coast of Keta Central) (01004, 02/2019).

The Regent of Vodza in Keta also added that but for the construction of the SDP, they should have abandoned their current settlement by now. He added that the SDP stopped erosion from the sea in the area but flooding persists and that to solve the problem of flooding, the groynes need to be extended further into the sea. Evadzi et al. (2018) have found mixed feelings following the construction of the sea defense in Keta. While some top government officials consider the construction of the sea defense as the best solution to the problems of coastal erosion and flooding, some respondents complained about its effect on increasing erosion in communities' down drift. According to the survey results, 15 % of respondents think the construction of the sea defense system has increased the rate of coastal erosion in their areas. The chief fisherman for Blekusu in Keta for instance lamented that:

> The construction of the sea defense at Keta Central is the reason for the increasing intensity of erosion along the coast of Blekusu for the past ten years. The construction of the groynes here is also re-directing the waves to other areas such as Amochnho, Ahdina, and Salakope, and it is thus affecting these communities (01005, 02/2019).

Similar sentiments to the above were raised during the in-depth interviews. For instance, respondents in Otropke and Totope around the old District Assembly area in Ada have lamented that the SDP has produced a new hazard in the area altogether. They noted that water from the sea waves penetrates through the rock boulders and seeps into the community. They added that the water that seeps through the community from underneath the land reclamation project makes the entire place wet enough to the extent that they just harvest that water from the sand for their domestic purposes with no need to walk to the seaside to fetch water. They noted that this makes their rooms and the entire community very wet and cold and therefore very uncomfortable to live in. These findings are similar to those of Hillmann & Ziegelmayer (2016) who compared the situation concerning environmental change and migration between Keta in Ghana and Semarang in Indonesia. Codjoe et al. (2020) however found that the construction of the SDP was not successful in attracting back people who out-migrated from both areas due to loss in livelihood sources. Addo et al. (2018) noted that not all communities in these areas can be managed by the sea defense structures and therefore advocated for the consideration of a rather soft engineering approach, for instance, beach nourishment. It has also been argued that hard engineering approaches such as the sea defense system do fail as waters overflow during storm surges and that cognizance should rather be given to soft engineering and beach nourishing approaches (Asare, 2019).

The findings of this study have further indicated that the sea defense system also affected the socio-economic activities and livelihood sources of the people, specifically fishing in the communities where they are constructed. Respondents noted that the construction of the revetments has halted the ‘dragnet’ method of fishing as it leads to the destruction of their nets. They claim the rough surface of the revetment coupled with the sharp edges of the rocks has been destroying their fishing nets and also making it more difficult for them to pull their nets offshore. More manpower is now needed in pooling the net offshore ultimately increasing their cost of production. They further indicated that before the construction of the revetments, they used to anchor their fishing canoes at the shoreline. However, after the construction, they now anchor

their canoes in the sea which leads to their canoes being carried deepsea beyond retrieving during high tides. A similar study in Ada by Owusu-Daaku & Rosko (2019) also found that the construction of the Ada sea defense system has obstructed the 'dragnet' fishing leading to a loss of income by fisherfolk. Furthermore, the findings of this study have again shown that the construction of the SDP has affected the lives of living organisms in such areas. For instance, the respondents along the coast of the old District Assembly area in Ada noted that, before the construction of the project, the abundant sea turtles used to come to the coastline around August to lay their eggs. After the construction, however, the coastline has been compacted making it hard for the turtles to bore holes into the ground where they will lay their eggs as they used to. The turtles have no option but to lay their eggs on the hard surface which are either collected by people or eaten by some animals. This according to the respondents has led to a drastic reduction in the turtle population along that portion of the coastline due to a lack of reproduction. The construction process and examples of the nature of groynes and revetments in both study areas are shown in Figure 9.

Fig. 9: Picture 'a' shows the construction site for 14 groins at Blekusu-Keta, picture 'b' shows some groynes being constructed at the time of the research, picture 'c' shows a groyne in Blekusu-Keta, and picture 'd' depicts a revetment in Keta Central. All pictures were taken during the fieldwork in 2019.

Surrounding/barricading buildings with sandbags

In preparation for the approaching rainy season, households surround their houses and buildings with sandbags to prevent the strong waves during high tides from splashing into their premises which could eventually lead to flooding. The survey results show that 12 % of households apply this strategy in preparation for the approaching flood season and to help slow down the rate of erosion along the coastline. However, the interview results for Azizakpe in Ada indicated that the use of sandbags was unsuccessful as water from strong waves collected in an area behind the wall leading to the formation of a pond that sometimes floods the community of Azizakpe at the peak of the rainy season. Water also finds its way into the bags and gradually drains away the sand leaving the empty sags that are always carried into the deep sea. This is a source of environmental pollution and a threat to the lives of aquatic animals. The strong waves in the area have again succeeded in undercutting and eroding the sand beneath the wall of sandbags leading to the collapse of the wall into the water.

5.3.3 Retreat strategies

The following retreat coping and adaptation strategies are utilized by households in both areas towards coastal erosion and flooding.

Shifting or relocating further inland

Shifting or relocating houses further inland away from the coastline is one major way households adapt to the menace of coastal erosion and flooding in Keta and Ada. Per the findings of the household survey, on average, households have shifted their houses once further inland due to coastal erosion and flooding. The results of the in-depth interviews have shown that before the construction of the sea defense walls, some households lived in temporal houses made of either mud or branches of coconut trees and they abandoned those structures to construct new ones further inland as the erosion from the sea approaches. Though poor financial capacity is one of the major reasons why people live in temporal structures as only 26 % of respondents noted they have financial savings, however, the findings indicate that the temporal houses also serve as a coping and adaptation strategy as households can easily abandon such low-cost houses and retreat further inland due to coastal erosion and flooding. The Regent of Vodza in Keta noted that "*we used to live in temporal buildings and when the erosion reaches our houses, then we shift further inland*

to construct new ones until the sea defense wall was constructed. We began putting up permanent buildings after the construction of the sea defense wall". A female dweller in one of these temporal settlements along the coast of Ketzi in Keta also lamented that "*our previous houses were eroded and this is the fourth successive home we are living in now*." In their study, Codjoe et al. (2020) found that a common coping and adaptation strategy along the Volta Delta which includes the Keta and Ada areas is the modification of housing systems and moving houses completely. Hagedoorn et al. (2021) also found that parts of some communities along the Volta Delta have moved and some planning to move in the near future as they can no longer bear the impacts of coastal erosion and flooding.

However, the survey results indicate that more people in Ada than Keta (92 %, and 63 % of respondents) respectively consider relocation or shifting further inland to reduce the impacts of coastal erosion and flooding on their lives and property. This can be attributed to the scarcity of land in Keta for people to acquire plots of land for the construction of new houses without totally leaving their communities. Ada, however, has more vacant land than Keta in most of the communities. This makes the idea of relocating communities an acceptable idea in Ada by general opinion as shown during the in-depth interviews. In a similar study, Yang et al. (2019) indicated that scarcity of land is an important factor hampering in-situ adaptation by communities in Ada and Keta toward sea level rise and environmental hazards.

Resettlement

Closely related to the relocation of houses further inland is the resettlement of severely affected or severely vulnerable communities to coastal erosion and or coastal flooding by the government further inland away from the coastline. Considering the financial cost associated with relocation making it difficult for most households to afford, an attempt by successive governments of Ghana to move households in Keta away from the eroding coastline and the impacts of coastal flooding led to the rolling out of the Keta Resettlement Scheme (KRS) in 2003 and it ended in 2016 (see again Codjoe et al., 2020). The resettlement houses were constructed at Vodza, Adzido, and Kedzi all within the Keta Municipality to provide housing units for people who lost their houses to coastal erosion and also during the construction of the Keta Sea Defense Project (KSDP). In a report submitted by the National Disaster Management Organization (NADMO) to the Keta Municipal Assembly dated 30-10-2017 entitled 'Submission of report on the allocation of

resettlement houses', there are various classifications of houses constructed during the resettlement scheme. This classification is based on the nature of the house of the potential recipient that was destroyed to make way for the construction of the KSDP. According to the report, Class 'A' houses were valued by the committee at more than 6,000 New Ghana Cedis. These were houses constructed with sand and cement crete and which were plastered, painted, and well-maintained. The Class 'B' houses, rated between GHC 4,000 and GHC 6,000 were also constructed with the same sand and cement crete and plastered but not painted. The Class 'C' houses, valued between GHC 2,000 and GHC 4,000 were constructed with the same sand and cement crete but neither plastered nor painted. Houses constructed with wattle and daub fall under Class 'D'.

Table 5 shows the total number and type of resettlement houses that were completed and distributed to beneficiaries between the periods of 2003 to 2016. The report indicated that, besides the 573 completed buildings, 23 uncompleted buildings were abandoned by the contractors. These uncompleted buildings were distributed to beneficiaries who agreed to complete them at their own cost without any reimbursement from the government. This means a total of 596 houses were constructed under the resettlement scheme.

Table 5: The Keta resettlement scheme: total number of houses completed and distributed between 2003 and 2016

COMMUNITY	NO. OF HOUSES COMPLETED				TOTAL COMPLETED	UNCOMPLETED
	TYPE "A"	TYPE "B"	TYPE "C"	TYPE "D"		
ADZIDO	0	4	11	127	142	D = 4
VODZA	0	4	11	185	200	D = 2
KEDZI	0	1	9	221	231	D = 15; C = 2
TOTAL	0	9	31	533	573	23

Source: National Disaster Management Organization (NADMO), Keta Municipality (2017).

The report further indicated that not all expected beneficiaries received their house under the scheme. Table 6 shows the summary of deficit buildings under the resettlement scheme.

Table 6: The Keta resettlement scheme: summary of deficits of buildings

CLASS	VODZA	ADZIDO	KEDZI	KETA	TOTAL
A	5	2	12	1	20
B	2	-	20	1	23
C	17	15	49	-	81
D	76	52	-	1	129
TOTAL	100	69	81	3	

Source: National Disaster Management Organization (NADMO), Keta Municipality (2017).

There are however contradictory accounts by the respondents concerning fairness in the allocation of houses under the resettlement scheme. A female household head currently living in a temporal structure of palm leaves along the coastline of Kedzi in Keta who unfortunately did not benefit from the resettlement housing cried out that there is partiality in the allocation of houses under the resettlement scheme. She noted that one either needs strong lobbying skills or to have relationships at the top in order to benefit from the scheme. She, therefore, has no option but to shelter herself together with her daughter in such a temporal structure hoping for resettlement by the government soon. During the in-depth interviews, respondents from Azizakpe and Azizanya all in Ada wished the government could replicate the resettlement scheme of Keta in their areas, but noted they would only accept such an offer if the chosen site for the resettlement is not too far away from the coast so they can continue with their main source of livelihood which is fishing.

Out-migration

It has been argued that households under the threat of sea level rise and other coastal hazards will always try to avoid out-migration due to other socio-cultural and economic factors until out-migration becomes the only option for them (Hauer et al., 2020). Despite the construction of the sea defense system, the findings of this study indicate that household members out-migrated within the last five years with coastal erosion and flooding among the major causes. To find out the rate of out-migration of household members, respondents were asked a simple question during the survey whether their household members had out-migrated within the last five years. Based on the survey results, 56 % of respondents indicated their household members had out-migrated within the last five years. This result is in tandem with the findings of a quantitative survey by

Hillmann & Ziegelmayer (2016) who found that 65 % of households have experienced out-migration of their members in Keta. This result is also comparable to Adiku's (2018) findings on Ada-Foah which demonstrate that 40 % of the youth in the area have either out-migrated or considering doing so due to climate-related factors. 30 % of respondents noted their household members out-migrated permanently while 43 % of respondents noted their household members out-migrated temporarily. The survey result indicates that an average of four persons per household out-migrated to other places within the last five years in both study areas. To find out whether coastal erosion and flooding are among the main reasons why household members out-migrated within the last five years, respondents were asked to chose from a list of options the reasons why their household members out-migrated within the last five years. The result is shown in Figure 10 below.

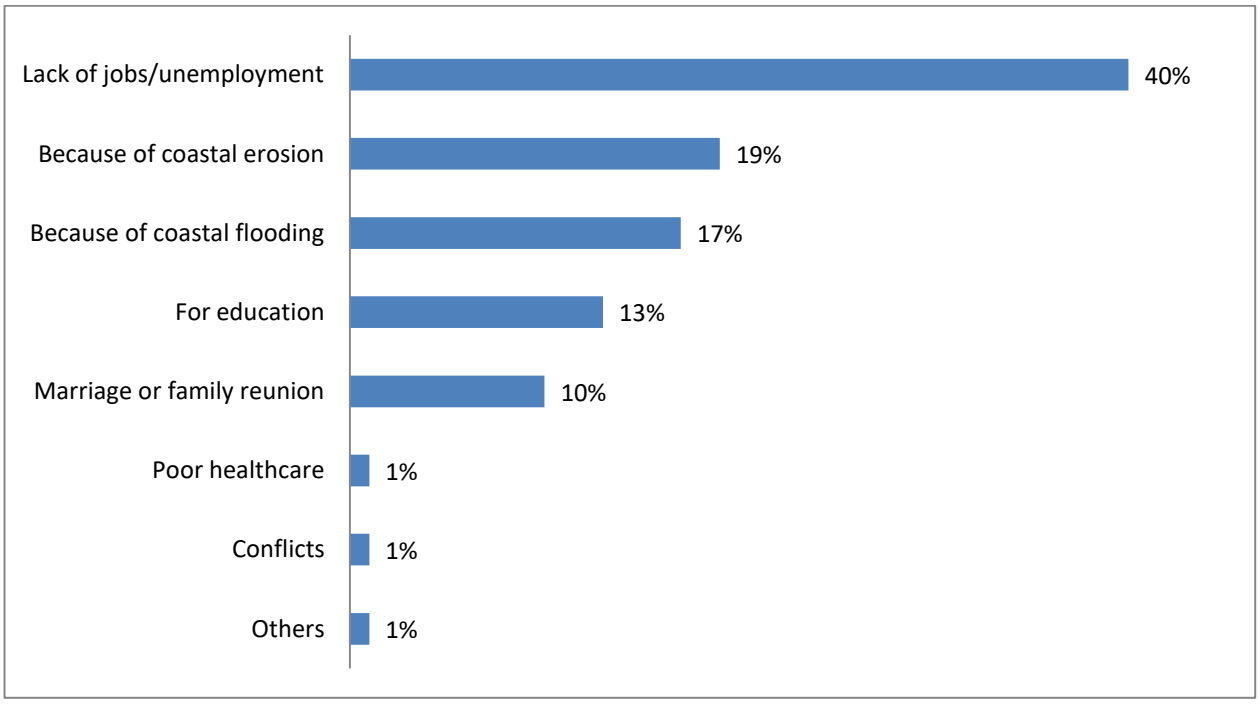


Fig. 10: Reasons why household members out-migrated within the last 5 years (% of responses)

Source: Fieldwork (2020).

The results of the in-depth interviews indicate the out-migration of household members both within Ghana and to other countries. For instance, respondents from Ada have noted during the in-depth interviews that most households in the area have at least one of their family members living in Accra, or other parts of Ghana, or outside Ghana in countries such as Togo, Benin, Cameroon,

and the Ivory Coast. These people migrated to these countries purposely for fishing and were also triggered by coastal erosion and flooding. The respondents from Keta also noted during the interviews that there is out-migration in the Keta area to parts of the country and, especially along the coasts of Togo, Benin, Nigeria, and even Abidjan in the Ivory Coast. This according to the respondents is due to three major factors which are; (1) depletion in the fish stock in both the Keta Lagoon and the sea at Keta, (2) coastal erosion, and (3) coastal flooding. This result again confirms the findings of a quantitative survey by Hillmann & Ziegelmayer (2016) who found that 65 % of households have experienced the out-migration of at least one of their members in Keta. Hillmann & Spaan (2017) also found that out-migration in Keta is not solely due to environmental factors but rather the combined effects of multiple factors that include over-exploited resources and better education in the urban centers.

5.4 Conclusion of the chapter

The findings of this study have shown that coastal erosion and flooding remain among the top issues that affect lives and property in the study communities despite huge investments by the central government and development partners over the years byways of the Keta and Ada sea defense projects. This explains the continued prevalence of all three coping and adaptation strategies (accommodating, retreating, and protecting) by households in both areas. The accommodating strategies are mostly the initiatives of the locals themselves based on everyday practice and passed down knowledge from generations. The retreat strategies comprise the initiative of the people themselves (relocation houses further inland) and a top-down initiative from the government (the resettlement scheme). The results further indicate that the dominant protection strategy (the sea defense system) is a top-down initiative by the central government with no or little involvement of the locals and thus not much influenced by the level of social capital of the area. The type of coping and adaptation strategy utilized by households at a time also depends on the phase of the hazard that they find themselves in (preparation phase, during the hazard, or the recovery phase). In a nutshell, self-initiated coping and adaptation strategies by the people have been very instrumental in alleviating households of the impacts of coastal erosion and flooding considering the lack of capacity and inefficiency of state agencies such as the NADMO in dealing with the matter.

Chapter 6
Local social capital and how it influences coping and adaptation to coastal erosion and flooding in Keta and Ada

6.1 Local social capital and how it influences coping and adaptation strategies

This chapter discusses how social capital derived within the community or the village to a larger extent influences the coping and adaptation strategies of households towards coastal erosion and flooding. The chapter begins with a descriptive discussion of the various sources of local social capital, the benefits households derive from the various sources of local social capital and their impact on coping and adaptation strategies, and then a presentation of bivariate results from Chi-square analysis of the influence of social capital on each of the coping and adaptation strategies. The results of the in-depth interviews will be discussed in parallel with the quantitative results from the household survey.

The results are presented in line with the three forms of local social capital; bonding, bridging, and linking local social capital.

6.2 Bonding social capita; sources of bonding social capital, and benefits households derive from their bonding ties

6.2.1 Sources of bonding social capital

Participation in voluntary associations

Putnam, (1993) has identified social interactions and the relevance of voluntary associations as key elements for the generation of social capital such as trust and the norms of reciprocity. Claridge (2018) noted that bonding social capital can be found in an association or organization where the members have a sense of belonging and shared identity. Associations for that matter are considered creators or sources of social capital due to ‘socialization effects on democratic and cooperative values and norms’ (Stolle, 2003 p. 22). For instance, Stenbacka & Mattsson (2004) found how voluntary participation by all genders in sports, business, and other associations generates social capital that is important for overall developmental purposes. Callois & Aubert (2007) have therefore stipulated that bonding social capital depends on the density of the social networks within the community, and this can be facilitated through membership and participation in the activities of community associations. From the above insight, civic participation in voluntary associations is considered a source of local social capital for household members in this study.

In an attempt to find out the meetings and activities of voluntary associations, households partake in that provide them with bonding social capital, respondents were asked during household surveys about the meetings of associations attended by household members. The result is shown in table 7 below.

Table 7: Meetings attended by household members

Name of meeting	% of households whose members attend
Fishermen association meetings	44
Fishmongers association meetings	31
Religious association meetings	73
Farmers association meetings	8
Traders association meetings	13
Traditional council meetings	9
District/Unit Committee meetings	12
Prayer group meetings	60
Sports meetings/doing sports together	38

Source: Fieldwork (2020).

During the in-depth interviews, respondents indicated by popular opinion that their household members partake in the meetings of varied associations in their village such as the fishermen associations, fishmongers associations, traders associations, religious associations, and the Umbrella Group of the Keta Vegetable Farmers and Marketers Association (with sub-groups such as Honesty Vegetable Farmers and Marketers Association, Agwanu Youth Farms Association, and Dzidepo Vegetable Farmers Cooperative Society). A fisherman along the coast of Wugah in Keta noted: "*we belong to the fishermen association. The criteria for membership of this association is that one must be a fishing net or boat owner to be a member".* The result further indicated that most of these associations are registered with the state under respective state agencies depending on the aims and objectives of each association such as the National Youth Council, the Register Generals Department, and the Department for Social Welfare. The assembly member of Keta Central noted that:

> We have the Keta Development Association which is putting a lot of pressure on the government of the day to listen to the plight of the people of Keta. An example is the construction of the sea defense wall. We also have religious organizations, the Fishmongers Association, and the Fishermen Association (01006, 02/2019).

All the above-mentioned associations according to the respondents are registered with the register generals department.*"* In a related study, Ní Chléirigh (2019) found the existence of a women's organization in the Ada area known as the Ada Songor Salt Women's Association (ASSWA) that serves as a collective force and a mouth-piece for their members not only in salt production related issues but on a varied range of issues that affects them. Amoako (2018) has also found that the residents of Old Fadama, Glefe, and Agbogbloshie all within the Greater Accra Region formed varied forms of social groups around opinion leaders within their communities such as chiefs, assemblymen, market queens, and ethnic group leaders. Some respondents however believe these associations are of not much benefit to their members. For instance, they lamented the lack of transparency from the side of the leadership of community-based associations as benefits from the central government that are meant for all the members of the association are sometimes squandered by the leaders and their few favorite persons. In a related study, Osei (2016) found that some farmers in the Central Region of Ghana have lost faith in farmer-based organizations and have therefore decided not to participate in their activities. Amu (2005) has found that women in Ghana are significantly disadvantaged in terms of network ties as compared to men in rural Ghana and that male-headed households have more social capital than female-headed households. This is, however, contrary to the findings of this study. For instance, the results of this study show that meetings of all associations are attended by both men and women though in some cases with some notable variations in the percentage of gender representations depending on the type of association in question. The variations in the gender representations in some of the associations are due to the gender-specific nature of some of the occupations in question. Examples are; In rural Ghanaian fishing communities such as Keta and Ada where going to the sea for fishing for instance is a 100 % male activity while fish mongering is a predominantly female activity. In this regard, the fishermen association for instance is predominantly male while the fishmongers association is predominantly female.

The results of the survey have again shown less discrimination and less restriction in the attendance of meetings of associations for community members as 95 % of the respondents

indicated that there are no meetings of associations within the community that they wish to attend but are denied or not permitted to do so. The survey results also indicated that age and educational level are not criteria for membership of these associations as 98 % of respondents indicated members of association meetings they attend are not of the same age group and 100 % of respondents indicated members of association meetings they attended are not of the same educational level. In terms of participation in the decision-making, the survey results indicated an active involvement of group members in decision-making in their various associations. For instance, 57 % of respondents indicated that the group members hold a discussion and then decide together, 33 % of respondents noted the group leader as the members what they think and then decide, about 2 % noted decisions are made through voting, and only 1 % indicated the leader makes the decision and then inform the group members. This is an indication that the group members also stand to benefit from the outcome of those decisions thus buttressing Putnam's notion of social capital.

Gómez-Limón et al. (2014) have found that an association where members trust each other has the potential to achieve its goals than an association without trust among its members. To find out if households derive trust as a source of social capital from their bonding ties, respondents were asked a simple question during the household survey; What is the level of trust in your village? The result is shown in Figure 10 below. Also, to further ascertain the level of trust enjoyed by households as a bonding social capital, respondents were again asked during the household survey to either agree or disagree with open statements such as; most people in this village are basically honest and can be trusted; people in this village are more trustworthy than people in other villages; most people in this village are willing to help if you need it; and I feel accepted as a member of this village. The result is again shown in Figure 11 below.

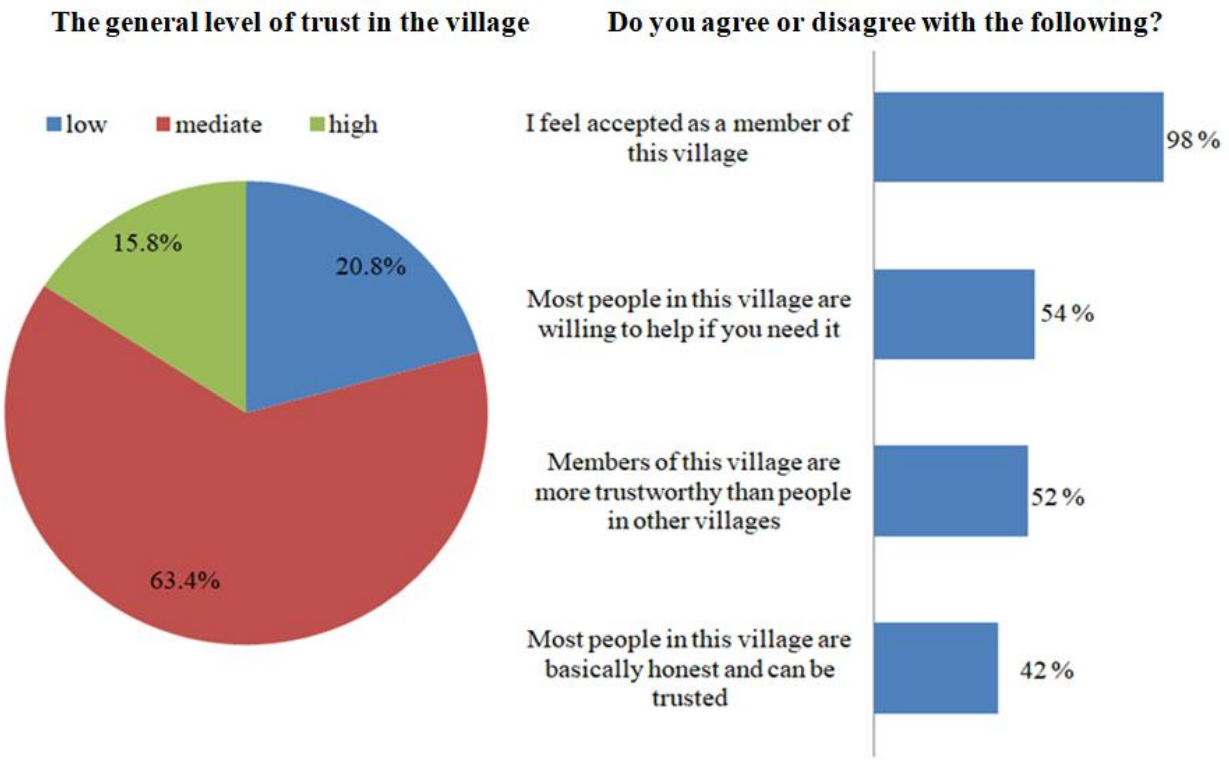


Fig. 11: Perceived level of trust in both study areas

Source: Fieldwork (2020).

Still, on trust, respondents were asked under whose care they will leave their fishing boats, house, and other belongings supposed they have to go away for a while. 92 % of the respondents noted they would leave them with other family members, 33 % of the respondents noted they would leave them with their neighbors, and 8 % of the respondents noted they would leave them with anyone from the village/town. The survey result further indicates that fewer people (7 %) are afraid their fishing boat, motorbike, or other property could be stolen by other village members as compared to those who are not afraid that any of their property could be stolen by other village members (11 %). During the in-depth interviews, though respondents were not asked directly about trust within their community or village at large, respondents indicated they can count on their community members for support during times of need such as in times of coastal flooding and economic hardship, demonstrating some level of trust among community members. Collective action by community members toward a problem that affects them which is found to be the case in both study areas (as discussed in Chapter 7 below) is also an outcome of trust among community members. In a related study, Freduah et al. (2019) have found that the existing trust and respect between fishers of the Western Region of Ghana and their religious leaders has

resulted in the former sometimes going to the latter to seek prayers during seasons of poor fish catch. Their findings added that the religious leaders sometimes capitalize on the opportunity to offer scientific reasons behind the reduction in catch to the fishers and thus admonish them to desist in practices that lead to dwindling fish stock in the waters of the area.

Staying in touch with relatives within the community or village at large

Another important source of bonding social capital is through close relations and family ties, neighbors, and friends (Hawkins & Maurer, 2010; Islam & Walkerden, 2014; Smith et al., 2012). Falk & Harrison (1998) noted that social interactions have the potential of building or accumulating varied forms of social capital. A study by Edin & Lein (1997) has revealed that poor mothers who live in public housing schemes depend on the financial support they receive from close family relations and friends for their survival. Constant communication and keeping in touch with relations within the same town or village is therefore an important source of bonding social capital as it is the basis for the flow of information, resources, and ideas among village members. Guided by the above hypothesis, respondents were asked during the survey where the largest number of their relatives live. The results show that 43 % of the relatives of most of the respondents live within the same village/town. Also, when respondents were further asked during the survey under which of the following circumstances they mostly meet with people in their village, 14 % noted during family gatherings and only 1 % noted during cemonies such as marriage and outdooring. Furthermore, and using the different generations of household members living together as an indicator for companionship, 42 % noted the generation of grandparents. This shows that 42 % of households have grandparents, parents, and children living together under the same roof which provides companionship as a bonding social capital. Respondents noted by popular opinion during the in-depth interviews that they stay in touch with their relations in the village through visits, in market places, and via phone calls.

6.2.2 Benefits/resources households derive from bonding ties

Claridge (2018) has noted that bonding ties enable community or village members to derive social support by allowing them access to information, financial and material favors, and moral support. Bonding social capital, therefore, fulfills an important social function by enabling people access to needed social support in times of socio-economic hardships such as in times of coastal hazards

(ibid). Below are examples of the benefits households in Keta and Ada derive from their bonding social ties.

Financial support

To find out whether respondents derive financial support from their bonding social capital, respondents were asked during the household survey who will help them financially supposed they incur an economic loss (e.g. during flooding or due to coastal erosion). 42 % noted extended family members will help while 22 % noted neighbors will help. Associations constituted 16 % while religious bodies constituted 29 %. The results of the in-depth interviews indicated that some of the associations do contribute money to help their members during times of need such as during flooding. The chief fisherman of Blekusu-Keta noted during an in-depth interview; *"During flooding, the members of the fishermen association do contribute some money to the chief fisherman to support the affected members"*. A household head in Akplabanya-Ada also noted that as a member of the fishermen's association of the area, they contribute fresh fish each time they return from fishing. The accumulated fish is sold and the proceeds are saved in the name of the association. He indicated that some of these monies are used in helping members of the association who are bereaved or lost their properties and source of livelihood due to coastal erosion or flooding, and also during occasions such as funerals, marriage, and naming ceremonies. Commenting on the financial benefits the farmers of the Keta area derive from their bonding ties, the secretary of the Umbrella Group of the Keta Municipal Vegetable Farmers and Marketing Association indicated that *"when they (the farmers) are together as an association they take collective decisions for instance in terms of the marketing of their products or even with the pricing of their produce"*. This, according to him improves the financial status of the farmers and boosts their coping and adaptation strategies toward coastal erosion and flooding. In a related study, Hillmann & Spaan (2017) have found that people who intend to out-migrate from Keta can always count on financial assistance from their family members. Asante et al. (2011) also found that farmer-based organizations offer farmers in the Eastern Region of Ghana access to credit facilities, loans, and market power. Yang et al. (2019) have also found that membership in community associations provides community members in Ada-East and Keta with financial support that also boosts their adaptation capacities.

Accommodation for affected persons and a safer place for belongings

Almost all the respondents acknowledged during the in-depth interviews that, in times of coastal flooding, community members whose houses were not affected by the flooding offer shelter to those whose houses were affected. They also offer them a place where they can keep their belongings until their houses are safe enough to accommodate them before they go back. Commenting on this, the Regent of Vodza also added that "*during flooding, the neighbors whose houses are not affected provide accommodation to the affected ones"*. These results confirm the findings of previous studies by Codjoe et al. (2020) and Goldbach (2017) who found that during flooding, residents of the Keta and Ada areas whose houses were flooded seek refuge in the houses of neighbors, friends, and other family members.

Collective action as a benefit of bonding social capital

Coleman (1988) argues that social groups that portray a highly cohesive network in the form of bonding ties tend to be more effective in terms of the establishment and observation of norms that propel collective action in times of need among community members. Social ties can facilitate collective action as a form of an 'informal insurance mechanism' (Callois & Aubert, 2007). Collective action due to social interaction has therefore been considered a necessity for effective coping and adaptation to environmental hazards (Adger, 2001). In rural coastal communities of the Global South whose institutions have less capacity for risk management, mutual aid is of utmost importance for immediate response to hazards (Callois & Aubert, 2007).

To find out the level of collective action households derive from their bonding social capital, respondents were asked during the survey who would deal with the situation if in case a problem such as a crop disease or violence affected their village. 69 % noted neighbors will deal with it among themselves while 60 % of the respondents noted the entire village will deal with it together. Furthermore, 73 % of respondents noted during the survey that if differences among people cause problems in the community, neighbors will intervene.

The results of the in-depth interviews also point to the existence of collective action in dealing with problems in both areas. The chief of Azizanya in Ada noted that, during flooding, some of the churches within the community do organize people to provide some help to the affected households such as assisting them to carry their valuables to safer grounds or the homes of non-

affed neighbors. The wife of the chief fisherman of Wugah noted that *"we do call on relatives and friends around us to help and they come to pack our things out of the water. Some neighbors carry our belongings to their homes for safekeeping and we go for it when it's over"*. The Regent of Wugah in Keta also noted that in the event of flooding, they first call on members of the community to help them move their belongings to safer grounds even before the NADMO arrives with some relief items. These results confirm the findings of Chléirigh (2019) who indicated that community branches of the Ada Songor Salt Women's Association (ASSWA) hold regular meetings to find a collective solution to issues that affect their members and women in general in the area. Also, in his study on Glefe, a coastal community in the Greater Accra Region of Ghana, Amoako (2018) has found that youth groups in the area are always mobilized to clean the drains before the peak flooding period. The findings of Freduah et al. (2019) also show how fishermen in the Western Region of Ghana utilized collective action to minimize the impacts of high tides and storm surges by helping each other transfer their fishing boats and nets to safer locations. Kraan (2009) has found that the Anlo-Ewe beach seine fishermen utilize collective action to boost their fishing activities. All these findings show how bonding ties enable community members to pool their resources together to deal with a situation for the collective interest of all members.

By the above findings, the second hypothesis of this study which states that local social capital such as trust enables the people to act collectively against any societal problem including coastal erosion and flooding has been accepted and the null hypothesis therefore rejected.

Food items

The respondents also noted during the in-depth interviews that, they provide help and support each other with food, especially during tidal floods. This is because some households lose their belongings including food items and will find it difficult to survive without support from neighbors and other relations in terms of food items. Other sources of food for affected people during coastal floods as stated during the in-depth interviews include religious bodies and associations they are members of.

6.3 Bridging social capital; sources of bridging social capital, and benefits households derive from their bridging ties

6.3.1 Sources of bridging social capital

Bridging social capital can be derived from weak ties existing 'between extra-community networks and heterogeneous groups' (Cofré-Bravo et al., 2019). Examples include the relationship between community members and agricultural extension officers, experts and advisors, and agri-business enterprises (ibid). Some scholars have argued that bridging ties provide access to certain types of social capital even more than bonding ties. For instance, Burt (2000) has argued that while dense social networks (bonding ties) mostly convey 'commonplace information', weaker social ties which mostly exist among different classes of social groups (bridging ties) convey original information. Still, on access to information, Granovetter (1973) has noted that mobile actors who have connections with different social ties do not only receive varied information but do so quicker than actors in closer ties (bonding ties). In summary, the bridging ties perspective believes that weaker social ties with sparse networks do generate varied valuable social capital for its members (Riemer & Finke, 2015).

The findings of this study have shown that households derive bridging social capital from the National Fishermen and Fishmongers Association, officers of the National Disaster Management Organization, agricultural extension officers, leaderships of farming and marketing associations, and chief fishermen. For instance, and as already indicated in the chapter above, the survey results have shown that households attend meetings of several associations whose leadership serves as sources of bridging social capital. Respondents noted during the in-depth interviews that they do attend the annual meeting for fishermen and fishmongers in Accra where they get the opportunity to present their grievances to their leaders so they can channel them to the government of the day for redress. The agric director for Keta Municipality also indicated during the in-depth interview that their office works with the farmers through their registered associations on several issues concerning farming in the area such as the acquisition of subsidized fertilizers, inputs, and seedlings for the farmers at the beginning of the cropping season. He added that they also step in to help the farmers recover from the impacts of flooding on their crops. The leaders of associations such as chief fishermen and the secretary for the vegetable farmers and marketers association serve as linkages between their respective association members and other state

institutions that enable them to secure benefits such as fertilizers, chemicals, and pre-mixed fuel for their fishing boats. Respondents, however, have mixed feelings concerning the role of the chief fishermen as they accused them of favoritism and the lack of transparency and fairness in the allocation of such support such as pre-mixed fuel for fishing from the government.

6.3.2 Benefits/resources households derive from bridging ties

Below are some of the benefits that households in Keta and Ada derive from their bridging social ties.

Information and sensitization

Callois & Aubert (2007) have noted that social capital connotes social links and social links are endowered with valuable information which is costly, and people with access to valuable information always have the advantage when it comes to making important decisions. From the results of the household survey, 52 % of respondents indicate they receive sensitization or education from state institutions via training organized by heads of associations (mostly the chief fishermen) before the approaching rainy season against coastal erosion and flooding. In terms of recovering from the impacts of coastal erosion and flooding, 49 % of respondents indicated they receive education in that regard. Atta Mauli, a fisherman in Wugah-Keta stated, "*one needs to be a fisherman and also own a net in other to be a member of the fishermen's association. They (the chief fishermen) sometimes call us to come and listen to some information they have from the government"*. The respondents in Ada noted during the in-depth interviews that they receive periodic training from the National Fishermen and Fishmongers Association, with its main office in Accra in hygiene-related areas during fish processing at their meetings which, though not directly related to coastal erosion or flooding, is important in increasing the value of their fish whiles improving the health of both the fishmongers and the consumers thus indirectly impacting coping and adaptation strategies. The agric director of Keta noted they also provide training to farmers through their associations on how to minimize the impacts of coastal erosion and flooding on their crops.

These results confirm the findings of Chléirigh (2019) who found that the leadership of the ASSWA women's group sometimes issues a call via Radio-Ada to their members to come out to protest an issue that affects them and their occupation. In another related study, Freduah et al.

(2019) found that fishers in the Western Region of Ghana utilize information derived from their external networks to purchase pre-mixed fuel from other villages and also track the movement of fish. The findings of Osei (2016) also show that farmers in the Central Region of Ghana receive skills in planting crops and other farming-related practices from their extension officers.

Skills acquisition

The findings of this study also indicate that household members acquire some skills through their bridging ties. In the survey results, 19 % of respondents noted they have acquired some new skills from the meetings of associations they are members of. The fishermen for instance noted during the interviews that they receive directives as to the type of nets that should be used in fishing in other to avoid the catching of fingerlings and thus avoid the depletion of fish stock in the waters. (see again Cudjoe & Alorvor 2021).

6.4 Linking social capital: sources of linking social capital, and benefits households derive from their linking ties

6.4.1 Sources of linking social capital

Linking social capital is said to be important in connecting disaster victims with government officials who not only control the resources but also have the knowledge regarding how to access needed resources from different levels of government (Pfefferbaum et al., 2017). Mathbor (2007) has also argued that long-standing relationships between the state, organizations such as banks, and other agencies (linking ties), play a significant role in mitigating the impacts of natural environmental hazards on communities.

To find out the various linking ties of households that provide them with linking social capital, respondents were asked if any of their family members hold the following positions?; District/Municipal Chief Executive (DCE/MCE), Member of Parliament (MP), or Regional Minister (RM). From the survey results, only 1 % of respondents noted their family member is an MP, and 4 % noted their family member is either a DCE or MCE. Also, to find out whether households attend meetings of influential institutions where they can derive linking social capital, respondents were asked during the survey to choose which of the following meetings is more important to them. 3 % of respondents noted Traditional Council meetings and 3 % also noted

District Assembly meetings. The survey results further indicate that issues directly concerning coastal erosion and flooding and coping and adaptation strategies are discussed during the above-mentioned meetings attended by household members. For instance, the respondents were asked about the important topics discussed during District Assembly meetings. 36 % of respondents noted issues relating to coastal erosion while another 36 % noted issues relating to coastal flooding. 31 % noted migration-related issues. Also, when respondents were asked about the important topics discussed during Traditional Council meetings, 35 % noted coastal erosion-related issues, 36 % noted coastal flooding-related issues, and 32 % noted migration-related issues. Furthermore, to find out whether the above institutions that serve as sources of linking social capital are directly involved in tackling any problem that affects the community, respondents were asked during the survey who will deal with the situation if in case a problem such as a crop disease or violence affects their village. 80 % noted local government leaders and 87 % noted chiefs or Traditional Council leaders.

The results of the in-depth interviews also show collaboration between state agencies such as the NADMO and community-based associations in the areas of managing the impacts of coastal erosion and flooding. The NADMO director of Keta noted during the in-depth interview that *"we (the NADMO) are in close contact with the associations and their leadership. We work together to help reduce the impact of these hazards on their lives"*. A household head in Otropey-Ada also noted that "w*e have the NADMO here, whenever we have our association meetings we invite them and they do come to listen to our demands from them"*.

A report from the Ministry of Fisheries and Agricultural Development (MOFAD) has indicated that the government of Ghana in collaboration with some NGOs has implemented projects geared towards alleviating communities of the lower Volta of the impacts of hazards after the construction of the Volta Dam (MOFAD 2018b). Yang et al. (2019) have also found that Ghana's Ministry of Food and Agricultural Development in collaboration with the World Bank set up a steering committee that is vested with the responsibility of implementing programs that will facilitate alternative sources of livelihood for rural fishing communities. Freduah et al. (2019) also found that there is a collaboration between the Western Fishmongers Association and state agencies such as the Coastal Resource Centre and even other foreign bodies such as the likes of the Netherlands Development Organization and the World Bank through the National Fisheries Commission to improve on the activities of fishers in the area. Frick-Trzebitzky (2017) in their

study has also found out how the activities of community chiefs have an impact on both the success and otherwise of adaptation practices of their people towards coastal flooding in some communities within the Greater Accra Region. However, the findings of other studies have expressed mixed feelings on the relevance of state institutions especially the NADMO in managing coastal hazards in Ghana. For instance, Evadzi et al. (2018) have noted that households in some communities of Ada-East and other towns along the lower Volta established their discontent with the NADMO for their inability to provide households affected by climate-related hazards with the needed relief items over the years. Frick-Trzebitzky (2017) has also found that apparent incoherence on the part of state institutions in the management of coastal floods within the Greater Accra region has led to less success in the discharge of their duties.

6.4.2 Benefits/resources households derive from linking ties

The following are some of the benefits derived by households from their linking ties.

Financial support

To find out whether households derive some financial benefits from their linking ties, respondents were asked during the survey who will support them financially supposed they suffer an economic loss. Only 4 % of respondents noted banks, 2 % noted politicians, and another 4 % noted traditional rulers. Also, 5 % of respondents noted during the survey that they receive financial support from the state to help them prepare for the approaching flood season. The qualitative results also indicated that households derive financial benefits from their linking ties. For instance, the residents of Azizanya-Ada noted during the in-depth interviews that some time ago, they were permitted by the District Assembly to use the proceeds derived from the sales of the premix fuel (used for fueling fishing boats) for community development. As a result, they were able to use some of the monies for the dredging of one portion of the coastline which reduced coastal flooding in the area for some time. Currently, they no longer have access to such money as they are now required to write to the District Assembly for the release of funds for such a purpose. They noted that in recent times, they have written several letters to the District Assembly in this regard but their plea has never been granted and as a result, they are unable to do some more dredging. This makes the entire area flooded in the event of any heavy rainfall due to spillage from the Volta Lake. The report from the Ministry of Fisheries and Agricultural Development (MOFAD) has indicated that the government of Ghana together with the World Bank has set up a

revolving credit scheme for small-scale fishers of groups of 5 to 10 to help reduce their overdependence on marine resources (MOFAD, 2018b).

Tools, equipment, inputs

The results of this study also show that households acquire tools and inputs for their farming and fishing activities through their linking ties though the figures from the household survey are quite insignificant. Only 1 % of respondents indicated they receive tools from the state to enable them to prepare against coastal erosion and flooding. In terms of recovering from the impacts of coastal erosion and flooding, the survey results indicate only 2 % of households receive tools/equipment from the state for such purposes. During an in-depth interview with the secretary of the umbrella group of the Keta Municipal Vegetable Farmers and Marketing Association, he indicated that their members do obtain farm inputs such as chemicals, fertilizers, and seedlings at the beginning of the season from the government through the Ministry of Agriculture at subsidized prices to help boost their farming activities. The chief fishermen of Akplabanya in Ada-West noted during an in-depth interview that the state does provide their members with premixed fuel and onboard motors at subsidized prices for their fishing activities. Some respondents, however, believe these associations are of not much benefit to their members. They noted that any benefits from the central government that are meant for all the members of the association are always been squandered by the leaders and some few favorites. A household head at Wugah in Keta by the name AKA Acid lamented that:

> they told us if we formed the association they would help us get nets, boats, and other facilities from the government for fishing. One pays a one-time premium to be a member, and one needs to be a fisherman and also own a net to qualify as a member of the fishermen's association. We do not get any support from these associations (01007, 02/2019).

These results are similar to the findings of Yang et al. (2019) who found that farmers receive support from the state in its bid to make agriculture attractive to the youth. Mensah et al. (2006) also found that in an attempt to modernize artisanal fishing, the government of Ghana introduced onboard motors and made them affordable to the fishermen through loan schemes and subsidized import duty taxes, the establishment of repair shops for the onboard motors, subsidized fuel for fishing boats, and the replacement of the old fishing nets made of cotton and other materials with nylon ones.

Information/sensitization

The results of this study have again shown that the people of both areas receive information and sensitizations from state agencies especially the NADMO to enable them to prepare for and recover from the impacts of coastal hazards. For instance, the result has shown some major steps taken by the Keta Municipal Assembly in this regard including the passing of By-laws such as the 'buffer zone law' that prevents people from building less than 300m from the coast and also carrying out public education and sensitization activities to keep the populace informed about measures that will boost their coping and adaptation strategies. The NADMO director for Keta Municipality noted during the in-depth interview that NADMO as an organization lacks the needed capital to organize meetings with large numbers of people in other to sensitize them on issues relating to coastal erosion and coastal flooding. As a result, they are always on the watch-out for days that members of a particular association are meeting or having an event, and then they (the NADMO) book a slot in that event where they get the opportunity to sensitize the people on issues relating to coastal erosion and flooding. The NADMO director of Keta noted they, for instance, educate the farmers through their sensitization programs on safe periods of planting to prevent the crops from being washed away by floods. He added that they again educate the populace as to who or which specific office to contact via hotlines for which specific disaster. This, according to him is to ensure a quick response to the disaster and thus minimize its impacts on lives and property. He concluded; *"our duties are as follows; prevent disasters, manage disasters when they do happen, and reconstruct and put the people back into their livelihoods after every disaster"*.

Contrary to the submissions by some respondents that NADMO officials are only seen during disasters when they come to distribute some relief items and then disappear afterward until the next disaster, the NADMO director of Keta noted that the organization has an all-year-round schedule of different events for managing disasters within the Municipality. He stated that the organization has specific programs for specific communities based on their needs. According to him :

> For some communities, we only go there to educate them on fire, some about flooding, and some about caterpillar worm infections. We do a hazard mapping of all the areas and thus we know the specific needs of each community. These are what we are doing and we are succeeding (01008, 02/2019).

He added that NADMO has always been the first point of call for the people of the Municipality in times of disaster. These results confirm the findings of a study by Agbogah et al. (2016) who noted that the NADMO undertakes several activities in coastal communities all over the country such as hazard mapping of vulnerable communities, and the establishment of community-based emergency response centers all geared towards alleviating the people of the impact of coastal hazards.

6.5 Impact of local social capital on coping and adaptation strategies

A bivariate analysis (chi-square analysis) was used to find out the relationship between the various benefits of local social capital and coping and adaptation strategies in Keta and Ada. The independent variables for the analyses are shown in Table 8 and the dependent variables in Table 9. It must, however, be noted that not all the coping and adaptation strategies discussed above will be included in the bivariate analysis. This is because some of the coping and adaptation strategies are obviously not influenced by social capital. The sea defense project and the resettlement schemes are both not the people's initiatives but rather top-down initiatives of the central government. Other coping strategies are also very basic activities that do not require any form of social capital to execute (e.g. sweeping out water from the room with a broom, scooping out water from the room with a bowl, perforation the wall to serve as a passage for stagnant water, raising the height of the bed, and placing items on the room on higher surfaces). There are also a few coping and adaptation strategies that are not top-down and are also related to social capital but are not included in the bivariate analysis because they are only captured in the in-depth interviews and not the household survey.

Table 8: Independent variables for analyzing the impacts of local social capital on coping and adaptation strategies

variable	Description and type of variable	Type of measurement	Form of local social capital
Skills acquired from associations	Skills acquired by household members from mother associations outside the village (0 = No; 1 = Yes)	Categorical variable	Bonding social capital
Financial support from extended family members	Financial support households receive from extended family members towards coastal erosion and during flooding (0 = No; 1 =Yes)	Categorical variable	Bonding social capital
Financial support from neighbors	Financial support households receive from neighbors during flooding and toward erosion (0 = No; 1 = Yes)	Categorical variable	Bonding social capital
Financial support from associations	Financial support households receive from community-based associations they belong to (0 = No; 1 = Yes)	Categorical variable	Bonding social capital
Financial support from religious bodies	Financial support households receive from religious bodies during flooding and towards erosion (0 = No; 1 = Yes)	Categorical variable	Bonding social capital
Sensitization/education from state agencies	Sensitization households receive from state agencies towards erosion and flooding (0 = No; 1 = Yes)	Categorical variable	Linking social capital

Source: Fieldwork (2020).

Table 9: Dependent variables for analyzing the impacts of local and translocal social capital on coping and adaptation strategies

Variable	**Description and type of measurement**	**Type of variable**
Out-migration	Whether household members out-migrated within the last five years (0 = No, 1 = Yes)	Categorical
Modification of housing styles	Whether households made some changes or modified their houses within the last five years (0 = No, 1 = Yes)	Categorical
Relocation of houses further inland	Whether households moved or relocated their houses further inland away from the coastline within the last five years (0 = No, 1 = Yes)	Categorical
Pumping out water with a water pump	Whether households used water pumps to pump out floodwaters from their rooms within the last five years (0 = No, 1 = Yes)	Categorical
Barricading houses with sandbags	Whether households barricaded their houses with sandbags in anticipation of floods within the last five years (0 = No, 1 = Yes)	Categorical

Source: Fieldwork (2020).

The results of the bivariate analysis (Chi-square test) on the relationship between local social capital and coping and adaptation strategies are shown in Table 10 below ($\alpha = .05$, and a 95 % confidence ratio).

Table 10: Chi-square test result; Impact of local social capital on coping and adaptation strategies

		Value	df	Asymp.Sig. (2-sided)	Crosstabs				
Pumping out water with water pump							No	Yes	Total
Skills learned from associations	Pearson Chi-square	15.412[a]	1	*.000*	No	Count	317	9	326
						Expected count	310.5	15.5	326
					Yes	Count	64	10	74
						Expected count	70.5	3.5	74
Financial support from extended family	Pearson Chi-square	.178[a]	1	.673	No	Count	222	12	234
						Expected count	222.9	11.1	234
					Yes	Count	159	7	166
						Expected count	158.1	7.9	166
Financial support from neighbors	Pearson Chi-square	2.561[a]	1	.110	No	Count	300	12	312
						Expected count	297.2	14.8	312
					Yes	Count	81	7	88
						Expected count	83.8	4.2	88
Financial support from associations	Pearson Chi-square	7.909[a]	1	*.005*	No	Count	275	8	283
						Expected count	269.6	13.4	283
					Yes	Count	106	11	117
						Expected count	111.4	5.6	117
Sensitization/ education from state agencies	Pearson Chi-square	6.125[a]	1	*.013*	No	Count	190	15	205
						Expected count	195.3	9.7	205
					Yes	Count	191	4	195
						Expected count	185.7	9.3	195
Modification of housing styles							No	Yes	Total
Skills learned from associations	Pearson Chi-square	1.484[a]	1	.223	No	Count	251	75	326
						Expected count	246.9	79.1	326
					Yes	Count	52	22	74
						Expected count	56.1	17.9	74
Financial support from extended family	Pearson Chi-square	5.895[a]	1	*.015*	No	Count	167	67	234
						Expected count	177.3	56.7	234
					Yes	Count	136	30	166
						Expected count	125.7	40.3	166
Financial support from neighbors	Pearson Chi-square	1.062[a]	1	.303	No	Count	240	72	312
						Expected count	236.3	75.7	312
					Yes	Count	63	25	88
						Expected count	66.7	21.3	88
Financial support from associations	Pearson Chi-square	13.345[a]	1	*.000*	No	Count	266	70	336
						Expected count	254.5	81.5	336
					Yes	Count	37	27	64
						Expected count	48.5	15.5	64
Financial support from religious bodies	Pearson Chi-square	7.428[a]	1	*.006*	No	Count	255	58	283
						Expected count	214.4	68.6	283
					Yes	Count	78	39	117
						Expected count	88.6	28.4	117
Sensitization/ education from state agencies	Pearson Chi-square	2.199[a]	1	.138	No	Count	143	62	205
						Expected count	155.3	49.7	205
					Yes	Count	160	35	195
						Expected count	147.7	47.3	195

Barricading buildings with sandbags							No	Yes	Total
Skills learned from associations	Pearson Chi-square	.706[a]	1	.401	No	Count	289	37	326
						Expected count	286.9	39.1	326
					Yes	Count	63	11	74
						Expected count	65.1	8.9	74
Financial support from extended family	Pearson Chi-square	28.448[a]	1	*.000*	No	Count	223	11	234
						Expected count	205.9	28.1	234
					Yes	Count	129	37	166
						Expected count	146.1	19.9	166
Financial support from neighbors	Pearson Chi-square	.043[a]	1	.835	No	Count	274	38	312
						Expected count	274.6	37.4	312
					Yes	Count	78	10	88
						Expected count	77.4	10.6	88
Financial support from associations	Pearson Chi-square	2.385[a]	1	.122	No	Count	292	44	336
						Expected count	295.7	40.3	336
					Yes	Count	60	4	64
						Expected count	56.3	7.7	64
Financial support from religious bodies	Pearson Chi-square	1.002[a]	1	.317	No	Count	252	31	283
						Expected count	249	34	283
					Yes	Count	100	17	117
						Expected count	103	14	117
Sensitization/ education from state agencies	Pearson Chi-square	2.625[a]	1	.105	No	Count	202	3	205
						Expected count	180.4	24.6	205
					Yes	Count	150	45	195
						Expected count	171.6	23.4	195
Relocating buildings further inland							No	Yes	Total
Skills learned from associations	Pearson Chi-square	.129[a]	1	.719	No	Count	76	250	326
						Expected count	74.2	251.8	326
					Yes	Count	15	59	74
						Expected count	16.8	57.2	74
Financial support from extended family	Pearson Chi-square	46.712[a]	1	*.000*	No	Count	25	209	234
						Expected count	53.2	180.8	234
					Yes	Count	66	100	166
						Expected count	37.8	128.2	166
Financial support from neighbors	Pearson Chi-square	2.964[a]	1	.085	No	Count	65	247	312
						Expected count	71	241	312
					Yes	Count	26	62	88
						Expected count	20	68	88
Financial support from associations	Pearson Chi-square	9.673[a]	1	*.002*	No	Count	86	250	336
						Expected count	76.4	259.6	336
					Yes	Count	5	59	64
						Expected count	14.6	49.4	64
Financial support from religious bodies	Pearson Chi-square	.180[a]	1	.672	No	Count	66	217	283
						Expected count	66.4	218.6	283
					Yes	Count	25	92	117
						Expected count	26.6	90.4	117
Sensitization/ education from state agencies	Pearson Chi-square	43.490[a]	1	*.000*	No	Count	19	186	205
						Expected count	46.6	158.4	205
					Yes	Count	72	123	195
						Expected count	44.4	150.6	195

					Out-migration		No	Yes	Total
Skills learned from associations	Pearson Chi-square	.205[a]	1	.651	No	Count	151	175	326
						Expected count	149.1	176.9	326
					Yes	Count	32	42	74
						Expected count	33.9	40.1	74
Financial support from extended family	Pearson Chi-square	.012[a]	1	.911	No	Count	110	124	234
						Expected count	107.1	126.9	234
					Yes	Count	73	93	166
						Expected count	75.9	90.1	166
Financial support from neighbors	Pearson Chi-square	9.889[a]	1	*.002*	No	Count	158	154	312
						Expected count	142.7	169.3	312
					Yes	Count	25	63	88
						Expected count	40.3	47.7	88
Financial support from associations	Pearson Chi-square	22.619[a]	1	*.000*	No	Count	173	163	336
						Expected count	153.7	182.3	336
					Yes	Count	10	54	64
						Expected count	29.3	34.7	64
Financial support from religious bodies	Pearson Chi-square	9.289[a]	1	*.002*	No	Count	142	141	283
						Expected count	129.5	153.5	283
					Yes	Count	41	76	117
						Expected count	53.5	63.5	117
Sensitization/ education from state agencies	Pearson Chi-square	5.564[a]	1	*.018*	No	Count	86	119	205
						Expected count	93.8	111.2	205
					Yes	Count	97	98	195
						Expected count	89.2	105.8	195

NB: The results of some of the variables are excluded from the table above because they are statistically invalid due to very small counts.

Pumping out water with a water pump

The results of the Chi-square analysis above have shown that pumping out water with a water pump has a significant positive relationship with skills learned from associations ($p < .001$). Surprisingly, financial support from extended family members, financial support from neighbors, and financial support from associations do not have significant positive relationships with pumping out water with a pump. Drawing from the findings of the in-depth interviews, households were exposed to the modern technique of getting rid of flood waters from their rooms by attending meetings of their mother associations outside their village. In a related study, the findings of Asante et al. (2011) indicated that access to machinery services is one major reason why farmers of the Eastern Region of Ghana join farmer-based organizations. Cordaro & Desdoigts (2021) also found that the greater the social capital of farmers the more likely they are to adopt new technologies for farming.

Modification of housing styles

The result indicates that financial support from associations has a significant positive relationship with the modification of housing styles ($p < .001$). Also, financial support from religious bodies has a significant positive relationship with the modification of housing styles ($p = .006$). On the other hand, modification of housing styles has a significant relationship with financial support from extended family members ($p = .015$), but the crosstab results indicate that financial support from external family members negatively influences the modification of housing styles by household members (expected count = 40.3, actual count = 30). Though this is unexpected, the results of the in-depth interviews indicate that poorer households mostly use financial support they receive from external family to meet their basic needs and eventually out-migrate leaving behind their houses. Thus the more money they receive from their extended family, the more likely they shift their attention from the modification of their houses to focus on other basic strategies and later on out-migrate. This result also supports the findings of the in-depth interviews already discussed above where leaders of the fishermen's associations noted their members do make contributions that they use to support members affected by coastal floods. In some instances, some members noted the relief items they receive from the state and the support from associations they belong to including bags of cement and roofing sheets for the reconstruction of their demolished homes due to the impacts of coastal erosion and flooding. In a related study, Fitrinitia & Matsuyuki (2022) found that local social capital influenced the construction of additional infrastructure within the house such as temporary dykes and stairs as preparation for anticipated floods in Pekalonga in Indonesia.

Barricading buildings with sandbags

Barricading buildings with sandbags has a significant positive relationship with financial support from extended family members ($p < .001$). It is, however, not surprising that sensitization from state agencies does not have a relationship with barricading buildings with sandbags because the practice is tantamount to sand winning and thus will not be promoted by any state agency. The respondents noted during the in-depth interviews that in some instances, support from extended family members comes before the onset of the flood season to enable households to prepare for the approaching floods. The findings of a related study by Hotchkiss & Rupasingha (2021) have suggested that communities with access to local social capital do embark on accommodating

practices towards coastal hazards (such as barricading buildings with sandbags) in order to prevent them from having to move away from the place that they are attached to.

Relocation of houses further inland

Financial support from associations has a significant positive relationship with the relocation of houses further inland ($p = .002$). On the other hand, relocation of houses further inland has a significant relationship with financial support from extended family members ($p < .001$), but the crosstabs result indicates financial support from associations negatively influences the relocation of houses (expected count = 128.2, actual count = 100). Though unexpected again, and as already explained above, the results of the in-depth interviews indicate that poorer households mostly use financial support from associations to meet their basic needs and eventually out-migrate leaving behind their houses. Thus the more money they receive from associations, the more likely they shift their attention from the relocation of their houses to focus on other basic strategies and later on out-migrate. Also, sensitization/public education has a significant relationship with the relocation of houses further inland ($p < .001$), and the crosstabs results indicate that sensitization from the state negatively influences the relocation of houses (expected count = 150.6, actual count = 123). The result of the in-depth interviews again indicates that most of the sensitizations and relief items received from the NADMO specifically are geared toward enabling households to manage the disasters to reduce impacts on lives and property. This rather encourages households to stay and deal with the situation instead of relocating. There is, however, no significant relationship between financial support from religious bodies and tools/equipment from state agencies with the relocation of houses further inland as one might expect, which contradicts the findings of the in-depth interviews. For instance, the results of the in-depth interviews indicate that sometimes, victims whose houses have been destroyed or severely damaged do receive roofing sheets as a part of the relief items from the state.

Out-migration

Out-migration of household members has a significant positive relationship with financial support from neighbors ($p = .002$). Financial support from associations also has a significant positive relationship with out-migration ($p < .001$). Again, financial support from religious bodies has a significant positive relationship with out-migration ($p = .002$). One might expect a positive correlation between financial support from extended family members with the out-migration of

household members but this is surprisingly not the case as the results of the in-depth interviews also indicate that some of the support for the out-migration of household members are from extended family members and friends. Per the results of the in-depth interviews, accommodation at the destination place, support in finding a job, and news of encouragement influence outmigration more than financial support. There are, however, divided opinions in the literature on how local social capital influences out-migration in general. For instance, Hotchkiss & Rupasingha (2021) found that higher local social capital is an indication of a stronger community integration thereby reducing the probability of out-migration. On the contrary, Horney et al. (2012) found that communities with strong bonding social ties who are reluctant to migrate after a disaster are always encouraged and supported by their relations and friends to do so.

From the above results and analysis, the first hypothesis of the study which states that resources derived from social networks improve the capacities of people and households to prepare for, respond to, and recover from the impacts of coastal erosion and flooding has been accepted and the null hypothesis is rejected (though some of the variables appear to have a negative correlation).

6.6 Conclusion of the chapter

The results above have shown two main categorizations of local social capital in both areas. These are community social capital (derived from memberships of voluntary associations) and personal social capital (derived from networks of neighbors and relatives). From the results above, bonding social capital mostly in the forms of financial support from extended family members and neighbors dominates in influencing bottom-up coping and adaptation strategies by households such as relocating houses further inland, modification of housing styles, and out-migration. This can be attributed to the rather homogeneous nature of the social structure of both study areas as Ada is predominantly inhabited by the Ga-Adangbe ethnic group (100 % of households captured under the survey) and predominantly Christian (99 %). Also, 99 % of households captured during the survey in Keta are inhabited by the Ewe ethnic group and 66 % of the households captured under this study are Christian as well. These results are in line with the findings of Bott et al. (2019) who found how the homogeneous social structure in communities of Java in Indonesia produces bonding ties that influence the response to coastal flooding by community members. But on a rather general note, and with reference to the findings of the in-depth interviews, local social

capital does not influence coping and adaptation strategies in both study areas as expected. This points to an important contribution of this study and reflects the results of the in-depth interviews on the following two points; (1) The issue of lack of transparency on the part of leaders of associations which affects the level of bridging social capital and its impact on coping and adaptation strategies. (2) The lower dominance of linking social capital in both study areas can also be attributed to the lack of capacity of state institutions to enable them to function effectively as has been established during the in-depth interviews.

Chapter 7
Translocal social capital and how it influences coping and adaptation to coastal erosion and flooding

7.1 Translocal social capital and how it influences coping and adaptation strategies

This chapter focuses on how translocal social capital influences coping and adaptation strategies to coastal erosion and flooding. The chapter first presents results on the various sources of translocal social capital for the people and the resources households derive from their translocal ties. The chapter proceeds to look at how resources/benefits households derive from translocal ties influence coping and adaptation strategies to coastal erosion and flooding and a presentation of the results of bivariate analysis (Chi-square test results) on the relationships between translocal social capital and the various coping and adaptation strategies. Finally, the chapter presents results on how proximity and ethnicity influence out-migration as a coping and adaptation strategy towards coastal erosion and flooding in both areas.

7.2 Sources of translocal social capital

Migration

Massey et al. (1999) have noted that existing relationships between non-migrants, migrants, and former migrants represent translocal social capital that facilitates the translocal exchange of goods and services and the movement of people as well. Migrants, both internal and external are found to connect places of origin, transit, and destination thereby creating a translocal space that facilitates the exchange of valuable resources and information (Etzold, 2014).

Based on this background, and to find out whether the respondents comprise migrant settlers or not, respondents were asked the following questions during the household survey: What is your birthplace? Do you have members in your household who were born somewhere else? The result shows that 78 % of respondents were born in the same village/town, 15 % in another village/town in the region, 6 % were born in another region in Ghana, and only 1 % were born outside Ghana. 42 % of respondents noted that some of their household members were born elsewhere (outside the village), and an average of 6 household members were born outside the village. Also, and as already indicated in Chapter five above, the result of both the household survey and the in-depth interviews show that household members from both study areas have out-migrated due to several reasons within the last five years. Respondents were therefore asked during the survey of the places their household members out-migrated to within the last five years. The result is shown in Figure 12 below.

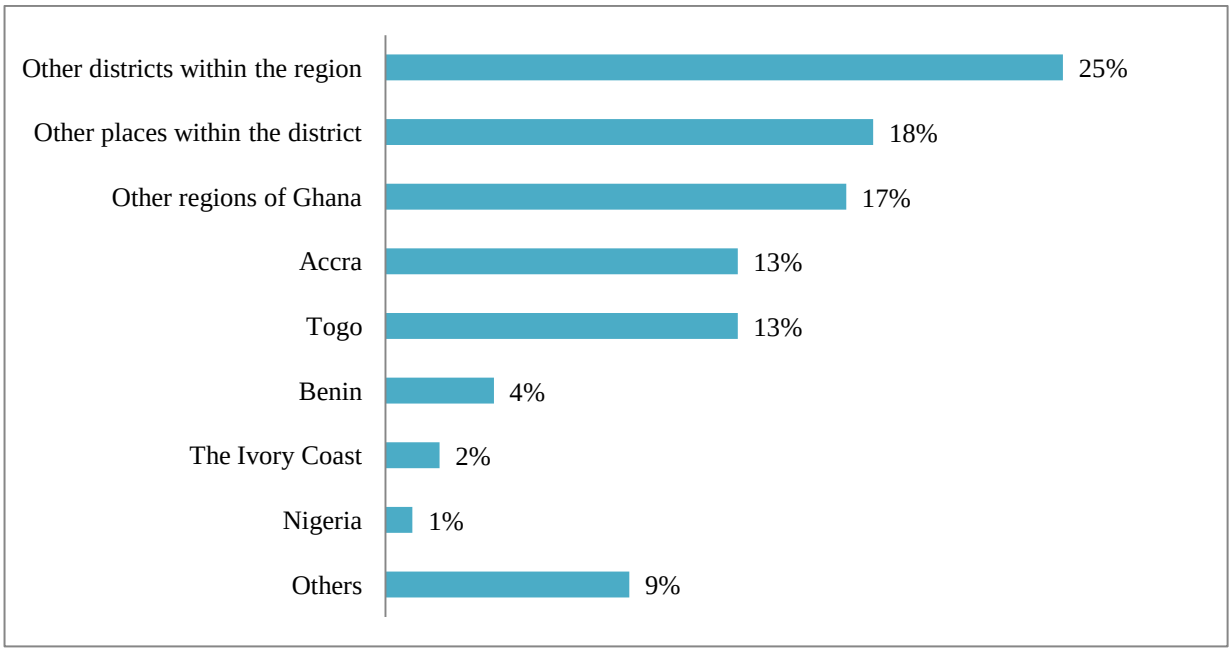


Fig. 11: Places household members out-migrated to within the last five years (% of responses)

Source: Fieldwork (2020).

The "other places" where 10 % of household members out-migrated to, as shown in Figure 11, include China, Europe, and the USA. The results of the in-depth interviews have shown that though in recent times, there are indications of more out-migration from the Keta area as compared to in-migration, in-migration still exists to some extent, and the Keta area functions as one of the first points of settlement, especially for Ewe-speaking immigrants from neighboring Togo and Benin before they proceed to Accra or any other part of Ghana. Commenting on this, the chief of Wugah in Keta stated:

> For some time now a good number of people in Keta and Zomayi are settlers, and we are Aborigines. At first, when the white men came, they landed at Keta and a lot of people came from Hohoe, Ho, etc. to Keta to buy goods to go and sell, and that's why people are still calling for a harbor in Keta. Lots of things (activities of the people are going down (experiencing a setback) now. Even marketing activities have gone down and because of this most people are migrating to other places now (01009, 02/2019).

The development planner of Keta Municipality added that:

> There are migrant settlers in this community (Keta), but 75 % of the people are from this area. People also come when there is a bumper harvest of fish. The people sometimes come here but the out-migration of our people is more. It's rather the people here that migrate to other places, and some of the places they go to include Togo, Benin, and Abidjan (010010, 02/2019).

The presence of migrant settlers in the study communities with existing links with their places of origin undoubtedly facilitates the exchange of resources and information as a form of translocal social capital. These results are similar to the findings of Mensah et al. (2006) who noted that the fishermen of Ghana are on a constant internal migration due to the migratory nature of some fish species. They noted that the sardine fish species that started moving from the Western to the Eastern and Volta Regions of the country prompted a similar migratory pattern of the fishermen. Lazar et al. (2015) have indicated that other towns around the Volta Lake are the favorite destination for migrants from the lower Volta area so they can have the opportunity to continue with their fishing activities. In another related study, Kraan (2009) also found that Ghanaian fishermen have a strong record or footprint in the artisanal fishing industry across entire West Africa, especially in countries such as the Ivory Coast, Liberia, Togo, and Benin and they are said to be responsible for between 50 % to 90 % of the fish catch in the above-mentioned countries. The Ghanaian fishing canoe is being used in many countries of the West African sub-region, and the Ghanaian fishermen, due to their equipment and techniques have taught the fishermen of many West African countries how to fish (ibid).

Keeping in touch / constant communication with relatives/associations outside the village

Frequent communication among groups is found to be a necessity for the existence of social capital (Madhavan & Landau, 2011). Greiner & Sakdapolrak (2013) consider translocal social capital to be derived from a well-established network with relations at multiple locations. The presence of a network of relations in different destinations, therefore, lays the foundation for communication by people among each other across those destinations. To find out whether households have relations in different places outside their village whom they have established translocal ties with, respondents were asked during the household survey where the largest number of their relations live. The result is shown in Figure 13 below.

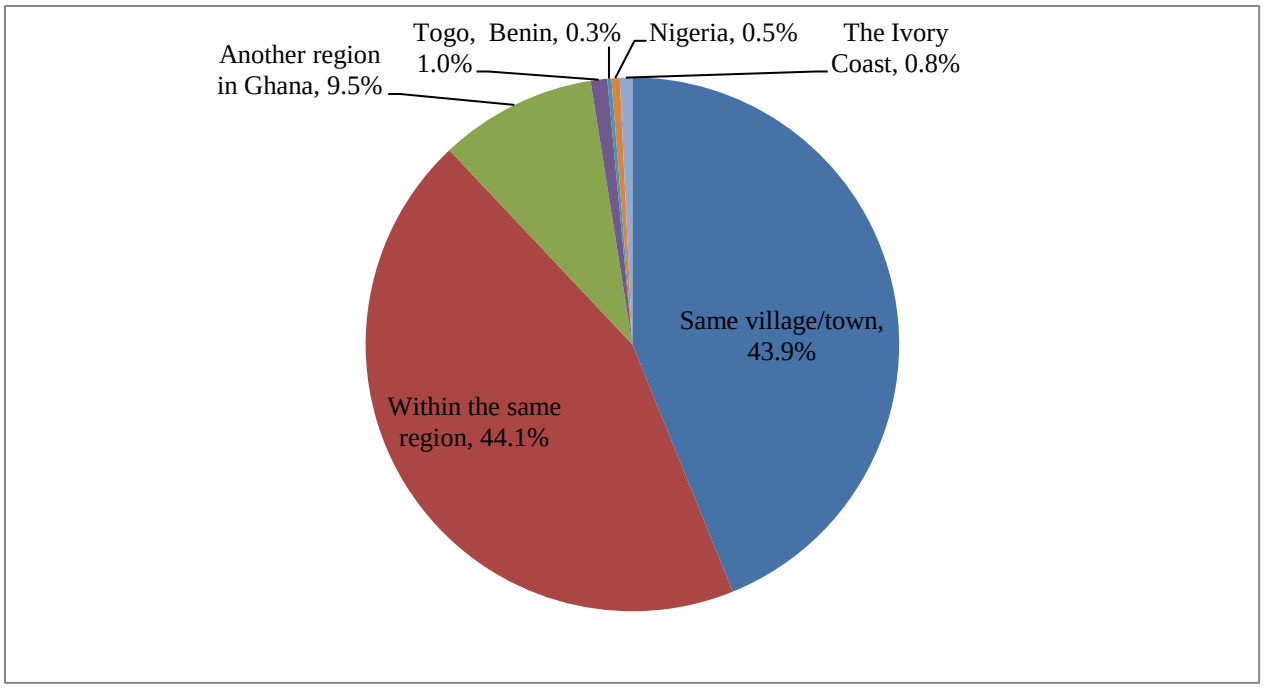


Fig. 12: Where the largest number of respondents' relations live

Source: Fieldwork (2020).

The above results indicate that respondents have relations in multiple destinations outside their village (both within and outside Ghana) which establishes the foundation for communication and exchange of ideas and resources between them. Furthermore, to find out the level of communication between household members and their relations in other places, respondents were asked during the survey how often they stay in contact with their relations in the various destinations. The results are shown in Figure 14 below.

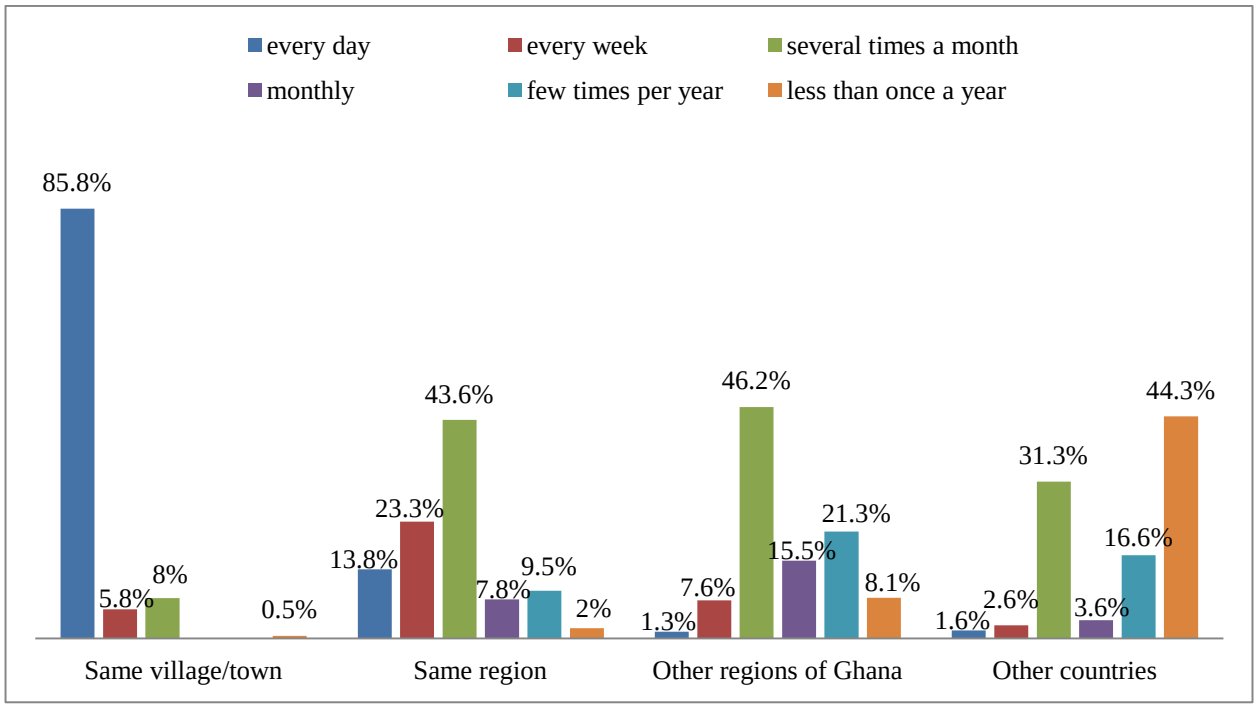


Fig. 13: How often do respondents stay in contact with their relations in other places

Source: Fieldwork (2020).

The findings of the in-depth interviews also indicate constant communication between household members and their relations living in other places. A household head at Wugah in Keta by the name AKA Acid noted in an in-depth interview *"We have relatives in Togo and also in Nigeria. Sometimes they come to us to spend some time here and we also go to them as well to spend some time there before we come back."* He added that there is also trading between the Ewes of Ghana and their counterparts in Togo and Benin for instance mostly in the areas of clothes and general goods. The Assembly member for Keta Central commented that:

> There are also connections between the people here and their family members across the border in Togo and Benin. It is the same family, when there is a funeral here they come and when there is a funeral there we go as well. There are intermarriages among us, we trade with each other as well. Our people do go there to buy clothes and come back to Ghana to sell, their people come here to buy foodstuff and other items (010011, 02/2019).

The exchange of resources and ideas among the people of both study areas and their relations in other places serves as a source of translocal social capital that could lead to an improvement in

their standards of living and therefore strengthen the coping and adaption capacity of the people towards coastal erosion and flooding.

Closely related to the above is the presence of associations outside the village/town that the people of both areas have connections with. The qualitative results also indicate the linkage between the people of Keta and Ada with associations outside of their areas. These associations are predominantly of migrant settlers from the Keta and Ada areas who now live and work outside of their respective regions. During the in-depth interview with the District Chief Executive of Ada-Foah, she noted that there are also associations of natives of Ada both within Ghana and other parts of the world who do come to the aid of the people of the area in many ways. She added that these associations comprise people from Ada who are residing in other cities because of work and are predominantly women. She noted that some of these associations include the Cloth Sellers' Association in Takoradi, the Uni-liver Group in Tema, and the Azizanya Fishermen and Fishmongers Association in Tema. She added that the members of these associations do return to Ada yearly, especially during the annual 'Onua festival' to celebrate with their relatives back home and make contributions geared towards the overall development of the area. The Assemblymember of Keta Central also hinted that "*we have the association of Ewe Land known as the Council of Ewe Associations of North America (CEANA) with branches in the USA and other places the world over. They do come down here (to Keta) even sometimes for funerals."* The findings of the study by Chléirigh (2019) have indicated that the ASSWA women group of the Ada and Songor areas have established links with small-scale salt farmers in other regions of Ghana such as Accra and even with other activists of indigenous rights at the Global level.

Modern communication devices

The increase in access to modern communication devices such as mobile phones, smartphones, and computers has facilitated the rate at which household members stay in contact with their relations in other places. Brickell & Datta (2011) have for instance stated that modern communication mediums such as text messages, phone calls, and the Internet offer family members scattered across different locations the opportunity to engage with each other in intimacy thereby enabling them to take advantage of emerging and varied economic opportunities abroad in the form of social capital that leads to an improvement in their lives. To find out the level of accessibility of household members to modern communication devices that could facilitate their

ability to communicate and keep in touch with their relations in other places that could, in turn, boost their translocal social capital, respondents were asked during the household survey if they have access to the internet, Skype, Facebook, and WhatsApp. The results are shown in Figure 15 below.

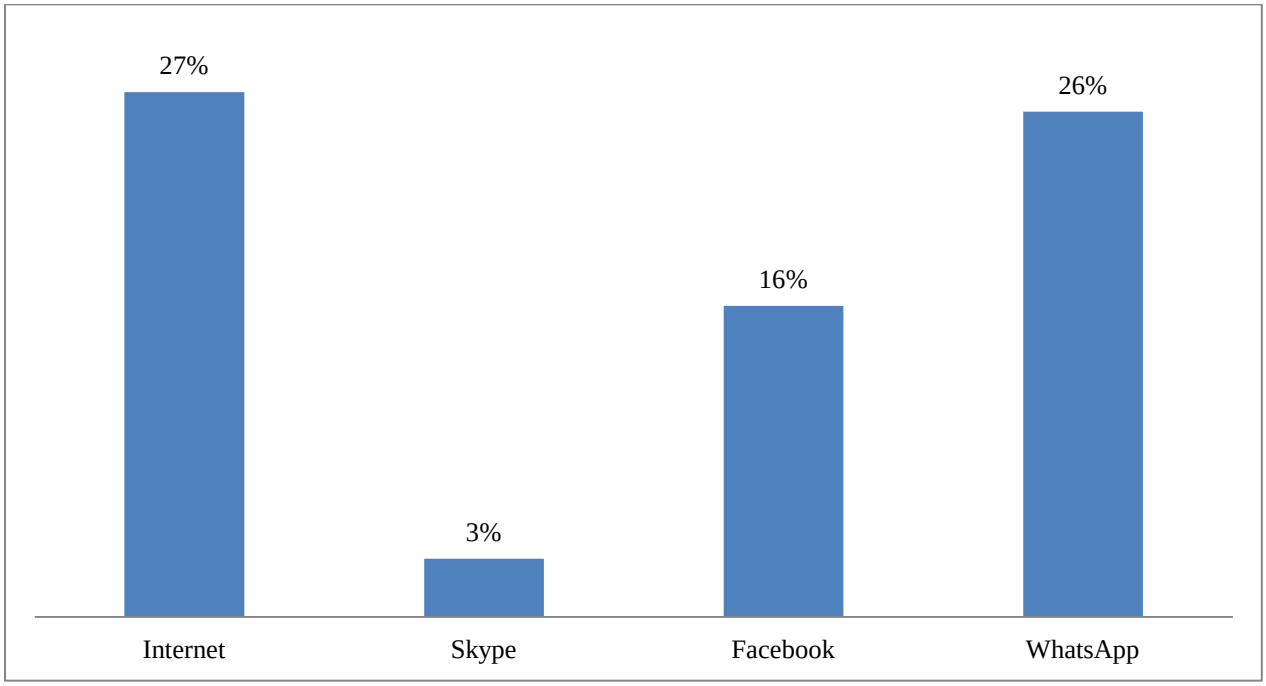


Fig. 14: % of households whose members have access to internet services?

Source: Fieldwork (2020).

Furthermore, when respondents were asked during the survey how they keep in touch with their relations in other areas, 98 % noted in person (during visits), and 97 % noted through phone calls. The rest are Skype (2 %), WhatsApp (24 %), and Facebook (11 %). The results of the in-depth interviews also indicate that household members in both study areas utilize modern communication devices, especially mobile phones to enable them to stay in touch with their relations in other places. A household head in Wugah in Keta by the name AKA Acid noted that, when their tribemates in Nigeria intend to visit them, all they need to do is to call and they are always ready for them. In a similar study, Tanle & Abane (2018) have found that the increasing usage of mobile phones in rural Ghana has led to an increase in 'irregular migrants' (see also Brickell & Datta, 2011). The results of this study, therefore, agree with the views of Mandaville

(1999) that the emergence of modern communication mediums has given translocality a `new face`.

7.3 Benefits households derive from their translocal networks and how they influence coping and adaptation strategies

Many scholars have praised the translocalism framework for serving as a lens via which the cultural, social, and economic relationships that exist between receiving and sending communities could be viewed (Carling, 2008; Portes et al., 2002; Smith, 2005). Translocal networks are found to be endowered with varied resources that people affected by environmental hazards harness to boost their response strategies (Bott et al., 2020). To find out whether households derive certain benefits from their translocal ties that influence their coping and adaptation strategies towards coastal erosion and flooding, respondents were asked the following questions during the household survey; Do you receive money from people from outside your village? Do you receive food from people from outside your village? Which of the following supports do you/your family receive from either your tribesmen or family tides in other places to aid you in traveling to them? Which of the following supports do you/your family members receive from your tribesmen or family tides in other places that make your stay comfortable when you go there? During your visit to your relations in other places have you learned some skills from them that enable you to deal with coastal erosion and flooding after your return? The results, both from the in-depth interviews and the household surveys show the people of Keta and Ada derive financial support, food, skills/new ideas, information, assistance in fishing, job/employment, accommodation, and piece of land from their networks of relations and tribe mates outside of their respective towns.

Financial support

Based on the results of the household survey, 8 % of respondents indicated they receive financial support from outside their village only in times of crisis as remittances while 17 % indicated they receive financial support from outside their village occasionally as remittances. Another 13 % of households indicated they receive financial support from outside the village regularly as remittances. 53 % of households indicated their members received financial support from their relations in other places to enable them to out-migrate. The respondents in Ada noted during the in-depth interviews that some of their relations outside the village do support them by sending them remittances, especially in times of coastal flooding. They indicated that they use these

monies for food and some other basic needs which help them cope with the floods until they are over. Fatimah, a female household head at the resettlement site at Kedzie added:

> Our relatives who live and work in other parts of the country do send us money during flooding and sometimes when things are hard so we can use it to purchase food. But this is purely at the household level as people only send money to their direct relations, so it is very difficult to know who else receives money from their relatives and who does not (02002, 02/2019).

In addition to the above is the return of some expatriates of Ada to invest in the area mostly in the tourism industry. The interview results further indicate that some natives of the area who lived and worked in other parts of the world are returning to the area to establish businesses mostly hotels, resorts, and other recreational activities along the shores of Lake Volta. Jet skiing and boat riding on Lake Volta provide jobs to the people of the area and have also contributed to making the area one of the favorite destinations for tourists in Ghana and thus an important source of revenue for other developmental purposes. According to the Development and Physical Planners of Ada, the locals mostly own guest houses while the hotels and island resorts are owned mostly by expatriates from abroad and even foreign investors with the caretakers being locals. This according to the respondents has provided jobs to many of the youths in the area where they derive some income from. The results of the in-depth interviews indicated that fishermen from both areas who out-migrated and are now living in other places carrying on with their fishing activity do support them by sending them remittances, especially in times of coastal flooding. They use these monies for food and some other needs which help them cope with the floods until they are over. In a related study, Hillmann & Spaan (2017) found that remittances from relations leaving abroad constitute an additional source of household income that reduces the risk of out-migration in Keta. Their findings added that 30 % of households in Keta receive remittances at an average of about GHC 4,000 per annum in Keta.

Food items

The survey results also indicate that households in both areas receive food support from outside of their village though the figures in some cases are less significant. For instance, respondents were asked during the survey whether they receive food items from outside the village or not and the results are as follows; 17 % of households indicated they receive food items during a visit to their

relations in other places or upon request, only 2 % indicate they receive food support from outside of the village during flooding or other disasters, 8 % indicated they receive food support during funerals or other occasions, and 2 % indicated during poor fishing seasons. Also, 90 % of respondents indicate their household members receive food from their relations and tribemates in their new destinations whenever they out-migrate to their places.

The wife of the chief fisherman of Blekusu in Keta who is a fishmonger herself had this to say in an in-depth interview with her;

> Some of the women whose daughters are married elsewhere do send food items to their mothers back home, especially during coastal flooding and also in times of poor fish catch as we don't have much fish in the waters of this area again. Some of those whose daughters are married in not-too-faraway destinations, do carry some food items along for their mothers when they come to the market on market days (02003, 02/2019).

The findings of Hillmann & Spaan (2017) have indicated that about 7 % of households in Keta are being provided with food by their out-migrated relations who are settled and working elsewhere.

Skills/new ideas

To find out whether households in both areas acquired some skills through their translocal ties, respondents were asked during the survey whether they had learned something new about coastal erosion and flooding during their visit to their relations in other places outside the village. Though the figure from the survey results regarding skills learned from translocal ties is insignificant (1 %), the results of the in-depth interviews, however, indicate that whenever relations of the people of both areas who are settled in other countries such as Togo, Benin, and Nigeria visit them, they sometimes come up with new ideas of doing things that they (the people of Keta and Ada) do adopt to see how effective they are. The respondents indicated that some of these new ideas also include new methods of fishing and how to deal with coastal erosion and flooding as well. The former assembly member of Azizanya in Ada noted in an in-depth interview that there has always been an exchange of ideas between them and the migrant settlers in their communities which is mostly in the areas of fishing. These migrant settlers according to him are mostly Ghanaians from other fishing communities who come to the Ada area to settle for fishing. When these people come, the natives grant them land to settle and are generally kind to them as they (the people of Ada) receive the same treatment when they out-migrate to other places. One new fishing

technique that they learned from the fishermen who travel deep sea as far as Europe for fishing and return to Ada is the light fishing technique. The Chief of Azizanya in Ada had this to say in an in-depth interview with him:

> Virtually everyone here has a root from another town. Our grandfathers came here to settle because of the fishing job. As a result of migration, this place has gotten a name, it has become a community that is known well for fishing in the whole of Ada and its environs. These migrant settlers come with new techniques, and our methods of fishing keep changing. For instance; our fishing nets used to contain another smaller net before the people of Ningo-Gbugblah came here. We realized that their nets do not contain the smaller net which is used for catching smaller fishes. So during the season for bigger fishes, they get higher catches than we do so we quickly also removed that smaller net from the whole bigger net (02004, 02/2019).

The Assembly member of Keta Central during the in-depth interview also added that:

> The people in Togo are very good in skills such as hair plating for the females and the preparation of continental dishes due to the many Lebanese and foreign restaurants there. As a result, the people here (around the Keta area) go to Togo to stay there for about six months, learn these skills, and then return to the Keta area to establish their businesses. On the other way round, the people of Togo always cross to Keta to acquire some skills from the very good seamstresses in the area. They also return to Togo after their graduation to establish their businesses there. All these are possible because we all speak a common language which is Ewe (010012, 02/2019).

Though there is no direct exchange of ideas in this context concerning coping and adapting to coastal erosion and flooding, these could however improve the lives of the people which will indirectly boost their abilities to cope with and adapt to coastal erosion and coastal flooding. In a related study, Overa (2001) noted that the Ewes and Ga of Ghana learned the art of deep-sea fishing from the Fantes who used to move from one Ghanaian town to the other in pursuit of migratory fish species. Danquah (2002) also noted that the Anlo-Ewes acquired technical skills in salt extraction, and boat-making from 'sea-faring communities' like the Fantes, Ga, Kru, and Ada which enabled them to later exploit both the lagoon and the sea. The Ewes were said to commence deep-sea fishing after a new type of net called 'yevudor' (the white man's net) which is of European origin was made known to them (Nukunya, 1991). Commenting on this, Mensah et al.

(2006) noted that the different ethnic groups doted along the Ghanaian coast also specialized in different artisanal fishing techniques as the Ga, Fante, and Effutu specialized in the drifting gill net and seine fishing, the Dangbe and some section of Ga in specialized in 'Lagas' fishing (fishing with ice), and Anlo-Ewe predominantly into beach-seine fishing. As a result, there is always an exchange of techniques through migration among these ethnic groups.

Information to aid out-migration and employment opportunities

To find out if households receive information from their networks of relations outside the village to aid them in out-migrate as a coping and adaptation strategy, respondents were asked during the household survey which of the following supports do you/your family members receive from either your tribesmen or family tides in other places to aid you in traveling to them? The survey results again indicated that 64 % of household members receive information from their relations outside in that regard. This information according to the results of the in-depth interviews includes information on the route and travel options so they can get to their targeted destinations with fewer difficulties. When they get to their intended destinations, their relations and tribe mates again provide them with information on say the job market, trading, and how to find their way around. This information and pieces of advice according to the respondents are crucial in helping the new migrants adapt to their new environment within the shortest possible time. A fisherman along the coast of Wugah AKA Acid noted during the in-depth interview:

> Sometimes when our people go there (their relations in Togo, Benin, and other places) and they are still new to the environment, they find it difficult to get around and find a job. So our relations over there do always show them around and provide them with information on jobs. It is the same way when they come here. They stay with us for some time and acquire some information about what to do before they move to Accra or any other part of Ghana to find a job there (010013, 02/2019).

Still, on permanent or long-term out-migrants from the Keta and Ada areas, the survey results indicate that 19 % of households indicated they are assisted to acquire a job in their new settlement by their relations and tribemates in their new environment whenever their members out-migrate. Specifically, with regards to the fishermen who out-migrated from both areas, 22 % of respondents noted their household members are assisted to start their fishing job in their new destination by their relations and tribemates. The respondents of Keta have indicated during the

in-depth interviews that the free movement between the Ewe people of the Keta area and their counterparts in Togo, Benin, Nigeria, and the Ivory Coast is contributing to reducing unemployment among these people. This is because it is easy for Ewes to cross the borders of any of these countries to work as their relatives across the border are always available to help them settle down and find a job. Kraan (2009) has indicated that the ability of Ghanaian fishermen to cross over to neighboring Ivory Coast, Liberia, Togo, and Benin for fishing is due to the merger of continental waters which also has an impact on the governance of fishing within the sub-region.

Accommodation/shelter

To find out if respondents are offered shelter by their networks of relations outside the village during out-migration that entices the people of both areas to out-migrate as a coping and adaptation strategy, respondents were asked during the household survey which of the following supports do you/your family members receive from either your tribesmen or family tides in other places that make your stay comfortable when you go there? The survey results indicate that 99 % of households are offered accommodation by their relations and tribemates outside of the area whenever they travel to their places to make their stay comfortable. This result confirms the results of the in-depth interviews as respondents unanimously indicated that their household members are offered a place to sleep free of charge during their visits to relations and tribemates in other places. The respondents in Keta for instance noted that migration in the area to and from neighboring Togo, Benin, Nigeria, and the Ivory Coast is influenced largely by the Ewe ethnicity. They added that when their household members visit any of the above-mentioned places, their relations and tribemates there provide them with accommodation and assist them to get settled in any way they can. They consider them as their brother and sisters, and thus always available to receive them with open hands. Likewise, when their relations in Nigeria, Togo, or any other part of Ghana intend to visit them, all they need is to pre-inform them and they will be offered a place to sleep and food as long as they intend to stay (see also Lazar et al., 2015).

A plot of land for settlement

In terms of permanent out-migrants from the Keta and Ada areas, 9 % of respondents noted that their relations and tribe mates in different places do offer them a plot of land for them to build their own houses and settle on. This finding was again confirmed during the in-depth interviews when some of the respondents indicated their household members who out-migrated received a

plot of land (sometimes for free and sometimes the immigrants with money to buy do pay for it) from their tribemates in their new destination so they can build their own house and also for some farming activities. These results are in line with the findings of Kraan (2009) who noted that the migration of the Anlo-Ewe beach seine fishermen both within and outside of Ghana entails the negotiation for space both for their fishing activities and for accommodation with ethnicity playing a crucial role in this process.

7.3.1 Results from Chi-square analysis

The bivariate analysis (Chi-square analysis) was used to find out the relationship between translocal social capital and coping and adaptation strategies in both study areas. The independent variables for the analyses are shown in Table 11 below and the dependent variables are the coping and adaptation strategies (out-migration, modification of housing styles, relocation of houses further inland, pumping out water with a pumping machine, barricading buildings with sand, and filling the compound with sand) as shown in Table 8 in the previous chapter.

Table 11: Independent variables for analyzing the impacts of translocal social capital on coping and adaptation strategies

Variable	Description and type of variable	Type of measurement
Financial support from outside the village	Financial support households receive from their relations living outside the village, especially during flooding or towards erosion (0 = No; 1 = Yes)	Categorical variable
Food support from outside the village	Food support households receive from their relations living outside the village, especially during flooding (0 = No; 1 = Yes)	Categorical variable
Financial support to aid in out-migration	Financial support households receive from their relations living outside the village to help household member(s) to out-migrate (0 = No; 1 = Yes)	Categorical variable
Information to aid in out-migration	Information household members receive from their relations living outside the village to facilitate their out-migration (0 = No; 1 = Yes)	Categorical variable
Accommodation during out-migration	Accommodation household members receive from their relations whenever they visit/out-migrate (0 = No; 1 = Yes)	Categorical variable
A plot of land to settle during out-migration	A plot of land offered to out-migrated household members by their relations living outside the village to enable them to settle (0 = No; 1 = Yes)	Categorical variable
Food support during out-migration	Food items offered to out-migrated household members by their relations in their new environment (0 = No; 1 = Yes)	Categorical variable
Job support during out-migration	Support in finding a new job that out-migrated household members receive in their new environment from their relations or tribemates (0 = No; 1 = Yes)	Categorical variable

Support in fishing during out-migration	Support out-migrated household members receive to enable them to continue their fishing activities in their new location (0 = No; 1 = Yes)	Categorical variable
Support in trading during out-migration	Support out-migrated household members receive in their new destination to enable them to continue with their trading (0 = N0; 1 = Yes)	Categorical variable

Source: Fieldwork (2020).

The results of the bivariate analysis (Chi-square test) on the relationship between translocal social capital and coping and adaptation strategies are shown in Table 12 below. (α = .05, and a 95 % confidence ratio).

Table 12: Chi-square test result; Impacts of translocal social capital on coping and adaptation strategies

		Value	**df**	**Asymp. Sig. (2-sided)**	**Crosstabs**				
Modification of housing styles							No	Yes	Total
Financial support from outside the village	Pearson Chi-square	25.640[a]	1	*.000*	No	Count	123	72	195
						Expected count	147.7	47.3	195
					Yes	Count	180	25	205
						Expected count	155.3	49.7	205
Financial support to aid in out-migration	Pearson Chi-square	41.804[a]	1	*.000*	No	Count	114	73	187
						Expected count	141.7	45.3	187
					Yes	Count	189	24	213
						Expected count	161.3	51.7	213
Information to aid in out-migration	Pearson Chi-square	1.838[a]	1	.175	No	Count	105	41	146
						Expected count	110.6	35.4	146
					Yes	Count	198	56	254
						Expected count	192.4	61.6	254
A plot of land to settle during out-migration	Pearson Chi-square	4.098[a]	1	*.043*	No	Count	280	83	363
						Expected count	275	88	363
					Yes	Count	23	14	37
						Expected count	28	9	37
Food support during out-migration	Pearson Chi-square	7.369[a]	1	*.007*	No	Count	24	17	41
						Expected count	31.1	9.9	41
					Yes	Count	279	80	359
						Expected count	271.9	87.1	359
Job support during out-migration	Pearson Chi-square	.000[a]	1	.987	No	Count	246	79	325
						Expected count	246.2	78.8	325
					Yes	Count	57	18	75
						Expected count	57.1	17.9	75

Support in fishing during out-migration	Pearson Chi-square	.371[a]	1	.542	No	Count	240	74	314
						Expected count	237.9	76.1	314
					Yes	Count	63	23	86
						Expected count	65.1	20.9	86
Support in trading during out-migration	Pearson Chi-square	4.058[a]	1	*.044*	No	Count	263	76	339
						Expected count	256.8	82.2	339
					Yes	Count	40	21	61
						Expected count	46.2	14.8	61
Barricading buildings with sandbags							No	Yes	Total
Financial support from outside the village	Pearson Chi-square	38.441[a]	1	*.000*	No	Count	179	8	187
						Expected count	164.6	22.4	187
					Yes	Count	173	40	213
						Expected count	187.4	25.6	213
Financial support to aid in out-migration	Pearson Chi-square	19.829[a]	1	*.000*	No	Count	179	8	187
						Expected count	164.6	22.4	187
					Yes	Count	173	40	213
						Expected count	187.4	25.6	213
Information to aid in out-migration	Pearson Chi-square	1.266[a]	1	.261	No	Count	132	14	146
						Expected count	128.5	17.5	146
					Yes	Count	220	34	254
						Expected count	223.5	30.5	254
Support in fishing during out-migration	Pearson Chi-square	13.144[a]	1	*.000*	No	Count	286	28	314
						Expected count	276.3	37.7	314
					Yes	Count	66	20	86
						Expected count	75.7	10.3	86
Support in trading during out-migration	Pearson Chi-square	5.910[a]	1	*.015*	No	Count	304	35	339
						Expected count	298.3	40.7	339
					Yes	Count	48	13	61
						Expected count	57.3	7.3	61
Relocating buildings further inland							No	Yes	Total
Financial support from outside the village	Pearson Chi-square	98.285[a]	1	*.000*	No	Count	64	286	350
						Expected count	79.6	270.4	350
					Yes	Count	27	23	50
						Expected count	11.4	38.6	50
Financial support to aid in out-migration	Pearson Chi-square	31.671[a]	1	*.000*	No	Count	19	168	187
						Expected count	42.5	144.5	187
					Yes	Count	72	141	213
						Expected count	48.5	164.5	213
Information to aid in out-migration	Pearson Chi-square	9.158[a]	1	*.002*	No	Count	21	125	146
						Expected count	33.2	112.8	146
					Yes	Count	70	184	254
						Expected count	57.8	196.2	254
A plot of land to settle during out-migration	Pearson Chi-square	1.979[a]	1	.159	No	Count	86	277	363
						Expected count	82.6	280.4	363
					Yes	Count	5	32	37
						Expected count	8.4	28.6	37
Food support during out-migration	Pearson Chi-square	1.104[a]	1	.293	No	Count	12	29	41
						Expected count	9.3	31.7	41
					Yes	Count	79	280	359
						Expected count	81.7	277.3	359

Job support during out-migration	Pearson Chi-square	15.543[a]	1	*.000*	No	Count	87	238	325
						Expected count	73.9	251.1	325
					Yes	Count	5	70	75
						Expected count	17.8	57.2	75
Support in fishing during out-migration	Pearson Chi-square	17.562[a]	1	*.000*	No	Count	57	257	314
						Expected count	71.4	242.6	314
					Yes	Count	34	52	86
						Expected count	19.6	66.4	86
Support in trading during out-migration	Pearson Chi-square	17.562[a]	1	*.000*	No	Count	66	273	339
						Expected count	77.1	261.9	339
					Yes	Count	25	36	61
						Expected count	13.9	47.1	61
Out-migration							No	Yes	Total
Financial support from out-side the village	Pearson Chi-square	.688[a]	1	.953	No	Count	161	189	350
						Expected count	160.1	189.9	350
					Yes	Count	22	28	50
						Expected count	22.9	27.1	50
Financial support to aid in out-migration	Pearson Chi-square	49.150[a]	1	*.000*	No	Count	54	133	187
						Expected count	85.6	101.4	187
					Yes	Count	129	84	213
						Expected count	97.4	15.6	213
Information to aid in out-migration	Pearson Chi-square	4.725[a]	1	*.030*	No	Count	80	66	146
						Expected count	66.8	79.2	146
					Yes	Count	103	151	254
						Expected count	116.2	137.8	254
A plot of land to settle during out-migration	Pearson Chi-square	15.614[a]	1	*.000*	No	Count	177	186	363
						Expected count	166.1	196.9	363
					Yes	Count	6	31	37
						Expected count	16.9	20.1	37
Food support during out-migration	Pearson Chi-square	1.890[a]	1	.169	No	Count	15	26	41
						Expected count	18.8	22.6	41
					Yes	Count	168	191	359
						Expected count	164.2	194.8	359
Job support during out-migration	Pearson Chi-square	1.856[a]	1	.173	No	Count	145	180	325
						Expected count	148.7	176.3	325
					Yes	Count	38	37	75
						Expected count	33.9	41.1	75
Support in fishing during out-migration	Pearson Chi-square	15.477[a]	1	*.000*	No	Count	161	153	314
						Expected count	143.7	170.3	314
					Yes	Count	22	64	86
						Expected count	39.3	46.7	86
Support in trading during out-migration	Pearson Chi-square	3.834[a]	1	.050	No	Count	164	175	339
						Expected count	155.1	183.9	339
					Yes	Count	19	42	61
						Expected count	27.9	33.1	61

NB: The results of some of the variables are excluded from the table above because they are statistically invalid due to very small counts.

Modification of housing styles

The results indicate that support for trading during out-migration has a significant positive relationship with the modification of housing ($p = .044$). A plot of land to settle during out-migration also has a significant positive relationship with modification of housing styles ($p = .043$). On the other hand, financial support from outside the village has a significant relationship with the modification of housing styles ($p < .001$) but the crosstabs result indicates financial support from outside the village negatively influences the modification of housing styles (expected count = 49.7, and actual count = 25). Also, financial support to aid out-migration has a significant relationship with the modification of housing styles ($p < .001$), and the crosstabs result again indicates that financial support to aid out-migration negatively influences the modification of housing styles (expected count = 51.7, actual count = 24). This is not surprising as the results of the in-depth interviews indicate that household members with the desire to out-migrate will abandon their houses and leave as soon as they acquire the resources to do so. In short, people who are out-migrating care less about the modification of their houses. Finally, food support during out-migration has a significant relationship with the modification of housing styles ($p = .007$) and the crosstabs results again indicate food support during out-migration negatively influences the modification of housing styles (expected count = 87.1, actual count = 80). Though the above results did not indicate a strong positive correlation between translocal social capital and the modification of houses as a coping and adaptation strategy, respondents noted during the in-depth interviews that they receive financial support from their relations outside the village, especially during flooding that they use for various coping and adaptation strategies which include the modification of houses.

Barricading buildings with sandbags

Barricading buildings with sandbags has a significant positive relationship with financial support from outside the village ($p < .001$). Financial support to aid in out-migration also has a significant positive relationship with barricading buildings with sandbags ($p < .001$). Furthermore, support in fishing has a significant positive relationship with barricading buildings with sandbags ($p < .001$). Finally, support in trading during outmigration has a significant positive relationship with the barricading of buildings with sandbags ($p = .015$) and the crosstabs result indicates there is a relationship between the two (expected count = 7.3, actual count = 13). A single mother along the

coast of Kedzi in Keta indicated during the in-depth interviews "*our relations living in Accra and other areas do send us money to enable us to prepare for the approaching rainy season. But this is purely at the family level so it is hard to know what is happening in other families*".

Relocating houses further inland away from the coastline

Relocating buildings further inland also has a significant positive relationship with job support during out-migration ($p < .001$). This could mean that the more people are supported to find a job, the more money they have to relocate their houses. On the other hand, relocating buildings further inland has a significant relationship with financial support from outside the village ($p < .001$), but the crosstabs result, however, indicates that relocating houses is negatively influenced by financial support from outside the village (expected count = 38.6, actual count = 23). Also, financial support to aid in out-migration has a significant relationship with the relocation of buildings ($p < .001$), but the crosstabs results indicate that financial support to aid out-migration negatively influences the relocation of buildings (expected count = 164.5, actual count = 141). This makes sense because the more people are supported financially to out-migrate, the more they abandon their houses to out-migrate. Again, relocation of houses has a significant relationship with information to aid in out-migration ($p = .002$), but the crosstabs result again indicates that information to aid outmigration negatively influences the relocation of houses (expected count = 196.2, actual count = 184). This again makes sense as the more people receive information to aid them in out-migrating, the less interested they become in relocating their houses locally. Furthermore, support in fishing during out-migration has a significant relationship with relocating houses further inland ($p < .001$), but the crosstabs result indicates that support in fishing negatively influences the relocation of houses (expected count = 66.4, actual count = 52). Finally, support in trading during out-migration has a significant relationship with relocating houses further inland ($p < .001$) but the crosstabs result indicates that support in trading during out-migration negatively influences the relocation of houses further inland (expected count = 47.1, actual count = 36). When people are guaranteed they can easily continue with their fishing and trading should they out-migrate, they mostly refuse to relocate but rather abandon their houses to out-migrate. Though the findings of the in-depth interviews did not specifically mention the role of translocal social capital in the relocation of houses away from the coastline, it has however been established in the results so far that financial support and other forms of support that

households receive from outside the village in the form of translocal social capital increases the financial capacities of households that boost their overall coping and adaptation strategies.

Out-migration

Financial support to aid in out-migration has a highly significant positive relationship with out-migration ($p < .001$). Similarly, a plot of land to settle during out-migration has a highly significant positive relationship with out-migration ($p < .001$). Support in fishing during out-migration has a significant positive relationship with the out-migration of household members ($p < .001$). Furthermore, information to aid in out-migration also has a moderately significant positive relationship with the out-migration of household members ($p = .030$). This result also confirms the results of the in-depth interviews. During the in-depth interviews, respondents specifically indicated the role of financial support from outside the village in facilitating their out-migration process. They also pointed out they receive varied support from their relations and tribemates at the destination area as already discussed in chapters five and six above. The findings from the in-depth interviews also highlight the importance of information on travel routes and news of encouragement outmigration.

In a nutshell, and considering the low-income levels of households in both study areas, it is not surprising that remittances from relations living outside of the area through already-established translocal ties play a major role in coping and adaptation strategies. For instance, only 26 % of respondents noted their household has financial savings and only 14 % of respondents noted they can afford the cost of a motorcycle or bicycle if in case theirs is stolen.

Based on the above findings, the first hypothesis of the study states that ‘resources derived from social networks improve the capacities of people and households to prepare for, respond to, and recover from the impacts of coastal erosion and flooding’ has been accepted and the null hypothesis was rejected.

7.4 How physical and cultural factors (proximity and ethnicity) influence out-migration as a coping and adaptation strategy

The presence of a strong sense of identity among a group of people is said to represent a facet of social capital that can be harnessed by a society for the benefit of all (Lee et al., 2005). Ray (1998) has argued that a stronger sense of identity that exists in a society creates social capital by

fostering not only trust but also a sense of cooperation. Parker & Song (2006) have argued that people are either likely to abstain from some civic engagements or exclusively involve themselves in "co-ethnic organizations and networks*"* with corresponding implications on their translocal social capital. The presence of ethnic ties in the receiving community is for instance found to be important in helping emigrants adjust to their new environment (Varshaver & Rocheva, 2021). In this study, the influence of the Ewe and Dangbe ethnic groups on out-migration as a coping and adaptation strategy was also exploited by asking respondents the following questions during the household survey: Which ethnic groups are present in your household? Do you receive money from people from outside your village? Which of the following supports do you/your family members receive from either your tribesmen or family tides in other places to aid you in traveling to them? Which of the following supports do you/your family members receive from either your tribesmen or family tides in other places that make your stay comfortable when you go there?

In terms of the Ewe ethnicity, and per the results of the household survey, 99 % of the households in Keta and 18 % of households in Ada indicated they have at least a member of the Ewe ethnicity in their household. In terms of the Dangbe ethnicity, 100 % of households in Ada and only 1 % of households in Keta indicated they have at least a member in their household. This is an indication of the dominance of the Ewe language in both areas. The Ewe ethnicity as indicated in the previous chapters also spreads across the national borders of the three countries, Ghana, Togo, and Benin, and is found to be an important source of translocal social capital for the people of the Keta area. The descriptive results of the study indicate more translocal social capital in Keta specifically to aid in out-migration than in Ada. For instance, figure 16 below shows the various supports households receive from their relations in other places to aid them in out-migration and also to make their stay comfortable in their new destination.

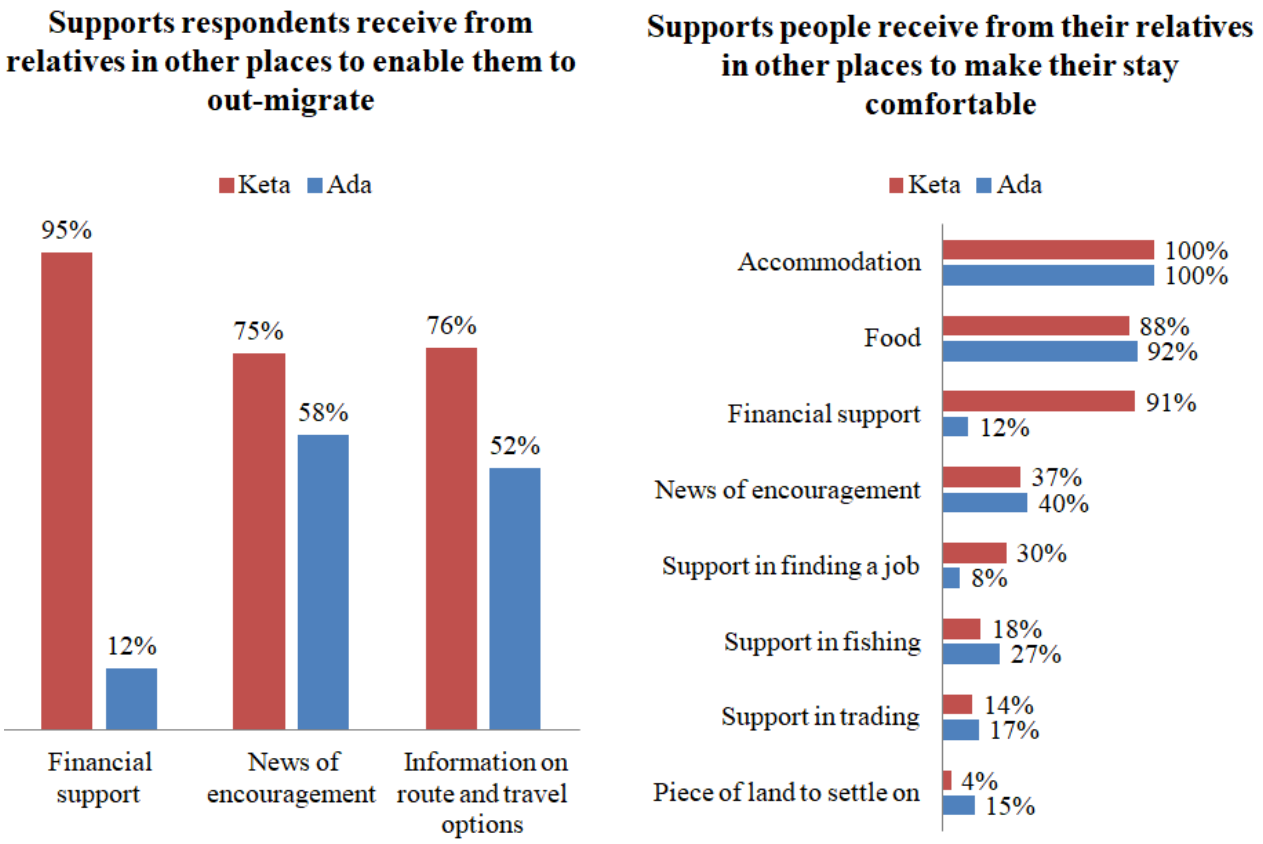


Fig. 15: Support household members receive from their relations in other places to help them out-migrate and to make their stay comfortable at their destination place (responses from Keta and Ada).

Source: Fieldwork (2020).

The results of the in-depth interviews also acknowledged the important role of the Ewe language and the proximity of the area to Togo in facilitating movement along the Keta area of the Ghana-Togo border. The Assembly member of Keta Central in the in-depth interview also noted that there are retirees in Togo who cross the border to Ghana at the end of the month to take their pension benefits and return, and there are also retirees in Ghana who cross the border to Togo at the end of the month to take their pension benefit and return. This shows how the Ghana-Togo border is never a hindrance to the free movement of people in the area simply because they all speak the same language and also due to the nearness of Keta to communities across the border in Togo. Previous researchers (Goldbach & Schlüter, 2018a; Hillmann et al., 2020b; Hillmann & Spaan, 2017; Hillmann & Ziegelmayer, 2016), have all acknowledged the important role of the Ewe ethnicity in facilitating the movement of people, goods, and services along the borders of Ghana, Togo, and Benin.

The respondents indicated during the in-depth interviews that the fact that they all speak the same language makes their movement across the borders to either Togo or Benin much easier. They indicated they consider themselves as one, and that it is only the Ewe language or ethnic group that matters to them but not the country of origin of the individual in question. Respondent also indicated that in most cases they do not need to show their national passports at the borders when crossing into any of these countries. As the Assemblymember of Keta Central puts it, *"All you need to do is to speak the Ewe language and they will allow you to cross because we are the same people. We don't care about Ghana or Togo, it is rather the Ewe language which is important to us."* In a related study, Kraan (2009) found that the migration history of the Ewes has established networks that boost their negotiation capacity for fishing space both within Ghana and in Togo.

However, the survey results indicated more out-migration from Ada within the past five years than in Keta as 74 % of respondents in Ada noted the out-migration of at least a member of their household to other places as compared to 38 % for Keta. Also, the result of the t-test of independence below shows the relationships between the Ewe and Dangbe ethnic groups on out-migration in both areas. The results indicate that the Dangbe ethnicity has a more significant relationship with the out-migration of household members ($p = .001$) than the Ewe ethnicity ($p = .051$). The qualitative results also acknowledged the role of the Dangbe ethnicity in out-migration from the Ada areas not only across the borders to Togo and Benin but predominantly internally especially to Accra and Tema and other areas of the Greater Accra Region. Respondents noted during the in-depth interviews that the fact that the people of the Ada area belong to the Ga-Adangbe ethnic group, the main ethnic group of the Greater Accra area makes the Accra-Tema areas a preferred destination for out-migrants from Ada because they can easily understand the language and they are always accepted in those areas as well because they are one people. The respondents also noted by popular opinion that their relations and tribe mates across the border in Togo, Benin, Nigeria, and the Ivory are always there to help them out whenever they intend to out-migrate to any of those places. This according to them makes out-migration from the Ada areas to any of those countries relatively easier due to available support from their relations and tribe mates.

The more out-migration in Ada than in Keta within the last five years can also be attributed to factors such as the number of people per household as there are an average of 40 persons per household in Ada as compared to 32 for Keta. The youthful nature of the population of Ada as

compared to Keta could also be an explaining factor as the mean age of respondents in Ada is 41 years as compared to 50 years for Keta. The financial status of the household can also be another important contributing factor as the average household income of Ada is GhC 1,800 as compared to GhC 3,600 for Keta. Furthermore, more respondents in Ada have access to a basic mobile (95 %) than in Keta (87 %) and smartphones, 40 % and 14 % for Ada and Keta respectively. These results are similar to the findings by Owusu-Daaku & Rosko (2019) that the local culture of the Dangbe people of Ada influences their adaptation mechanisms toward coastal hazards. These results, therefore, reject the fourth hypothesis of the study which states that the influence of the Ewe ethnic group and the proximity of Keta to the borders of neighboring Togo and Benin lead to more out-migration from the Keta than Ada to those areas within the last five years, and thus accepts the null hypothesis.

7.5 Conclusion of this chapter

Both the qualitative and quantitative results have indicated the existence of translocal ties between the people of both areas and their relations outside the village/town (both within and outside Ghana) mostly due to the long history of migration in both areas. The result indicates that households derive various translocal social capital from their translocal ties which they utilize to enhance coping and adaptation strategies. Though translocal social capital in both areas is found to largely influence out-migration as a coping and adaptation strategy, nonetheless, translocal social capital was also found to be relevant in improving other coping and adaptation strategies. This is mostly through remittances and financial support from relations outside the village, the exchange of ideas with migrant settlers, and new skills acquired during visits to relations in other places. The results further indicated that there is more translocal social capital in the Keta area as compared to the Ada area which is attributable to the influence of the Ewe ethnic language which spreads across the borders of Togo and Benin as well. The prevalence of more translocal social capital in Keta than in Ada, however, did not translate to more out-migration in Keta than in Ada within the last five years as hypothesized but rather the contrary. Finally, the results show the relevance of both ethnicity and proximity in influencing out-migration in both areas as would-be migrants prefer to go to an area already dominated by their tribe mates or relations and are easily accessible as well.

Chapter 8
Discussion of the results

8.1 Discussion

The results show that the different forms of social capital available to the people of Keta and Ada are being utilized during different stages of both hazards to influence coping and adaptation strategies. Bonding social capital derived from community-based voluntary associations, networks of friends, neighbors, and relations is very effective and relevant during the immediate response to coastal floods. During floods, households receive help from their neighbors, relations, and associations in the form of food, moving belongings to safer grounds, and shelter from those whose houses weren't affected. Interestingly, and per the results of the bivariate analysis, modification of housing styles which is mostly done in preparation for hazards is found to be influenced by financial support from associations and financial support from religious bodies (which are both benefits of bonding social capital). Relocating buildings further inland is also influenced by financial support from associations. Nonetheless, these results fit perfectly well in the words of Hanifan when he noted that:

> If he may come into contact with his neighbor, and they with other neighbors, there will be an accumulation of social capital, which may immediately satisfy his social needs and which may bear a social potentiality sufficient to the substantial improvement of living conditions in the whole community. The community as a whole will benefit from the cooperation of all its parts, while the individual will find in his associations the advantages of the help, the sympathy, and the fellowship of his neighbors (Hanifan, 1916 p. 130).

Other researchers such as Nakamura & Kanemasu (2020) also found the relevance of bonding social capital in remote communities of Fiji in facilitating the immediate response to rapid onset atmospheric events such as cyclones. Sanyal & Routray (2016) have also found out how bonding ties between neighbors in the Indian Sundarbans enable victims of cyclones to be offered shelter from their neighbors who have reinforced concrete houses. Similarly, and in an analysis of the role social capital played in community resilience in the 2018 earthquake of the Gili Trawangan in Indonesia, Partelow (2021) found that social capital which is already pre-existing in the form of bonding ties created in the people a mentality for urgency and collective action during the hazard in the island community. In a nutshell, the results of this study in terms of bonding social capital support the statement by Elliott & Pais (2006 p. 300) that "*People respond to disasters not as isolated individuals but as members of overlapping forms of social affiliation, which interpret, affirm and support particular definitions and responses to the situation*". The results, however,

also show that, during floods in both Keta and Ada, sometimes almost every household in the community is affected making it difficult for people to extend a helping hand to their neighbors and friends. A related study by Jordan (2015) also found that it is difficult for households in south-eastern Bangladesh to help their neighbors during cyclones because the entire village is always affected leaving every household with more than enough problems to handle but they do help each other out during other slow-onset disasters.

The result of this study has also indicated that bridging social capital is most important in influencing coping and adaptation practices in preparation for, and recovery from the impacts of both hazards just before the onset of the rainy season and after the rainy season respectively. Before the onset of the rainy season, households receive sensitization during meetings with mother associations outside the area on certain practices that will improve their overall coping and adaptation strategies. Leaders of associations also reach out to authorities to secure the needed help such as tools, inputs, and premixed fuel that will enable households to adequately prepare for and recover from the impacts of coastal erosion and flooding. The results of the bivariate analysis, however, indicate that bridging social capital also influences immediate response to coastal floods such as the use of pumping machines to pump out water during flooding. These results support the findings of Nakamura & Kanemasu (2020) who found that bridging social capital plays an important role in enabling households to prepare for and recover from the impacts of cyclones in remote communities of Fiji.

However, the results have also shown that though leaders of community-based associations are important sources of bridging social capital, a share of the locals have lost faith in these community-based associations and stopped participating in their activities. This, according to the results is due to the decline in trust in the leadership of the aforementioned community-based associations. An interviewee in Wugah in Keta noted that the leadership of their fishermen's association is not always transparent in the sales of the premixed fuel received from the government that is supposed to be sold at a subsidized price to the fishermen. He noted that for instance, the price of the premixed fuel is higher than the government ordered and that they are also biased in granting people access to purchase the premixed fuel. This result also supports the findings of Osei (2016) who found out how the lack of trust is affecting the functioning of farmer-based organizations in the Western Region of Ghana. Yang et al. (2019) also attribute the reasons

for the refusal of some fisherfolks of the Keta and Ada areas to join community-based voluntary associations to the issues of lack of trust and how issues are being politicized.

Linking social capital, on the other hand, is found to influence coping and adaptation strategies in all three phases of both hazards; i.e. in preparation for, during, and at the recovery stages. For instance, the NADMO in Ada has noted that they formed school clubs in the communities where they educate the pupils on ways of preparing for the approaching flood season, what to do when their homes are flooded, and how to recover from the impacts of coastal erosion and flooding. This knowledge is passed on by the pupils to their family members at home. The relief items received by affected communities during flooding from the central government as mentioned in chapter six also facilitate the instant response to and recovery from the impacts of flooding. The NADMO offices in both study areas also carry out evacuation services for those in need of evacuation during flooding. As already mentioned in chapter six, the NADMO in both areas sensitizes the people on how to prepare for the approaching rainy season, what to do when their houses are flooded, and how to get their livelihoods back on track after the hazard. Banks also serve as a source of financial support in the form of loans for households especially in times of hazard to enable people to recover from such hazards and also to save their sources of livelihood from collapse. Other benefits of linking social capital as already highlighted in the previous chapters include the sea defense project and the resettlement scheme. These results again confirm the works of previous researchers who explored the relevance of linking social capital in the response to environmental hazards in the Global South. For instance, a study by Bhandari (2014) on the role of social capital in disaster management during the 1934 earthquake in Kathmandu Valley in Nepal showed how the army and the police worked together with local volunteers through linking ties to ensure safety. His findings further indicated that the state provided interest-free loans for the reconstruction of demolished homes. Similarly, the findings of the work by Loebach & Stewart (2015) on the role of linking social capital in disaster recovery during the 2006 landslide on the island of the Philippines show how the community gym became the headquarters and operational stations for government agencies and other organizations who provided relieve services and aid to the survivors. Furthermore, in their study on selected communities of the Sirajgonj and Tangail Districts of Bangladesh, Alam et al. (2016) found that access to social capital embedded in state institutions influences the adaptation capacities of households towards coastal hazards such as tree planting, diversification of cropping, migration,

and homestead gardening. Islam & Walkerden (2015) have also found that links between households and NGOs in Bangladesh enable the former to receive varied support that boosts their adaptation capacities in preparation for, during, and after cyclone Sidr. Another study on three rural communities in Taiwan by Hung et al. (2019) found that aid from the government improves the preparedness of local communities for coastal hazards.

However, in the case of Keta and Ada, other household members shared their dissatisfaction concerning the kind of relief items distributed to them whenever they suffer severe coastal floods claiming that some of the items are of no help to them in dealing with the hazard at hand. For instance, a household head in Totopey in Ada lamented that he received only plastic cups for drinking water and blankets the last time they experienced severe floods that destroyed most of their property. "*Of what help is a plastic drinking cup to me as a person whose household was affected by flooding"?* he queried. Responding to these concerns during the in-depth interview, the NADMO director of Keta lamented that the organization is under-resourced and thus not able to perform its duties as expected. He noted that, for instance, the NADMO in Keta at the time of the study always had to wait until the pick-up truck belonging to the Keta Municipal Assemble was made available to them before they could visit meetings of associations to sensitize the people on coping and adaptation strategies towards coastal erosion and flooding. There is also the problem of the lack of the needed expertise on the part of the NADMO employees in the discharge of their duties which is affecting its efficiency. One of the NADMO employees of Keta noted during the in-depth interview that "*before I was offered this job, I did not know anything concerning disaster risk management, and since I started working here there has never been any in-service training for us".* The NADMO of Ada at the time of this study is housed in an abandoned classroom with not even a single motorbike for their operations. They rely on the services of commercial boat owners to get to affected island communities during flooding and they sometimes have to pay for the service of the boats themselves. In a related study in the Ada and Keta areas, Evadzi et al. (2018) found that interviewees were not satisfied with the activities of the NADMO as they accused the organization of not providing victims of coastal hazards with the needed relief items.

In terms of translocal social capital, and likewise bridging social capital, the results have shown that translocal social capital is much more useful during preparation for approaching flood periods and during the recovery from the impacts of floods and erosion. For instance, household members

also receive financial support and information from their relations outside of the village to facilitate their out-migration process. Skills learned from migrant settlers and during visits to relations outside the village improve the fishing activities of the people of the area which indirectly facilitate their ability to prepare for the approaching rainy season due to improved income levels of households. Support in trading and a plot of land offered to migrant settlers for them to settle by their relations and tribemates in other places encourages people who are already threatened by coastal erosion and flooding to out-migrate. These results support the findings of Randell (2018) who found that displaced households in the state of Para in the Brazilian Amazon received information on the availability of land from their recent translocal ties before they out-migrate while their long-term translocal ties provided them with financial support to facilitate the migration process and job opportunities at the destination place. The results also support the findings by Garip (2008) who found that weak ties through translocal networks are more important in facilitating out-migration in rural Thailand by providing households with information about jobs in the urban centers. Nonetheless, the bivariate results also indicate that translocal social capital has significant relationships with immediate response strategies during flooding as well. Examples are the financial support received by households from their relations outside the village which is used in purchasing basic needs to enable households to survive the flooding period and food items received from outside the village during flooding as already discussed in chapter seven above.

Finally, besides social capital, proximity, and ethnicity are other factors that are found to influence out-migration in response to coastal erosion and flooding in both areas. For instance, and as already highlighted in chapter seven, the Dangbe ethnic group and the proximity of the Ada area to the Accra-Tema Metropolises influence mostly internal out-migration from the previous to the latter. However, there is also external out-migration from Ada mostly by the fishermen to neighboring, Togo, Benin, and even Europe predominantly for fishing. Out-migration from Keta on the other hand is predominantly to Togo, Benin, Ivory Coast, and even Nigeria due to the influence of the Ewe ethnic language and the proximity of Keta to Togo. There is also internal out-migration from the Keta areas predominantly to Accra mostly in such for jobs and education. These results again support the findings of previous research on the role played by ethnicity and proximity in out-migration in the Global South. For instance, the Isan people of Thailand find people of their clan reliable based on the established trust and thus always wish to stay around

each other in Bangkok after they migrated there as an adaptation strategy to climate change (Porst & Sakdapolrak, 2018). Hartter et al. (2015) also found out in their study that already-settled Bakiga people around the Kibale National Park in Western Uganda offered land to their tribe mates in other parts of the country so they could move to join them in a bid to increase the dominance of the Bakiga ethnic group around the National Park as a source of security and social capital. In their study on the Chitwan Valley of South-central Nepal, Hughes et al. (2020) found that men with a high sense of family obligations are more likely to forgo other economic benefits for proximity by migrating to India instead of other faraway destinations.

Despite the importance of ethnicity and proximity in influencing out-migration, one must also acknowledge the importance of occupation in influencing out-migration as the farmers of Keta and Ada are found to be more reluctant to out-migrate as compared to the fishermen. This is not only due to the fear of losing their plots of farmlands as land is a very scarce commodity, especially in Keta, but also due to the cost involved in getting settled and finding another plot of land for their farming purpose in their new environment should they out-migrate. This is however not the case for the fishermen as they only need their fishing boat and a place to sleep should they out-migrate and they are already in business.

Chapter 9
Conclusion

9.1 Conclusion

This research sought to achieve four main objectives. The first objective of the study is to investigate how both local and translocal networks are established and sustained in both study areas. The findings have shown that local social networks in both areas are established and sustained through the existence and keeping together with extended family relations, participation in the activities of voluntary community-based associations, membership of, and participation in religious activities, and overall involvement in communal activities. The relatively homogeneous nature of both the Keta and Ada areas especially in terms of ethnicity also serves as a common binding force that facilitates the thriving of bonding ties. Per the results, there is no evidence of significant gender discrimination in terms of participation in the activities of voluntary associations even though membership in some of these associations is dominated by a particular gender due to the nature of the particular occupation. Collective action towards a problem that affects the community is not only a benefit of bonding social capital derived from bonding ties but also helps to sustain local social networks for the benefit of all. These results correspond with the findings of Bott & Braun (2019) who, based on their study on the Semarang Bay of Indonesia found that the habit of collective action towards problems (due to bonding social ties) enables community members to initiate accommodating strategies towards coastal hazards. The results of this study further indicated that translocal social networks, on the other hand, are established and sustained by connections and keeping in touch between out-migrants from both areas and their places of origin, connections with associations outside both areas, the presence of, and close contacts with tribe mates or family ties outside of the village, and access to modern communication devices such as mobile and smartphones, tablets, and computers. The increase in access to modern communication devices, especially basic mobile phones, has come to strengthen already existing translocal ties through ease in the exchange of information and ideas as people no longer need to travel over longer distances to do so. This result also confirms the findings of Ling & Horst (2011) who found that the widespread usage of mobile telecommunication in rural communities of the Global South has come to make existing social relations more visible. Their findings added that increasing usage of mobile communications in the Global South has come to challenge already-existing structures concerning how communication across space takes place.

The second objective of the study is to find out the resources people derive from their network of relations both within and outside their communities. The results have shown that households

derive several benefits ranging from financial benefits, information, skills, food and relief items, job opportunities, and collective action towards a problem that affects the community from their local social and translocal social ties. Benefits derived from voluntary local associations are mostly enjoyed by both those who actively take part in the activities of these associations and non-members. There is, however, a perceived bias on the part of leaders of associations in the allocations of benefits meant for all members leading to the loss of trust by some members reducing their participation in the activities of these local associations. In a related study, Valenzuela et al. (2020) found that social relations both internal and external serve as important sources of social capital for rural Filipinos. The findings of this study have shown that differences in social status within the community such as gender, age, and level of education do not largely affect access to social capital. A similar study on rural communities of Zimbabwe by Kairiza et al. (2023) has shown no difference between female-headed households and male-headed households in their ability to possess or access bridging social capital. Their findings, however, indicated the ability of female-headed households to possess more bonding social capital than their male-headed counterparts. In this study, it must be noted that the benefits households derive from their social ties are not only in relation to coastal erosion or during coastal floods but also to their general well-being. This is also attributable to the reduced fish catch leading to unemployment and a dwindling of the local economy of both areas as fishing is a major source of livelihood for the people. It is, however, difficult to quantify the support households derive from their social ties and networks.

The third objective of the study is to examine the impacts of resources derived from social networks both within and outside of the community in coping and adapting to coastal erosion and flooding. The findings have shown that households utilized the benefits from their social networks for varied coping and adaptation strategies toward coastal erosion and flooding. The role of social capital in both areas is even more crucial considering the inefficiency of the necessary state organizations such as the NADMO in alleviating the people of the impacts of these hazards. Households in both areas are, therefore, left with fewer options which include relying on their social networks and tapping into the benefits therein for their coping and adaptation strategies and overall well-being. Resources derived from bonding ties are found to be crucial in immediate response strategies during flood events. It is obvious that the impacts of coastal flooding on lives and property in both areas would have been worse but for the role played by bonding social

capital in minimizing such impacts. For instance, households utilize their bonding ties to act collectively during flood events by moving valuables to safer grounds as stated in chapter six. Bonding social capital, therefore, appears to have much more influence on rapid response to hazards especially flooding than the other forms of social capital. Bridging social capital on the other hand is most relevant in enabling households in both areas to prepare for, and recover from the impacts of both hazards. The benefits derived from bridging ties are not always directly related to coastal erosion and flooding but are mostly geared towards improving the livelihood sources of the people which indirectly boosts their coping and adaptation capacities. In this regard, the role of bridging social capital in both areas can be described as supplementary to bonding and linking social capital. Linking social is found to be relevant in boosting coping and adaptation strategies during all three phases of the hazards. Despite the limited capacities of state agencies, especially the NADMO, in managing hazards which is largely attributable to a lack of resources and trained personnel, their activities are designed to enable households to prepare for, respond to, and recover from the impacts of coastal hazards including erosion and flooding in both areas. Financial support from banks in the form of loans also boosts the livelihood sources of the people with its corresponding impacts on overall coping and adaptation strategies. A study by Su (2022) on how households utilized social capital to recover from the impacts of Typhoon Haiyan which in 2013 struck the Philippians indicated that lower-income households with out-migrated relations have more bonding social capital as compared to bridging and linking social capital. The results also indicate that resources derived from translocal networks are mostly relevant for long-term adaptation strategies such as out-migration, modification of houses, and relocation of houses further inland. These results are similar to the findings of Adugna et al. (2022) who found that further mobility of Eritrean refugees in refugee camps in Ethiopia depends largely on the size and quality of a refugee's social networks. Their findings added that refugees with access to remittances and the socio-economic resources of the city are more mobile and likely to leave their designated camps to migrate to other places.

The fourth and final objective of this study is to find out how physical and cultural differences influence coping and adaptation strategies toward coastal erosion and flooding. The relative proximity of Keta to the border of Togo and the dominance of the Ewe ethnicity that spread across the borders of Ghana, Togo, and Benin have strong influences on coping and adaptation strategies in the Keta area. The constant cross-border interactions between the people of Keta and their tribe

mates in these other countries lead to an exchange of ideas and other resources that foster coping and adaptation. A key coping and adaptation strategy that is influenced by the Ewe ethnicity and the proximity of Keta to the borders of Togo and Benin is out-migration. However, Accra and other regions of Ghana, especially the coastal towns, also serve as favorite destinations for out-migrants from Keta. The Ga-Adangbe ethnicity on the other hand and the proximity of Ada to the Accra-Tema area also influences out-migration as a coping and adaptation strategy to these areas. Hauer et al. (2020) also found that the out-migration of people under the threat of sea level rise in Bangladesh is mostly to nearby destinations. Also, and as already stated in chapter eight, the findings of a study by Hartter et al. (2015) have shown how already settled Bakiga people around the Kibale National Park in Western Uganda influence the immigration of other Bakiga-speaking people to the area. The findings of this study, however, indicated more out-migration from Ada to Togo and Benin than from Keta within the last five years despite the influence of the Ewe ethnicity and proximity of Keta to both countries. Possible reasons behind the more out-migration from Ada to Togo and Benin than from Keta are attributable to the influence of coastal erosion and flooding due to the fewer sea defense walls in Ada as compared to Keta. Other reasons include youth unemployment, the relatively younger population of Ada as compared to Keta, and the role of modern communication devices.

The relevance of the findings of this study can be discussed in terms of theoretical contributions and implications for policymakers. Theoretical, these findings contribute to the advancement of the role of social capital in the response to natural environmental hazards in rural communities of the Global South. The findings of this study provide empirical evidence on how social networks are established and sustained, the resources embedded in them, and how vulnerable people harness these resources in times of need to enable them to respond to both slow and rapid onset natural environmental hazards. These contributions are timely considering the inadequacy of state-owned institutions in many Global South countries to effectively manage coastal environmental hazards. This study is also the first known of its kind to look at how social capital, both local and translocal influences coping and adaptation strategies in the Ghanaian context.

The findings of this study also provide some policy implications and suggestions. In the first place, considering the important role of social networks and the resources embedded in them in terms of boosting coping and adaptation strategies, the government needs to build the capacities of communities to enable them to identify and develop their social capital. This will help improve

response mechanisms and reduce the vulnerabilities of rural coastal communities toward coastal environmental hazards. Bakker et al. (2019) have found that bonding social capital constitutes an important feature of community resilience. They added that a stronger sense of social belongingness due to bonding ties favors collective action toward the achievement of the objectives of the community. Considering the reduction in fish catch in the waters of the areas studied which has laid most fishers off their sources of livelihood, the government's flagship programs such as "the one-district-one-factory policy" and the "planting for food and jobs" need to be extended to both areas. In terms of enhancing the capacities of state institutions in managing disasters in both areas, there is a need for periodic in-service training for the NADMO personnel, and only qualified applicants with backgrounds in disaster risk management or related fields should be recruited into the NADMO to ensure efficiency. Finally, the findings also have serious implications for migration and cross-border trade policies as these enable the exchange of resources and ideas that are not only important for the general well-being of the people of those areas but also, directly and indirectly, influence their coping and adaptation strategies towards environmental hazards.

This study was not, however, devoid of some limitations. In the first place, this study could not to a larger extent specify which local or translocal social capital influences which particular coping or adaptation strategy (except for out-migration). Similarly, though coastal erosion and flooding are found to be among the main drivers of out-migration in both areas, the findings could not ascertain how a slow-onset hazard such as coastal erosion differently triggers out-migration as compared to a sudden-onset one such as flooding.

Nonetheless, the findings of this study to a large extent are applicable to other rural coastal communities of the Global South especially those along the West African coastline. This is true considering that rural coastal communities along the West African coastline share relatively similar socio-economic conditions such as population density, occupation, level of education, and social amenities (Almar et al., 2023). They are also exposed to similar coastal environmental hazards and have similar coping and adaptation strategies towards coastal environmental hazards (see for instance Alves et al., 2020; Croitoru et al., 2019). Rural West African communities are again characterized by extended family networks and a long history of migration which is facilitated by the ECOWAS principle of free movement of goods and services across the sub-region (McKeon, 2018). The free movement of people and goods policy within the ECOWAS is

necessary for the thriving of both local and translocal social capital which, when properly utilized can facilitate response towards coastal environmental hazards as demonstrated by the findings of this study in both study areas. All the above-stated similarities among rural West African coastal communities give the findings of this study wider applicability.

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Appendices

Appendix A: Interview guide for in-depth interviews

Notice of informed concern: *The purpose of this interview is to collect the necessary information to help answer the research questions of this study. The findings of this study shall therefore be used for this purpose and nothing else. Participation in this exercise is voluntary and the confidentiality of participants is assured.*

1. **Background information of the respondent**
   a) Age
   b) Gender
   c) Occupation
   d) Ethnicity
   e) Level of education
   f) Marital status
   g) Number of children if any

2. **Settlement status of the respondent** (These questions are meant to find out whether the respondents are migrant settlers or natives)

a) Are you a resident of this area or you are temporally living here? If you are a resident here then;
   I. Where are you, your parents, or your ancestors from?
   II. Are you, your parents, or ancestors natives of this area, or they migrated from another place to settle here?
   III. How long have you, your parents, or your ancestors been living in this area?

b) If you are a temporal resident then;
   I. Where are you from?
   II. How long have been living here?
   III. What are you doing here?
   IV. How often do you come here?
   V. Where is your next destination and why?

3. **Coastal erosion and flooding:** (These questions will help find out the history, dynamics, and intensity of coastal erosion and flooding in the respective area)

a) For how long have you been experiencing coastal flooding in this area?
b) What do you think are the main causes of coastal erosion and flooding in this area?
c) At what rate can you say the coast has been eroding? The range according to slow, moderate, fast, or very fast.
d) What are the peak seasons for coastal erosion and flooding in this area?
e) What do you think are the impacts of the Volta River, Akosombo Dam, and Keta Lagoon on erosion and flooding in this area?
f) How often do you experience flooding in the peak seasons?
g) Which are the most affected parts of this area during coastal flooding?

h) For how long do you experience flooding in a season?
i) How high are the flood waters during the peak season?

4. **Impacts of coastal erosion and flooding on the livelihood of the people**
   a) How are coastal erosion and flooding affecting your daily activities?
   b) How do coastal erosion and flooding affect your economic activity such as farming or fishing?
   c) Any benefits?
   d) Have you ever lost any family members due to flooding?
   e) How much of your property in terms of monetary value is being lost to erosion or flooding in a year?
   f) On average, how many people do you think died as a result of flooding in a year?
   g) Have you ever lost any property as a result of the eroding coast or flooding?
   h) How are coastal erosion and flooding affecting your houses or homes?

5. **Coping with coastal erosion and flooding**: (These questions will help find out how the people have been coping with coastal erosion and flooding)
   a) What are the short-term measures that you put in place to at least reduce the strength of flood waters during flooding in this area?
   b) What are the short-term measures that you put in place to at least minimize the impacts of coastal erosion and flooding?
   c) Have you devised any new methods of farming, fishing, etc as a result of the eroding coast or flooding?
   d) Any changes in your housing styles in order to minimize the effects of erosion and flooding on your homes?
   e) Have you devised any new technology or device to enable you to deal with the eroding coast or flooding?
   f) Have you acquired any skills purposely for dealing with coastal erosion or flooding?
   g) What is so far your effective approach to minimizing the effects of coastal erosion and flooding?

6. **Adaptation to coastal erosion and flooding:** (These questions will help find out how the people have been adapting to coastal erosion and flooding)
   a) How have you dealt with the issue of coastal erosion and flooding over the past decade or two?
   b) Has there ever been any measure adopted by the people of your area to find a long-lasting solution to the issue of coastal erosion and flooding?
   c) What are these measures?
   d) How effective are they?
   e) Has there ever been any attempt by either the government, NGOs, or external organizations to help stop or find a long-lasting solution to the issue of coastal erosion and flooding?
   f) What were these measures?
   g) How effective were they?

h) What is currently being done by the government or district assembly to find a long-lasting solution to the problem of coastal erosion and flooding?

7. **Local social capital:** (These questions will enable me to find out the availability of local social networks, either formal or informal that could serve as sources of local social capital in the area)
   a) Do you belong to any social grouping(s) or associations in this area?
   b) What is the aim of this group or association?
   c) Are these associations registered with the state?
   d) What are the criteria for membership in this association?
   e) What are the benefits of being a member of this association?

8. **Impacts of local social capital on coping with, and adapting to coastal erosion and flooding**
   a) What is your main source of help in times of flooding and for dealing with coastal erosion?
   b) From where do you receive your first help or support of any kind in times of flooding and for dealing with coastal erosion?
   c) Are you a member of any association that provides support to you in times of coastal flooding and erosion? If yes then
   d) What kind of support, and
   e) For how long?
   f) How beneficial is the support that you get from these social groups in times of floods and erosion?
   g) What are the benefits of these supports in helping you temporally deal with the impacts of coastal erosion or flooding?
   h) In the event of flooding, how soon do you get support from these social groups?

9. **Translocal social capital:** (These questions will help find out the availability of translocal social networks, either formal or informal that could serve as sources of translocal social capital to the people)
   a) Do you belong to any social grouping(s) outside of this area, especially outside the borders of this country?
   b) What is the aim of this group or association?
   c) Are these associations registered with the state?
   d) What are the criteria for membership in this association?
   e) What are the benefits of being a member of this group or association?

10. **Impacts of translocal social capital on coping with, and adapting to coastal erosion**
    a) Do you receive any support from any of these groups or associations in helping find a long-term solution to the issue of coastal erosion and flooding? If yes then
    b) What kind of support
    c) Since when have you received this support and for how long?

d) How effective and beneficial have these supports been in helping find a long-term solution to flooding and erosion in this area?
e) What role do these associations play in helping minimize the impacts of coastal erosion and flooding while taking advantage of their benefits if any?

11. Relationships between local social capital and migration

a) If in case you are a migrant settler, how did you know or hear of this place?
b) Do you have family members or relatives who are already settled here before you? If yes then
c) What kind of support did you receive from these family members when you were still in your native area that helped you in your preparation to migrate here?
d) What kind of support were you given en route?
e) After arriving, what kind of support were you granted that enabled you to settle in this area?
f) After settling here did you offer any help to anyone in your native area in their quest to migrate to his place?
g) What kind of support did you offer them?
h) Were they successful in migrating to this place?

12. Relationship between translocal social capital and migration

a) If in case you are a migrant settler and while you were still in your native area, were you a member of any social grouping or association based in this area?
b) Were you a member of any social grouping or association in your native area that has a branch in this area?
c) What are the criteria for membership in this group?
d) Was this group(s) registered with the state?
e) What kind of support did you receive from this group(s) while you were still in your native area that helped you in your preparation to migrate to this place?
f) What kind of support were you given en route?
g) After arriving, what kind of support were you granted that enabled you to settle in this area?

Appendix B: Participants in in-depth interviews

Chiefs/traditional rulers/chief linguists, Assembly members/politicians, District coordinators of Agric, farmers, and fisherfolks. The rest includes District and Metropolitan Chief Executives, District Coordinator and staff of NADMO, caretaker of the meteorological station at Ada, household heads (male and female), traders, heads of schools, and Municipal and District physical planners.

Appendix C: Questionnaire for the household survey

Impacts of both local and translocal social capital on coping with and adapting to coastal erosion and flooding.

Sule Ayannor Issaka; Ph.D. candidate, Institute of Geography, University of Cologne.

Notice of informed concern: The purpose of this interview is to collect the necessary information to help answer the research questions of this study. The findings of this study shall, therefore, be used for this purpose and nothing else. Participation in this exercise is voluntary and the confidentiality of participants is assured.

SECTION ONE: Details of respondents who have been living in the area for at least 5 years

1.1.1: ID of the interviewer……..

1.1.2: Number of interviews……

1.1.3: GPS coordinates of the house (latitudes and longitudes)……..

1.1.4: ID photo of the house……

1.1.5: Name of village/town…….

1.1.6: Address/location description……

1.1.7: Date interview was conducted (d/m/y)…….

1.1.8: Time interview started (hh: mm)…….....

1.1.9: Time interview ended (hh: mm)……..

1.1.10: Name of interviewer……..

1.1.11: Name of respondent…….

1.1.12: Gender of respondent:

Mark only one oval

○ 1 = Male

○ 2 = Female

1.1.13: Of what material is the house built? (Mark only one oval)

- ◯ 1 = wood
- ◯ 2 = Stones, bricks, cement (Blockhouse)
- ◯ 3 = Adobe, wattle, daub (mud house)
- ◯ 11 = Branches and leaves of palm

SECTION TWO (2): Household information of the respondent

1000: How many people do you have in your household?.....

2.1.1: How many female members live in your household?……

2.1.2: How many male members live in your household?.....

2.1.3: How many of your household members are children? (below 18 yrs).....

2.1.4: Are the following generations living in your household?

Check all that apply

- Children ☐
- Parents ☐
- Grandparents ☐

2.1.5: How old are you? (Years)…….

2.1.6: How long has your household been living in this village/town (years)……

2.1.7: What is your place of birth?
Mark only one oval

- ◯ 1= this village/town
- ◯ 3= another village/town within this region
- ◯ 4= another region within Ghana
- ◯ 5= outside Ghana, please specify……..

2.1.8: If you weren't born here then why did you move to this place?

Mark only one oval

- 1= Marriage/family reunification
- 2= Fishing
- 3= Farming
- 4 = Education
- 90 = others, Please specify……

2.1.9: Do you have other household members who were born somewhere else? If *no* then go to question 2.1.14.

Mark only one oval

- 0 = No
- 1 =Yes

2.1.10: If yes then how many of your household members were born elsewhere?
……

2.1.11: Are these members male or female, or both?

Check all that apply

- Male
- Female

2.1.12: If they were born somewhere else why did they join your household?

Mark only one

- 1 = Marriage
- 2 = Better opportunities to work
- 3 = Education reasons
- 11= Children of external family members/other relatives
- 90 = others, please

specify……

2.1.13: Where were they born?

Mark only one oval

- 1 = this village/town
- 2 = another village/town within this region
- 3 = other regions in Ghana outside this region
- 4 = outside Ghana, please specify…….

2.1.14: What is your highest level of formal education?

Mark only one oval

- 1 = Never attended school
- 2 = Preschool
- 3 = Primary schools incomplete
- 4 = Primary schools completed
- 5 = Middle School/Junior high school
- 6 = High School
- 11= A-level
- 7 = Tertiary education (College or University)

2.1.15: What is the highest level of formal education in your household?

Mark only one oval

- 1 = Never attended school
- 2 = Preschool
- 3 = Primary school incomplete
- 4 = Primary school completed
- 5 = Middle school/Junior high
- 6 = High school
- 11 = A-level
- 7 = Tertiary education (College or University)

2.1.16: Who has the highest level of education in your household?

Mark only one per row

	0=N0	1=Yes
Generation of grandparents	○	○
Generation of father/mother	○	○
Generation of son/daughter	○	○

2.1.17: What is the religious affiliation of your household?

Check all that apply

○ African Traditional Religion (ATR)

○ Christianity

○ Islam

○ 90 = others, please specify…….

2.1.18: What ethnic groups are present in your household?

Check all that apply

☐ Ewe

☐ Dangbe

☐ Akan

☐ 90 = others, specify…….

2.1.20: Which languages do you speak?

Check all that apply

☐ Ewe

☐ Dangbe

☐ Twi

☐ English

☐ 90 = others, please

specify…….

2.1.21: What is your occupational form? If 1 or 4 go to 2.1.24. if 2 or 3 go to 2.1.23

Mark only one oval

- 1 = No work/unemployed
- 2 = Homemaker/Housewife
- 3 = Student
- 4 = Retired
- 5 = Daily laborer
- 6 = Employed
- 7 = Self-employed
- 90 = others, please specify

2.1.22: What is your main sector of occupation?

Mark only one oval

- 1 = Farmer
- 2 = Fish farmer/fisherman
- 4 = Trader of agricultural goods/fish/fish mongers
- 5 = Traders of other things
- 6 = Construction and building
- 7= Craftswoman/man
- 8 = Owns a small business (restaurant, store, etc)
- 10 = Security service
- 11 = other services
- 12 = Employed by/working for the government (civil servant)
- 13 = Politicians/Traditional leader
- 90 = others, please specify…….

2.1.23: Where is your location of employment/education?

Mark only one oval

- 1 = same village/town
- 2 = same district
- 11= another village/town within the region
- 12 = another region in Ghana
- 13 = neighboring Togo
- 90 = others, please specify…….

2.1.24: Are you the main earner of your house? If yes go to question 2.1.28.

Mark only one oval

- 0 = No
- 1= Yes

2.1.25: If the respondent is not the main earner then what is the occupational form of the main earner?

Mark only one oval

- 5 = daily laborer
- 6 = employed
- 7 = self-employed
- 90 = others, please specify……

2.1.26: If the respondent is not the main earner then what is the sector of occupation of the main earner?

Mark only one

- ○ 1 = farmer
- ○ 2 = fish farmer/fisherman
- ○ 4 = trade of agricultural goods/fish/fish mongers
- ○ 5 = trade of other things/sales
- ○ 6 = construction and building
- ○ 7 = craftswoman/man
- ○ 8 = owns a small business (restaurant, store, etc)
- ○ 10 = security service
- ○ 11 = other services
- ○ 12 = employed by/working for the government (civil servant)
- ○ 13 = politician/traditional leader
- ○ 90 = others, please specify…….

2.1.27: If the respondent is not the main earner then where is the location of employment/education of the main earner?

Mark only one oval

- ○ 1= same village/town
- ○ 2 = same district
- ○ 11 = another village/town within the region
- ○ 12 = another region in Ghana
- ○ 13 = neighboring Togo
- ○ 90 = others, please specify (village/town/city, and region)……

2.1.28: How many household members contribute regularly to household income?.....

2.1.29: Do members of your household hold the following positions?

Mark only one oval per row

	0=No	1=Yes
Assemblymember/DCE/MCE/RM	○	○
Member of Parliament	○	○
Leader of an association	○	○
(Fishermen/fish mongers/farmers)	○	○

Others, please specify,……..

2.1.30: How many members of your household have valid health insurance?.....

2.2.1: What is your household's average monthly income? (GHC per month)……

2.2.2: Does your household have financial savings?

Mark only one oval

○ 0 = No

○ 1 = Yes

1001: If yes, then can your household afford the cost of a fishing boat or its equivalent if yours is stolen or broken?

Mark only one oval

○ 0 = No

○ 1 = Yes

2.2.4: Do you have a bank account?

Mark only one oval

○ 0 = No

○ 1 = Yes

2.2.5: What is the ownership status of your house?

Mark only one oval

- ○ 1 = owned and completely paid for
- ○ 3 = rented
- ○ 5 = squatter
- ○ 11 = through inheritance
- ○ 12 = owned by a relative/boss/other people
- ○ 13 = jointly owned together with other family members
- ○ 90 = others, please specify……

2.2.7: How many rooms are in your house that people live in?.....

2.2.8: What is the primary source of drinking water for your household?

Mark only one oval

- ○ 1 = water from state company (pipe water system)
- ○ 2 = Communal well
- ○ 3 = Private well
- ○ 4 = Natural water bodies (river/stream)
- ○ 5 = Water truck
- ○ 6 = Bottled/sachet water
- ○ 11= Dam water
- ○ 90 = others, please specify……

2.2.9: Where does your household dispose of most of its garbage?

Mark only one oval

- 1 = river/ocean
- 2 = communal garbage bin
- 3 = It is burned
- 4 = landfilling/bury
- 5 = collected by private/public truck, etc
- 90 = others, please specify

1002: From which of the following ways do you respond to nature's call?

Mark only one oval per row

Private toilet facility within the household		
Public toilet		
Free range		

SECTION THREE (3): Local social capital-related questions

3.1.1: Under which of the following circumstances do you mostly meet with people from your village?

Mark only one oval

- ○ 1 = randomly
- ○ 2 = at work
- ○ 3 = meetings (official)
- ○ 4 = activities/hobbies
- ○ 5 = family gatherings
- ○ 6 = business meetings
- ○ 7 = political events
- ○ 11 = religious meetings/worship at church/mosque
- ○ 12 = market places
- ○ 13 = ceremonies (e.g. festivals, marriage, outdooring)
- ○ 90 = others please specify…….

3.1.2: Besides formal meetings, where do you mostly meet with people from your village spontaneously/unplanned?

Mark only one oval

- ○ 1 = on the streets of your village/town
- ○ 2 = street food stands in your village
- ○ 4 = village/town market
- ○ 7 = places of worship (mosque/church)
- ○ 11 = drinking sports
- ○ 90 = is others, please specify…….

3.1.3: Do any of your household member/s attend the following meetings?

Mark only one oval per row

	0=No	1=Yes
Fishermen association meetings	○	○
Fishmongers association meetings	○	○
District assembly/unit committee meetings	○	○
Traditional council meetings	○	○
Farmer's association meetings	○	○
Trades association meetings	○	○
Religious association meetings	○	○

3.1.4: Who attends the following meetings, women, men, or both?

Check all that apply

	Men	Women
Fishermen association meetings	☐	☐
Fishmongers association meetings	☐	☐
District assembly/Unit committee meetings	☐	☐
Traditional council meetings	☐	☐
Farmer's association meetings	☐	☐
Trader's association meetings	☐	☐
Religious association meetings	☐	☐

3.1.5: Are there meetings you would like to attend but are not invited to or not permitted to join?

Mark only one oval

○ 0 = No

○ 1 = Yes

3.1.6: If the answer to the above is yes then which of the following meetings?

Mark only oval per row

	0 = No	1 =Yes
Fishermen association meetings	○	○
Fishmongers association meetings	○	○
District Assembly meetings	○	○
Traditional council meetings	○	○
Farmer's association meetings	○	○
Trader's association meetings	○	○
Religious meetings	○	○
School-related/youth organization meetings	○	○

3.1.7: Which meeting is the most important to your household?

……..

3.1.10: Are the members of the meetings you attended mostly from the same age group?

Mark only one oval

○ 0 = No

○ 1 = Yes

3.1.11: Do members of the meetings you attended mostly have the same level of education?

Mark only one oval

○ 0 = No

○ 1 = Yes

3.1.12: How are decisions made in most of the meetings you attend?

Mark only one oval

- 1 = the leader decides and informs the other group members
- 2 = the leader asks the group members what they think and then decide
- 3 = the group members hold a discussion and decide together
- 4 = we vote
- 90 = others, please specify……

3.1.13: Have you or your household acquired new skills or learned something valuable from these meetings?

Mark only one oval

- 0 =No
- 1 = Yes

If yes which new skills?.....

3.1.14: What are the important topics discussed at the Unit committee/District Assembly meetings?

Mark only one oval per row

	0 = No	1 = Yes
Developmental issues in general		
Coastal flood-related issues		
Coastal erosion-related issues		
Migration related issues		
Peace and security		
Job creation/employment		
Governance		
Fishing		
Agricultural		
Health issues		

90 = others, specify……

1004: What are the important topics discussed at the traditional council meetings?

Mark only one oval per row

	0 = No	1= Yes
Developmental issues in general	○	○
Coastal flood-related issues	○	○
Coastal erosion-related issues	○	○
Migration related issues	○	○
Peace and security	○	○
Job creation/employment	○	○
Governance	○	○
Fishing	○	○
Agricultural	○	○
Health issues	○	○

90= others, specify……

3.1.15: Have you or any member of your household ever been denied support or benefits from any of the above associations/meetings due to failure to pay membership dues?

Mark only one oval

○ 0 = No

○ 1 = Yes

3.1.17: Do your household members participate in these activities?

Mark only one oval per row

	0 = No	1 = Yes
Group prayer meetings/services	○	○
Doing sports together/community games	○	○
Communal labor	○	○
Community cleaning	○	○

3.1.20: If a problem affects the entire village/town, for instance, crop disease or violence, who will deal with the situation?

Mark only one oval per row

	0 = No	1 = Yes
Each household/person will deal with it individually	○	○
Neighbors among themselves	○	○
Local government/political leaders	○	○
Chiefs/traditional leaders	○	○
The entire village	○	○

Others, please specify…….

3.1.21: What happens to people who fail to attend and participate in meetings and community activities?

Mark only one oval

○ 1 = nothing

○ 2 = loss of status/respect

○ 3 = do not get help when they are in need

○ 4 = are not considered members of the community

○ 5 = they are ignored

○ 11 = they are not considered patriotic

3.1.22: Do you agree or disagree with the following statement: A woman who never visits sick neighbors or other women who delivered should not also be visited when she is sick or delivers;

Mark only one oval

○ 0 = No

○ 1 = Agree

2.1.23: Differences often exist between people living in the same village/neighborhood. Do differences such as the following tend to divide people in your village?

Mark only one oval per row

	0 = No	1 = Yes
Differences in educational levels	○	○
Difference in wealth/material possessions	○	○
Differences in land holdings	○	○
Differences in social status	○	○
Differences between men and women	○	○
Difference between young and old generations	○	○
Difference between natives and migrant settlers	○	○
Differences in political party affiliations	○	○
Differences in religious believe	○	○
Difference in ethnicity	○	○

Others, please specify……..

3.1.24: If these differences cause problems, how are they always handled?

Mark only one oval per row

	0 = No	1 = Yes
People work it out among themselves	○	○
Family/house members intervene	○	○
Neighbors intervene	○	○
Chief/council of elders intervene	○	○
Religious leaders mediate	○	○
The judiciary mediates	○	○
The police mediate	○	○

3.1.27: How much influence do people like yourself have to make this village/town a better place?

Mark only one oval

- 1 = no influence
- 2 = not very much
- 3 = some
- 4 = a lot

3.1.28: Supposed you suffered an economic loss, who will support you financially?

Mark only one oval per row

	0 = No	1 = Yes
No one will help		
Immediate family members		
Extended family members		
Neighbors		
Banks		
Associations that you are a member of		
Politicians		
Traditional rulers		
Religious bodies		

90 = others, please specify……..

3.1.29: What is the level of trust in your village?

Mark only one oval

- 1 = low
- 2 = mediate
- 3 = high

3.1.30: Supposed your household had to go away for a while, in whose charge could you leave your house/farmland/fishing boat?

Mark only one oval per row

	0 = No	1 = Yes
No one	○	○
Other family members	○	○
Neighbor	○	○
Anyone from this village/town	○	○

Others, please specify……

3.1.32: Are you afraid that your fishing boat, motorcycle, or bicycle might get stolen in this village?

Mark only one oval

○ 0 = No

○ 1 = Yes

○ -77 = I don't own one

3.1.34: Do you agree or disagree with the following statements?

Mark only one oval per row

	0 = N0	1 = Yes
Most people in this village are basically honest and can be trusted	○	○
Members of this village are more trustworthy than people in other villages	○	○
Most people in this village are willing to help if you need it	○	○
I feel accepted as a member of this village	○	○

3.2.1: where does the largest number of your relatives live?

Mark only one oval

- 1 = same village/town
- 11 = within the same region
- 12 = another region in Ghana, please specify……
- 13 = in neighboring Togo
- 14 = Benin
- 15 =Nigeria
- 16 = the Ivory Coast

3.3.1: Do you own a

Mark only one oval per row

	0 = No	1 = Yes
Basic mobile phone		
Smartphone		
Landline telephone		
Tablet computer		
Personal computer		

3.3.2: Do you have

Mark only one oval per row

	0 = No	1 = Yes
Access to internet		
Skype		
Facebook		
WhatsApp		

SECTION FOUR (4): translocal social capital-related questions

3.3.3: How many days in a week do you always have a deposit (call credit) to use your mobile phone for communication? (days per month)

……..

1004: How do you mostly communicate with your family members/relatives in any of the above-mentioned places? (3.2.1)

Check all that apply

- ☐ In-person/during visits
- ☐ Phone calls
- ☐ Skype calls
- ☐ WhatsApp
- ☐ Facebook
- ☐ -77 = not applicable (no family members in other places)

3.3.6: How often are you in contact with the following people?

Mark only one oval per row

1=every day 2=every week 3=several times a month 4=monthly 5=few times per year 6=less than once a year

Relatives in your Village/town	○	○	○	○	○	○
Relatives in other Regions of Ghana	○	○	○	○	○	○
Relatives in Other countries	○	○	○	○	○	○

3.3.7: For what reason/occasion do you mostly meet with people from outside your village/town?

Mark only one oval

- 1 = business meetings
- 2 = family gathering
- 3 = friendly visits
- 4 = religious meetings
- 5 = political meetings
- 11 = for fishing purposes
- 12 = for farming purposes
- 90 = others, please specify……..

3.3.8: Do you receive money from people from outside your village?

Mark only one oval

- 0 = No
- 1 = only in times of crisis as remittances
- 2 = only in times of crisis as loans
- 3 = occasional remittances
- 4 = regularly as remittances
- 5 = as loans

3.3.10: Do you receive food from people from outside of your village?

Mark only one oval

- 0 = No
- 11 = during flooding/other disasters
- 12 = during a famine
- 13 = during poor fishing seasons
- 14 = during funerals or other occasions
- 90 = others, please specify……

SECTION FIVE (5): coastal flooding related questions

4.1.1: Which of the following events affected your household negatively in the last 5 years?

Check all that apply

- ☐ Coastal erosion
- ☐ Coastal flooding
- ☐ Lack of enough fish to catch in the waters
- ☐ Poor farm yield
- ☐ No market for fish catch
- ☐ No market for farm produce
- ☐ Ethnic/tribal issues
- ☐ Youth unemployment
- ☐ Education related
- ☐ Lack of potable water
- ☐ 90 = others, please specify……..

4.1.13: In the last five years, how high did the flood waters at the most stand in your house?

Mark only one oval

- ○ 1 = No water
- ○ 2 = Ankle high
- ○ 3 = Knee-high
- ○ 4 = Hip high
- ○ 5 = Chest high
- ○ 6 = Higher than chest high

4.1.14: At which water levels do floods become a problem?

Mark only one oval

- 2 = ankle high
- 3 = knee high
- 4 = hip high
- 5 = chest high
- 6 = higher than chest high
- 7 = never

4.1.15: How often did flood waters become a problem in the last five years?

Mark only one oval

- 1 = never
- 2 = once
- 3 = every few years
- 4 = yearly
- 5 = every few months
- 6 = monthly
- 7 = constantly

4.1.18: Have important facilities like schools and hospitals been closed due to floods or erosion?

Mark only one oval

- 1 = never
- 2 = yes, once
- 3 = yes, every few years
- 4 = yes, yearly
- 5 = yes, every few months
- 6 = monthly
- 7 = weekly
- 8 = constantly

4.1.26: Has it become more difficult for you to pay for flood and erosion protection over the last five years?

Mark only one oval

- ○ 0 = No
- ○ 1 = Yes, a little bit
- ○ 2 = Yes, very much

4.1.27: Did any of these assets get lost or were damaged due to floods or erosion?

Mark only one oval per row

	0 = No	1 = Yes
Clothes	○	○
Food	○	○
Furniture	○	○
Papers/document	○	○
Electric devices/TV, radio, etc	○	○
Motorbike/bicycle	○	○
Farmlands/salt ponds	○	○
Harvested crop/fish	○	○
Ovens for smoking fish	○	○

90 = others, please specify……

1005: On average, how many days do you experience coastal flooding in the rainy season within the past five years?

……..

1006: What is the duration (in days) of the peak season of flooding in this area?

……..

1007: How long (in days) do the flood waters stay in your compounds or rooms during the peak season?…….

1008: How do you always get rid of the flood waters from your compound and rooms?

Check all that apply

- [ ] Scooping/collecting with a container
- [ ] Creating a hole through the wall to serve as a passage for stagnant water
- [ ] Sweeping out with a broom
- [ ] Allowing it to dry up
- [ ] Others, please specify……

1009: how will you describe the impacts of coastal erosion and flooding on your lives and property within the last 5 years?

Mark only one oval

- ○ 11 = very severe
- ○ 12 = severe
- ○ 13 = moderate
- ○ 14 = minimal
- ○ 15 = no longer applicable because of the sea defense system

10010: Have you ever made changes to your housing style due to the impacts of coastal flooding/erosion?

Mark only one oval

- ○ 0 = No
- ○ 1 = Yes

10011: If yes then in which of the following ways?

Check all that apply

- ☐ From mud to blocks/concrete
- ☐ From wooden to mud
- ☐ From wooden to blocks/concrete
- ☐ From mud or blocks to wooden
- ☐ 90 = others, please specify

10012: Which of the following supports do you receive from the state to help you prepare for the approaching flood season?

Mark only one oval per row

	0 = N0	1 = yes
Financial support	◯	◯
Sensitization/public education	◯	◯
Tools and equipment/machines	◯	◯
Training and skills acquisition	◯	◯
Strict enforcement of bye-laws	◯	◯

90 = others, please specify……..

10013: Which of the following supports do you receive from the state or other agencies to help you recover from the impacts of coastal flooding?

Mark only one oval per row

	0 = No	1 = Yes
Financial support	◯	◯
Sensitization/public education	◯	◯
Tools and equipment/machines	◯	◯
Training and skills acquisition	◯	◯
Strict enforcement of bye-laws	◯	◯

90 = others, please specify…….

4.1.29: Have any of your household members been affected by the following diseases (last year)?

Mark only one oval per row

	0 = No	1 = Yes
Gastro-illness disease (e.g. diarrhea)	○	○
Febrile illness (e.g. malaria from mosquitos)	○	○
Lung disease	○	○
Skin disease/allergies	○	○
Food intoxication/food poisoning	○	○

4.1.30: Have people who suffer from these diseases usually been able to work/attend school?

Mark only one oval

○ 0 = No

○ 1 = Yes

4.1.31: Do you think that these diseases are caused by floods?

Mark only one oval

○ 0 = No

○ 1 = Yes

4.2.4: What do you think, how strong will tidal floods be in the future?

Mark only one oval

○ 1 = lower tides

○ 2 = same heights of tides

○ 3 = higher tides

4.2.6: Have you heard of the term sea level rise?

Mark only one oval

○ 0 = No

○ 1 = Yes

4.2.8: What do you think about sea level rise?

Mark only one oval per row

	1= I agree	0= I disagree
It won't affect us	○	○
It is a big threat to my family	○	○
We are prepared for it	○	○
We have to protect ourselves	○	○
As a community, we are able to deal with it	○	○

SECTION SIX (6): Coastal erosion-related questions/coping and adaptation mechanisms

10013: How will you describe the rate of coastal erosion in your area within the last 5 years?

Mark only one oval

○ 11 = very fast

○ 12 = fast

○ 13 = moderate

○ 14 = minimal

○ 15 = no longer applicable because of the sea defense system

10014: Has your house/fish oven/store or any physical property ever been destroyed due to coastal erosion?

Mark only one oval

○ 0 = No

○ 1 = Yes

10015: How many times have you shifted your house further inland due to the eroding coastline?

……..

10016: Which of your following properties do you think has been affected by coastal erosion the most?

Mark only one oval

- ○ 11 = house
- ○ 12 = farmland
- ○ 13 = places of worship (church, mosque, shrines)
- ○ 14 = shop or workplace
- ○ 15 = fishing boats and nets
- ○ 16 = fishing ovens
- ○ 90 = others, please specify……

10017: Which of the following physical assets of this community do you think has been affected/destroyed by coastal erosion?

Check all that is apply

- ☐ Houses
- ☐ Schools
- ☐ Market places
- ☐ Historical monuments
- ☐ Administrative buildings
- ☐ Farmlands
- ☐ Places of worship
- ☐ Roads
- ☐ Health facilities
- ☐ Fishing boats and nets
- ☐ Landing places for fishing boats and nets
- ☐ Tourist resorts and recreational places
- ☐ Others, please specify…….

10018: which of the following practice/s do you think is/are the major causes of coastal erosion in this area?

Check all that apply:

☐ Sand winning

☐ Coastline stone mining

☐ Construction of the sea defense system

☐ Sea level rise

☐ Construction of the Tema harbor

☐ Construction of the Akosombo Dam

☐ Others, please specify……..

10019: Which of the following practices do you think will help minimize or completely stop the rate of coastal erosion in this area?

Check all that apply

☐ Enforcement of bye-laws

☐ Construction of sea defense system

☐ Prevention of sand-winning/coastline stone mining

☐ Laying sandbags along the coastline

☐ Others, please specify…….

10020: Which of the following practices do you think will help reduce the impacts of coastal erosion on your lives and property?

Check all that apply

☐ Relocating further inland away from the coastline

☐ Changing your housing or construction material and style

☐ Barricading your house or property with sandbags

☐ Others, please specify…….

10021: Do you think the state has done enough to help minimize or completely stop the rate of coastal erosion in this area?

Mark only one oval

○ 0 = No

○ 1 = Yes

10022: If yes then in which way? Please specify……

10023: How efficient is the sea defense system in preventing coastal erosion in this area?

Mark only one oval

○ 11 = very efficient

○ 12 = efficient

○ 13 = moderate

○ 14 = minimal

○ -77 = not applicable (the area has no sea defense system)

10024: Which of the following are the disadvantages of the sea defense system?

Check all that apply

☐ Destruction of coastal ecosystem

☐ Causing coastal erosion in the down-drift

☐ Hampering fishing/destruction of fishing boats and nets

☐ Hampering farming activities

☐ Seepage of water from high tides through the sea defense into settlements

☐ Others, please specify……..

SECTION SIX (6): Migration and networks of migration

10025: Which of the following supports do you/your family members receive from either your tribesmen or family tides in other places to aid you in traveling to them?

Check all that apply

☐ Financial support

☐ News of encouragement

☐ Information on root and travel options

☐ 90 = Others, please specify…….

10026: Which of the following supports do you/your family members receive from either your tribesmen or family tides in other places that make your stay comfortable when you go there?

Check all that apply

☐ Accommodation

☐ Financial support

☐ Peace of land to settle on

☐ Food

☐ Job

☐ Assistance in fishing

☐ Assistance in trading

☐ News of encouragement

☐ 90 = others, please specify……..

10027: What kind of support do you offer your family tides or tribe mates in other places who intend to come to you to facilitate their coming?

Check all that apply

☐ Financial support

☐ News of encouragement

☐ Information on root and travel options

☐ 90 = Others, please specify…….

10028: What kind of support do you offer your family tides or tribe mates in other places living with you to make their stay conformable?

Check all that apply

- ☐ Accommodation
- ☐ Financial support
- ☐ Peace of land to settle on
- ☐ Food
- ☐ Job
- ☐ Assistance in fishing
- ☐ Assistance in trading
- ☐ News of encouragement
- ☐ 90 = others, please specify……..

5.2.6: In the last 5 years did you learn anything new against coastal erosion and flooding? (new methods, materials, etc)

Mark only one oval

- ○ 0 = No
- ○ 1 = Yes

5.2.7: If yes please specify

…….

10029: During your visit to your relatives in other places have you learned some skills from them that enable you to deal with coastal erosion and flooding after your return?

Mark only one oval

- ○ 0 = No
- ○ 1 = Yes

If yes mention them……..

THANK YOU VERY MUCH FOR PARTICIPATING IN THIS SURVEY AND FOR YOUR PATIENCE

Appendix D: Own contribution

Below are my contributions to the dissertation

- Literature review
- Developing a conceptual framework based on Bott et al. (2020), and Steinbrink (2007)
- Selection of research areas
- Preparation of interview guide for in-depth interviews
- Organization of first fieldwork
- Inspection of study communities together with Boris Braun and Lisa Niesters
- Conduction of in-depth interview (with Boris Braun and Lisa Niesters helping me to get started)
- Independent content analysis of the qualitative results
- Preparation of questionnaires for the household survey (with some questions taken from the questionnaire of the TRANSOCAP project)
- Organization of second fieldwork (household survey via structured questionnaires)
- Training research assistants for the survey
- Supervision and assisting of research assistants during the survey
- Entering survey data in Microsoft Excel and then SPSS (with guidance from Boris Braun and Lisa Niesters)
- Cleansing of quantitative data
- Statistical analysis of quantitative data with SPSS
- Independent write-up of the final dissertation

Appendix E: Eigenständigkeitserklärung

Hiermit versichere ich an Eides statt, dass ich die vorliegende Dissertation selbstständig und ohne die Benutzung anderer als der angegebenen Hilfsmittel und Literatur angefertigt habe. Alle Stellen, die wörtlich oder sinngemäß aus veröffentlichten und nicht veröffentlichten Werken dem Wortlaut oder dem Sinn nach entnommen wurden, sind als solche kenntlich gemacht. Ich versichere an Eides statt, dass diese Dissertation noch keiner anderen Fakultät oder Universität zur Prüfung vorgelegen hat; dass sie - abgesehen von unten angegebenen Teilpublikationen und eingebundenen Artikeln und Manuskripten - noch nicht veröffentlicht worden ist sowie, dass ich eine Veröffentlichung der Dissertation vor Abschluss der Promotion nicht ohne Genehmigung des Promotionsausschusses vornehmen werde. Die Bestimmungen dieser Ordnung sind mir bekannt. Darüber hinaus erkläre ich hiermit, dass ich die Ordnung zur Sicherung guter wissenschaftlicher Praxis und zum Umgang mit wissenschaftlichem Fehlverhalten der Universität zu Köln gelesen und sie bei der Durchführung der Dissertation zugrundeliegenden Arbeiten und der schriftlich verfassten Dissertation beachtet habe und verpflichte mich hiermit, die dort genannten Vorgaben bei allen wissenschaftlichen Tätigkeiten zu beachten und umzusetzen. Ich versichere, dass die eingereichte elektronische Fassung der eingereichten Druckfassung vollständig entspricht.

07-08-2023, Cologne

Datum, Ort

Sule Ayannor Issaka