UNIVERSITY OF CAPE COAST

INDIGENOUS KNOWLEDGE AND COASTAL LIVELIHOOD RESOURCE SUSTAINABILITY AT MOREE AND APAM COMMUNITIES IN THE CENTRAL REGION OF GHANA

FRANCIS ANING ANOKYE

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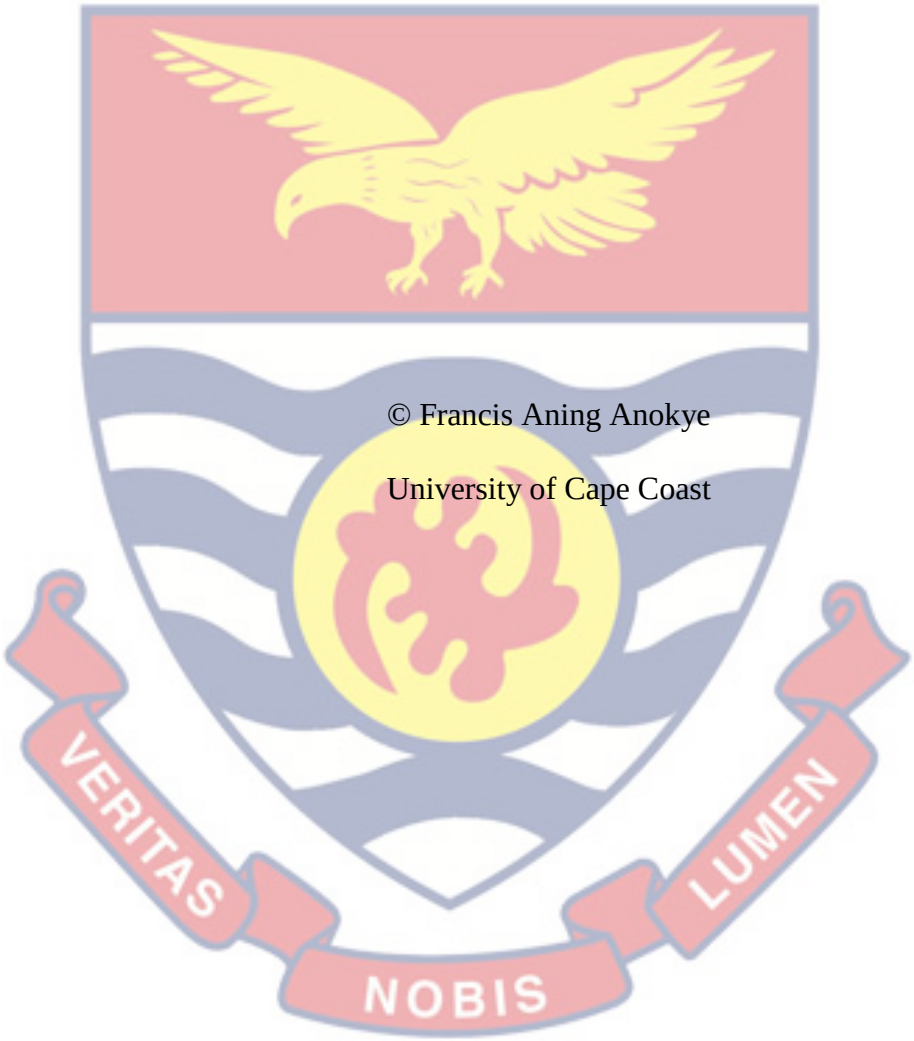

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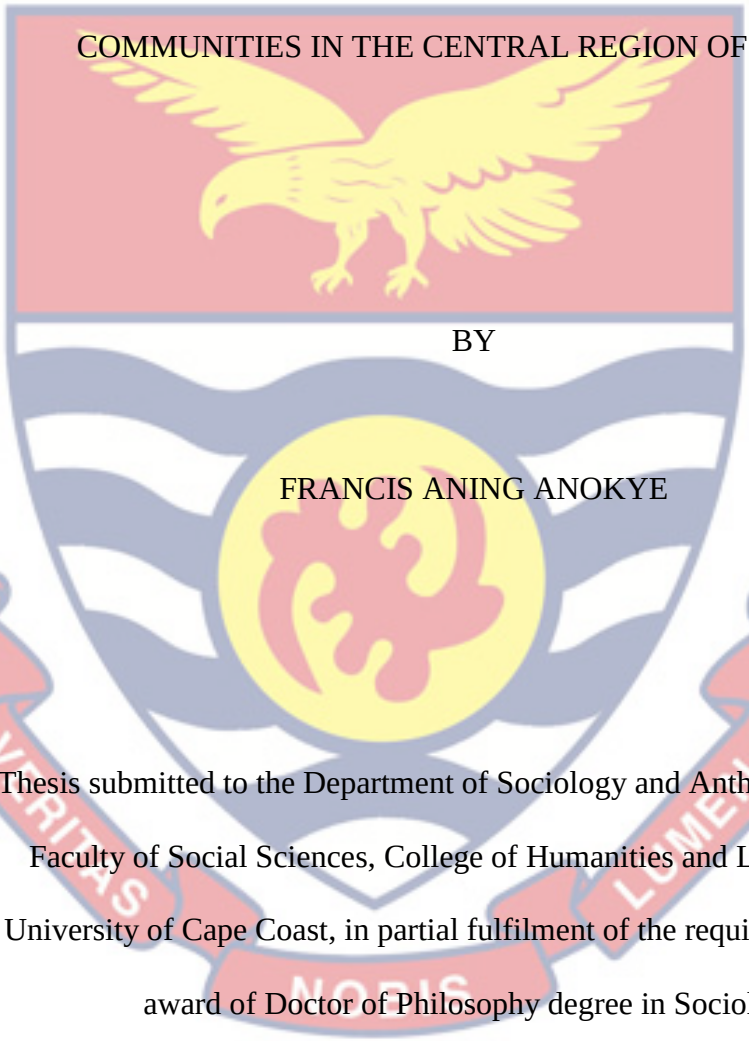

BY

FRANCIS ANING ANOKYE

Thesis submitted to the Department of Sociology and Anthropology of the Faculty of Social Sciences, College of Humanities and Legal Studies, University of Cape Coast, in partial fulfilment of the requirements for the award of Doctor of Philosophy degree in Sociology

NOVEMBER 2022

DECLARATIONS

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented in the university and elsewhere.

Candidate's Signature.....Date.....

Name: Francis Aning Anokye

Supervisors' Declaration

We hereby declare that the preparation and presentation of this thesis was supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature..... Date .....

Name: Professor Henrietta Abane

Co-supervisor's Signature ..... Date .....

Name: Professor Kwabena Barima Antwi

ABSTRACT

This thesis explored how indigenous knowledge systems about coastal environment influence utilisation of coastal livelihood resources and their sustainability in Moree and Apam communities, in the Central Region of Ghana. As a qualitative study, purposive, convenience, and snowball sampling techniques were used to select a total of 36 participants to provide information for the primary data. The data for the study were collected, using interview, focus goup discussion, and observation guides. The data were processed by transcribing, coding, and development of themes for the analysis. The study revealed that, the people had over the years used their indigenous knowledge to identify resources in the environment, through family socialisation, interaction with traditional authorities, and the long engagement with the coastal resources. Though there existed indigenous and modern measures that were capable of ensuring sustainable utilisation of the coastal livelihood resources in the communities, the people had flouted them with impunity, and that had led to the unsustainable utilisation of the resources. It is recommended that, the Fisheries Commission, in conjunction with the chief fisherrmen in the coastal fishing communities, should halt the registration of new canoes for at least one year. Also, a multifaceted collaboration between state officials in the fishing industry and the local authorities, should use both traditional and modern methods of conservation to deal with the problem of over-exploitation of the coastal livelihood resources.

KEY WORDS

Apam

Moree

Coastal resources

Indigenous knowledge

Livelihood

Sustainability

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DEDICATION

To my uncle, Mr. Pambour Aning (Ofa Yaw)

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CHAPTER ONE

INTRODUCTION

Background to the Study

Human beings like other living organisms depend on their physical environment for survival. This stems from the various degrees of services the environment provides for them (Braat & De Groot, 2012; Frumkin, 2001). The environment provides goods and services that are vital to the sustenance of humans and the socio-economic development of every society, of which coastal resources are not excluded. It is reported that more than half of the world's population lives within 60 kilometers of the coast, and this number was expected to climb to three-quarters by 2020, and many of the world's poor are crammed in coastal areas, and they rely on the coastal environment for fresh water and food (UNPF, 2005).

Mangor, Drønen, Kaergaard, and Kristensen (2017) have defined coastal areas as the land and sea areas bordering the shoreline, and all the resources within these areas and their adjacent shore lands, are coastal resources. They become livelihood resources, when people depend on them for their livelihoods. Therefore, livivelihood resources, in this study, are the resources within coastal areas and their adjacent shore lands, that support the coastal people's everday survival (Braimah, 2009). These could either be found in the sea (marine) or in-shore resources. These may include natural resources such as petroleum and natural gas, coastal sand and gravels, fishes, mangroves, coral reefs, for development and local subsistence (Viles & Spencer, 2014). These coastal environments also perform eco-system services

such as socio-cultural, tourism, and religious activities (Dłużewska, 2016; Schlacher, Schoeman, Dugan, Lastra, Jones, Scapini, & McLachlan, 2008).

Although the coastal resources provide diverse goods and and services, this study fcused on fisheries, sand salt mining, and by extension, tourism. This is because, these were the resources the study communities relied on for their livelihoods. Also, Anim, Nkrumah and David (2013) asserted that, the economy of the coastal areas in Ghana is mainly found to be in three sub-sectors, namely fishing, salt and sand mining and subsistence farming, which is also the case of the current study area.

In the area of fisheries, both indigenous and non-indigenous people rely on coastal resources, particularly fisheries, for their protein requirement (Bell, Kronen, Vunisea, Nash, Keeble, Demmke, & Andréfout, 2009). Millions of people rely on these resources for food and livelihood, and if they are used sustainably, they can help meet nutritional and social demands, especially in developing nations (Herrero, Thornton, Gerber, & Reid, 2009).

Fish is the most popular and cheapest form of animal protein in Ghana because of its contribution to food security. Béné, Barange, Subasinghe, Pinstrup-Andersen, Merino, Hemre, & Williams (2015) estimated that, 75 percent of the total annual catch of fish consumed locally is a stable source of food security. This is because fish accounts for 60 percent of Ghanaians' animal protein needs, with national per capita intake estimated at 24.5kg in 2011 (MoFAD, 2013). It is for these reasons that, Amponsah (2015) claimed that, in order to maintain food security from Ghana's fisheries arm of natural resources, coastal fishing operations must be safeguarded.

The fishery resource has been critical to the nation's development. The fisheries sub-sector, for example, generates approximately US$1 billion in revenue each year, and also accounts for at least 4.5 percent of Ghana's GDP (Ministry of Food and Agriculture [MoFA], 2017). It supports an estimated 10 percent of the population, or around 2.5 million individuals who are directly or indirectly employed, as well as their families (Ministry of Fisheries and Aquaculture Development [MoFAD], 2015).

According to the FAO (2014), ten percent of Ghanaians are employed in the fishery sub-sector, either directly or indirectly. It further states that, a growing proportion of Ghanaians rely on the coastal economy for their livelihoods, which includes fishing, fish processing and selling, salt and sand mining, as well as other associated businesses.

Another significant feature in most coastal environments is the availability of beaches, where salt and sand are often mined for various uses (Anim, Nkrumah & David, 2013). For example, the construction sector in coastal areas depend heavily on sand and gravels in the building of houses, bridges, roads and other construction activities.

In Ghana, though sand mining is illegal, it is the main source of sand supply for the construction sector (Anim, Nkrumah & David, 2013). Even though the coastal environment provides for the livelihoods of the people, there is the need to ensure that it is sustained. This stems from the argument that, economic growth related to oceans across the world in recent decades has been achieved mainly through unsustainable exploitation of many coastal resources.

Also, it has been estimated that, 40 percent of the global oceans are heavily affected by human activities, and in essence majority of human settlements are located on or near the coasts whose livelihoods are directly impacted (UNDP, 2011). This emanates from the fact that millions of people depend on the quality of coastal environment and the availability of the resources for their well being. This extensive utilisation has resulted in steady degradation of the resources, impacting on their livelihoods. The UNDP (2011) noted, for instance, that 60 percent of the world's major ecosystems that underpin livelihoods have been degraded or are being used unsustainably.

The long-term viability of coastal resources, on the other hand, is linked to indigenous knowledge systems, which aare collection of people's knowledge from certain geographic places that have lasted a long period, which is specific to a particular culture or society (Mapara, 2009). It consists of norms, taboos, a system of natural resource classification, set of empirical observations about the local environment, and a self-management system that oversees resource use (Mapara, 2009).

Similarly, Bahta (2017) argued that, indigenous knowledge (IK) provides each community's own identity. He claims that, Indigenous Knowledge is adaptable, allowing the society to continue to exist, because it is created to meet the requirements of the community and offer the local people, the power to participate in decisions that affect their livelihoods. People who are aware of IK are better able to accept and practise cultural beliefs, as well as serve as environmental custodians and lawmakers (Mapara, 2009). Bahta (2017) went on to say that, promoting indigenous knowledge is critical to long-term development since knowledge derived from local people's life

experiences complies with the law of the land, and this sustains their everyday lives. This is backed by Wutete (2014), who claimsedthat indigenous peoples' fear of the unknown is sufficient to prevent them from tampering with sacred woods, water resources, and other animal species.

Furthermore, Appiah-Opoku (2007) emphasised that, a local population's indigenous knowledge and practices are deeply rooted in religious beliefs and culture. In fact, meddling with sacred trees and water resources was frowned upon, and offenders were punished with illness, death, and even disappearance. These safeguarded forests, water resources, and wildlife from devastation and extinction. How resources are managed can be influenced by spiritual ideas about the environment. Local communities conserve the environment as they would not want to go against their beliefs (Wutete, 2014).

Tatira (2000), has also said that, taboos have been utilised to safeguard human values and respect for other species, particularly vulnerable, small, and helpless organisms that proliferate in our water bodies. For example, the Shona people of Zimbabwe believe that, killing a python will cause the rain to stop (Chemhuru & Masaka, 2010). Similarly, by abiding by water-related taboos, coastal resources have been kept clean and preserved (Chemhuru & Masaka, 2010).

Violators of any of the taboos in Ghana's coastal districts risk some type of retribution, even death at sea. Violators are, occasionally barred from going to sea for a period determined by chief fishermen and their elders. Usually, cases of violations are sent to the chief's palace for redress when violators fail or refuse to comply with these sanctions (Adjei & Sika-Bright, 2019). Apart from personal disasters, breaching taboos might have far-

reaching implications, such as drought and hunger, which could affect the entire population.

According to Anoliefo, Isikhuemhen and Ochije (2003), the Igbo community in Nigeria protected cultural values by employing indigenous taboos (rules) and punishments. These procedures were employed to conserve "sacred grooves" with the ultimate goal of better natural resource management and conservation.

In Ghana, ancestor veneration is very important for resource conservation (Appiah-Opoku, 2007). Many Ghanaians think that, ancestors can punish someone who breaks indigenously sanctioned customs or causes environmental destruction. Burial and ritual sites are revered as sacred grooves because they are thought to be the resting places of ancestors. Until certain rites are conducted, resource exploitation through activities such as farming, hunting and tree cutting is prohibited in these locations. The sacred grooves are a home to the ecologically and commercially significant species (Appiah-Opoku, 2007). Therefore, this study was based on the assumption that as local people strive to adapt to the environment in which they live and earn a living, they improve their knowledge, skills, and strategies for interacting with the natural (coastal) resources in a sustainable manner.

Statement of the Problem

In recent times, one of the world's most complex and tragic challenges affecting coastal communities is environmental degradation; as most of them face challenges in managing their resources (Munshi, 2000). It has been envisaged that the severity of this phenomenon in the 21st century, will be characterised by endangered natural environment, if it is allowed to continue.

For instance, United Nations (1994) stipulated that over dependence on the environment can lead to degradation, including depletion of renewable and non-renewable resources, and the pollution of air, water and soils. In the early 1990s the argument was that, environmental resources were overused, depleted or harmed, and there was the need for appropriate policies to maintain and conserve them (Boateng, 2006).

Another area of concern is the erosion of the beaches in the coastal areas, partly due to sand mining. Pitchaiah (2017) described sand mining, as one of the main causes of coastal erosion, threats to biodiversity, damage to properties leading to social discontent. In Ghana, for example, Jonah and Adu-Boahen (2016), did a study in Ghana and found that yearly coastline erosion rates of 1.13m in Accra and 1.10m in Moree (one of the study communities), are significantly greater than the natural rate, owing to coastal sand mining (Tilman & Lehman, 2001).

Also, researches such as Bortei-Doku Aryeetey (2000); Overå, 2001 and Ansah-Koi (2009), have reported that coastal resources at Moree have been over-exloited, especially, fishing and sand mining. At Apam, Akutse and Samey (2015) have reported that fishermen use both the prescribed and unprescribed fishing nets and light system of fishing to harvest more herrings and other small pelagics. They also, claimed that, the majority of the areas at Apam were littered with wastes, as most the people prefered open excretion to public toilets. The attempts by the Environmental Health Unit of Gomoa East District Assemlby, to fight pollution at Apam has not yielded the desire results, since the people did not see anything wrong with their actions. These

activities have led the over-exploitation of the resources and pollution in the study communities.

Government of Ghana, over the years, has implemented various policies, progammes, and projects, with the aim of protecting coastal resources, yet the rate of resource deteroration is still alarming. These include the Fisheries Act (625) of 2002, Environmental Protection Agency (Act 490) District Assembly Bye-Laws), of late, the Closed-fishing season. The problem is that, the framers of these policies did not adequately, recgnise the role of traditional authories. The Fisheries Commission, for example, was tasked to partner various stakeholders to regulate fisheries, and excluded traditional authories.

Also, in 1997, the World Bank funded fisheries sub-sector capacity building project and created 133 Community-Based Fishery Management Committees (CBFMCs) along Ghana's coast, with the aim of integrating modern and traditional ways of managing the fishery sub-sector of the economy. Braimah (2009) reported that this could not solve the problem of illegal and inappropriate fishing due to factors including, no legal recognition of the role and authority of chief fishermen and committees in enforcing fisheries rules.

In the area of research, a greater number of the studies reviewed concentrated on the use of indigenous knowledge to protect forest and agricultural production, probably because their degradations are quite visible (Omari, Bellingrath-Kimura, Addo, Oikawa & Fujii, 2018; Kamwendo & Kamwendo, 2014; Haidi & Hassan, 2014; Dawoe, Quashie-Sam, Isaac & Oppong, 2012).

Those who attempted to link indigenous knowledge to coastal resources focused on fishing, overlooking other resources such as coastal sand and salt mining (Mathooko, 2004). Odekunle (2016), who investigated practices that contribute to unsustainable development such as logging in mangrove forests, mining, dredging, filling, channelising wetlands, bottom trawling and dynamite fishing on coral reefs, showed little interest in how indigenous knowledge can be used to protect the resources mentioned.

Moreover, most of these researchers looked at the problem from geographical and marine science point of view without much concern about the social dimension of the development and sustainability of natural and coastal resources. One would like to find out, as to why not much has been done on the social dimensions of environmental management, especially the use of indigenous knowledge. Hence, there is a growing need for a sociological perspective, regarding indigenous people's knowledge and perceptions to promote collective actions that can ensure sustainable use of natural and coastal resources as enshrined in the SDG 14 (Kitolelei & Sato, 2016).

Objectives of the study

The general objective of the study was to generally, investigate how the local peoples' knowledge about the coastal resources influences their utilisation and sustainability in Apam and Moree. The specific objectives of the study were to:

1. Explore the participants' indigenous knowledge on coastal livelihood resources in the study communities;

2. Examine how indigenous knowledge systems are integrated into the livelihood strategies; and
3. Assess the effect of indigenous knowledge on the long-term sustainability of coastal resources in the study area.

Research questions

1. What are the indigenous knowledge of the participants on the the coastal livelihood resources in the study communities?
2. How does the indigenous knowledge of the people influence their utilisation of the coastal resources?
3. What indigenous strategies are adopted to maintain the sustainability of the coastal livelihood resources in the study communities?

Significance of the study

- The study outcome has provided a database which will form the basis for contributing to knowledge, both in research and theory building. Insight into indigenous knowledge systems would make it possible to develop sustainable coastal resource management strategies that incorporate both modern and local knowledge.
- On policy formulation, the findings from the study could be used to propose strategies of sustainable coastal resource management that enhances the sustenance of the resource base.
- Finally, the findings serve as a springboard for other researchers and students who would be interested in the study of the relationship

between indigenous knowledge and sustainability of costal livelihood resources.

Conceptual definitions

Conceptual definitions are concerned with identifying key notions of a particular study, turning these concepts into variables and defining them (Blaikie, 2009). This section therefore defines some key concepts as used in the present study.

Degradation: It is defined as the gradual deterioration of a natural resource's intrinsic quality or the loss of biological and/or economic productivity of land as a result of natural and manmade processes (Gyasi et al., 2006, Millennium Ecosystem Assessment, 2005).

Sand winning: This term refers to the gathering and transporting of solid earth materials such as sand and gravel.

Resource utilisation: It refers to the process of making the most use of the resources available in order to achieve the objective of one's wants.

Coastal livelihoodresources: They are natural resources occurring within coastal areas and their adjacent shore lands that support the every day suvival of the a people.

Sustainability: It refers to meeting current requirements without jeopardising future generations' ability to meet their own.

Indigenous knowledge: It refers to native and deeply ingrained concepts, beliefs, customs, values and traditions in the minds of local people. As a result, it is a body of knowledge accumulated over time by local people through their experiences and intimate awareness of the environment in a given culture (Akullo & Kanzikwera, 2007).

Livelihood: According to Ellis (2009), livelihood is a way of life that must be capable of maintaining the lives of the people in the community.

Sustainable Livelihood: According to Chambers and Conway (1992), a livelihood is sustainable if it can cope with and recover from shocks and pressures, as well as retain or expand its capabilities and assets in the present and future, without jeopardizing the natural resource base.

Delimitations and Scope of the Study

For the purpose of this study, understanding indigenous knowledge about coastal resources, and how such knowledge affects the utilisation and sustainability were the focus. In order to appreciate and better understand the issues relating to coastal environment, it would have been appropriate to conduct this study in all coastal areas in Ghana. However, the fact that coastal environments in Ghana have similar characteristics, the scope of the study was narrowed to some coastal towns in the Central Region. Hence, this study is delimited to two coastal towns of Apam and Moree in the Central Region. The study excluded migrants in the study areas, but focused on indigenes, who had been residents long enough to have better understanding of the beliefs, norms, taboos, myths and values, in relation to the utilisation of the resources in the areas. Indigenous leaders, chief fishermen/fishmongers, canoe owners and crew members, salt miners, sand winners, and environmental protection officers were the participants.

Organisation of the Study

The study is divided into nine chapters. chapter, concerntrates on the introduction, and it discusses the background to the study, problem statement,

research objectives and research questions. The significance of the study, conceptual definitions, study delimitation, and study organisation are also covered in this chapter. Chapter two covers review of related literature for the study. It discusses the the sociological theories that underpinne the study, including Symbolic Interaction theory, Theory of collective Action, and Sustainable Livelihood Approach. Chapter three discusses the resource use and environmental sustainability is covered in chapter four. Chapter five looks at the metodology adopted for the study. The findings and discussions of the data are presented in Chapters six, seven, and eight. Finally, chapter nine captures the summary of the work, key findings, conclusions, recommendation, and contributions to and suggestions for further studies.

Summary

This was an introductory chapter of the thesis that described the background to the study and the problem unsustainable utilisation of coastal resources at Apam and Moree communities in the central Region of Ghana, the reseacher identified and investigated. The general and specific objectives of the study, as well as, their accompanied research question were also captured in the chapter. These were followed by the significance of the study, conceptual definitions, delimitations and scope of the study, and ended with the organisation of the study.

CHAPTER TWO

REVIEW OF RELATED LITURATURE

(THEORETICAL PERSPECTIVES OF INDIGENOUS KNOWLEDGE SYSTEMS)

Introduction

This chapter focusses on the theoretical and conceptual issues about indigenous knowledge systems. Specifically, Symbolic Interactionsim and the Theory of Collective Action are discussed in this chapter. Finally, cosmovision, indigenous knowledge system, and its significance are also treated in the chapter.

Symbolic Interactionism

The Symbolic Interactionst perspective views social action from the individual point of view, hence it is also called the Micro Sociological Theory. The theory focuses on how human-environmental interactions are influenced by meanings, labels and definitions learnt through contact. This theory focuses on the interaction of small-scale social transformation (Haralambos & Holborn, 2004). From Mead's (1934) as cited in Haralambos & Holborn, 2004), point of view, human thoughts, experiences and conducts are essentially social. Mead argued that human beings interact, using symbols, gestures and most importantly language. He stressed that symbols allow humans to engage meaningfully with their natural and social environments (Haralambos & Holborn, 2004).

Herbert Blumer, a student of Mead is the next interactionist whose work is relevant to this study. Symbolic interactionism, according to Blumer (1986), is based on three major concepts (Haralambos & Holborn, 2004). To

begin with, humans react to things depending on the meanings associated with them. Such things may include those in the social and physical realms. Individuals in coastal communities assign varied meanings to resources, which influence how they are used.

With regard to the second premise, the meanings of such things are derived from, or arise out of, the social interaction. In the same way, interactions within coastal communities serve as a form of socialisation. Children, through these interactions with their parents and other significant others, learn more about the coastal environment. In effect, people's interaction with the environment is derived from and regulated through socialisation.

The third premise involves how meanings are handled and modified through an interpretative process. This is useful because in macro sociological settings, the meanings of things are often overlooked in the factors that account for their behaviours. According to Symbolic Interactionist Perspective, human beings are able to attach meanings to things.

According to this theory, actors can analyse and transform meanings based on the situation that informed their actions (Haralambos & Holborn, 2004). However, it must be noted that interpretations should be regarded as a formative process in which meanings are used and revised as instruments for the guidance and formation of action. For this reason, meanings attached to things are based on others' reactions toward the action (Blumer, 1986). The meaning paves the way for the actor to see and act towards an object.

The theory also claims that, action can also be traced to one's motives, status demand, roles requirements and situational demands. Humans also take

into account factors such as wishes and wants, objectives, the available means for their achievement and the likely result of a given action. Blumer (1986), also recognised that, the existence of social institutions places strict rules on actors, although there is a considerable room for human initiative and creativity (Haralambos & Holborn, 2004).

One of the shortcomings of this perspective is its failure to consider the role social forces or structures play in environmental changes. However, symbolic interactionism is interested in the roles of individual in ensuring resource utilisation and environmental sustainability without considering how these resources such as water bodies, air, land, and the vegetation cover serve a as means to the development of local livelihoods.

Theory of Collective Action

The Theory of Collective Action argues that, rational, self-interested individuals will not act to achieve their common or group interests because the benefits and burdens are shared by the entire group. An individual can choose not to act and still reap the benefits of others acting, or the burden incurred by their failure to act is shared by the entire group (Olson, 1965, cited in Pugel and Linden, 2019). Some similar aspects in the conceptualisation of collective action are noted by Meinzen-Dick, Di Gregorio and McCarthy (2004) that, the involvement of a group of individuals, shared interests, and common and voluntary acts promote those shared interests. Ostrom (1990) claimed that over the years, research has focused on how people collaborate to manage public goods.

Common Property Resource is often associated with public goods (Agrawal, 2001). One of such public goods, accessible to everyone is coastal

resources. Although accessible to everyone, there is the need to have exclusive rights over their usage which have to be regulated. The absence of regulations is believed to create incentives to free ride at the groups' expense, especially when the community is polluted and overpopulated (Bromley, 1992). For instance, a sand mining at the beaches can be beneficial to the operators while passing the cost of erosion and encroachment of the sea to the society as a whole. In another instance, outsiders can enter coastal communities and mine the sand at the shore of the sea without seeking for permission from appropriate authorities (Uetake, 2012) .

Hardin (1968) and Olson (1965) developed the tragedy of the commons and the logic of collective action, respectively, based on this grounded theory. They believed that users of common property should not be left on their own to decide, in terms of how they utilise them, and that their use should be regulated to prevent overexploitation (Ostrom, 2007).

Both Hardin's (1968) and Olson's (1965) models provide essential insights into why social institutions fail, but they do not explain how or why they form or are sustained. Instead, they claimed that no internal incentives exist inside any organisation to establish or maintain institutional agreements. Governments in Africa and other parts of the world had, until recently, assumed direct control and management of natural resources, such as water bodies, forests and wildlife, with the goal of avoiding Hardin's tragedy of the commons.

Hardin (1968) stated in his book "The Tragedy of the Commons" that, the private benefits of grazing an extra head of cattle on a shared range outweigh the private cost because, the expenses of maintaining range quality

(the public good) could be shifted to the entire group. In this scenario, Hardin (1968) observed that, regardless of what others might do, each person's urge is to free ride, which is the tragedy of overusing a specific resource, in this case, fishing or sand mining. Similarly, Olson (1965) believed that rational, self-interested people would not act in the common or collective interest. Hardin and Olson's arguments led to the conclusion that, people tend to act in their personal best interests at the expense of the group.

Individuals in coastal locations have a proclivity to engage in sand winning and unethical fishing techniques for personal benefit, without considering the societal ramifications of their activities. Mensah and Antwi (2002) also mentioned that, in open access, there are no accountabilities or limitations to property rights, and any individual or group can make use of such resources without regard for the interests of others seeking the same.

Although formal organisations are often linked with collective action, Ostrom (2007) contended that, informal collective action, in which local networks or small groups of people, organise and coordinate local activity to achieve specific short-term goals, deserves more attention. For example, village residents, including many women, employed tree hugging tactics for the first time, to prevent commercial destruction by timber contractors from outside Uttarakhand, India (Ishizaka, 2013).

When the lumber contractor's crew arrived in the Mandal Forest, the locals had taken the lead and risked their lives to protect the forest in a non-violent manner, preventing devastation. Because a huge number of local citizens protested by embracing each tree planned for removal, the contractors were not allowed to chop the trees. This "hugging" strategy was used often in

various parts of Uttarakhand after that. When wood contractors arrived in Reni village in March 1974, a huge group of women, led by Gaura Devi, a village women's organisation leader, kept an all-night vigil at the logging area for four days to prevent deforestation, despite the cold and the contractor's threats (Ishizaka, 2013).

Ostrom, (2007) believed that, local groupings of people are directed by certain predetermined ideals in order to conserve natural resources. The author, therefore, identified five key principles that must be followed to achieve sustainability of 'Common Good' resources. The first is to establish clear boundaries for the use of the commons, in this case, coastal resources. Ostrom (2007) further claimed that, without specifying the boundaries of a common property resource and restricting it to 'outsiders,' will lead to over-exploitation, to the disadvantage of the local users. As a result, she asserts that, local users who invest in a public good may not get the desired return. Others' (outsiders') acts could, at maximum, harm the resource itself. Thus, certain users must be denied access and use rights in order for any user to have a minimal interest in coordinating patterns of appropriation and provision. For this reason, the governments of Ghana, over the years, have developed policies to safeguard the deterioration of the coastal resources, including Fisheries Act 625 of 2002. The Act is interested in regulation, management and sustainability of marine resources of Ghana, including aquaculture development (Alabi-Doku, Ampofo-Yeboah & Berchie Asiedu, 2020).

The second premise concerns with the consistency of appropriation, rule provision and local conditions. As a result, consistent regulations set for an entire nation are unlikely to take into account the unique characteristics of a

resource when establishing laws (Ostrom, 2007). Ostrom's thesis was based on Swaney's (1990) assumption that, no single set of principles should apply to all irrigation systems in a region, and that each problem should be addressed separately. According to Ostrom (1999), rules for effective commons governance must be tailored to local realities. This means that, policies controlling the long-term viability of coastal resources must take into account the needs of local or indigenous people.

The collective-choice structure is the third principle, which postulates that users of common properties participate in the rules that govern the resource. Individuals who directly interact with one another and their environment at large, are able to tailor better regulations to suit local scenarios from common property resource institutions that employ this idea. Furthermore, the rules can be tweaked over time to reflect the unique characteristics of their environment (Agrawal, 2001).

The monitoring and sanctioning principles are discussed in the fourth and fifth principles. According to Ostrom (2007), the monitoring of the common (coastal) resource should be done by the users themselves or, better still, by someone who would be held accountable to them on a continuous basis. Common property users should intentionally and actively participate in operating norms that hold local users accountable to guarantee that this is done properly. Gradually graduated sanctions must be included in the operational regulations to determine who has the authority to withdraw from the Common Pool Resources (CPR). Such policies must also effectively regulate the appropriation activities, in light of local realities in order to improve resource sustainability in the long run.

In this sense, it can be inferred from Ostrom's (2007) view that, if indigenous institutions, which have knowledge and values that drive people's social behaviour, are allowed or resourced to manage coastal resources in their varied communities, then sustainability and efficiency can be secured. It is stated that Ostrom's arguments can be applied because the villages of Apam and Moree communities in the Central Region are homogeneous based on their traditional government structure. Ostrom's (1990) illustrations, based on field work and theory, illustrate that conventional institutions are capable of developing their own sustainability systems and tenure regimes when given the opportunity and means to do so.

Traditional leaders and their indigenous knowledge systems, according to Ostrom (2007), remain the symbol of an intimate partnership with their lands. Because of their physical proximity to their "community," they can apply a set of laws, conventions and practices that are rarely out of touch with ecological realities, resource management and conservation requirements in their territory (Baland, & Platteau 1996). As a result, there may be a variety of internal motivations for indigenous institutions' members to contribute freely to the collective sustainability of coastal resources.

The Theory of Collective Action has been critiqued that, despite the richness and legitimacy of local knowledge, resource users might not have complete information about ecological processes, such as the consequences of human action on resource stock and flow (Baland & Platteau, 1996). As a result, they might not adequately perceive the nature of the problem, and may, therefore, not respond accordingly. Sharing rules and solving problems do not necessarily reduce pressure on resources and conserve them. Similarly,

controlling access by outsiders does not mean that insiders are using resources appropriately (Baland & Platteau, 1996).

Despite these critiques, the Theory of Collective Action became an established field that has significantly contributed to broader concerns in social sciences (Agrawal, 2003). In other words, it has certainly informed policy making on the importance of formal and informal institutions in guiding human behaviour and its implications for natural resource sustainability.

The Cosmovision of Indigenous Knowledge System

The concept of indigenous knowledge would be incomplete without considering the people's worldviews or belief systems (cosmovision). This is based on the premise that, the human, natural, and spiritual worlds interact, and these interactive worlds provide physiological and spiritual insights into what to do (right thinking and action) and what not to do (wrong thought and action), as well as explanations of phenomena. As a result, this section emphasises cosmovision (particularly that of the Akan) and how it has affected people's understanding and relationships with their livelihood resources.

Cosmovision is a notion that embodies and defines the moral foundation for human intervention in nature. It governs how humans should act, interact with, and use nature's land, water, plants and animals, as well as how humans should make decisions, experiment, solve issues, and organise themselves (Botchway & Sarpong, 2015; Awua-Nyamekye, 2009; Haverkort & Hiemstra, 1999 cited in Millar, 2006). The idea is that Africans think that everything in the ecosystem and environment has a significant spiritual

importance for humans, and that this shifts personal duty to environmental accountability for the benefit of the current and future generations (Awuah-Nyamekye, 2009).

According to Suprina (2021), people consider the universe to be made up of three worlds: the human world, the natural world and the spiritual world in many indigenous and traditional cosmovisions. While the human world comprises people's social lives in all its forms community life, including, family, relationships, ethnic groupings, traditional leadership and institutions. The natural world encompasses nature in all its forms; animals, plants, crops, trees, landscapes, rivers and seas. A multitude of spirits, deities, and deities, as well as ancestral spirits, make up the spiritual realm. These three realms are intertwined, resulting in the formation of a cosmovision in which human beings play a major role.

The Akan Cosmovision

The study areas in Ghana are part of the Akan ethnic group. Brong, Bono East, Ahafo, Ashanti, Eastern, Central, Western, and Western North, as well as a small portion of the Oti area, are among the eight of the regions in Ghana. The Akan are Ghana's most populous ethnic group. They are mostly found in Ghana's central and southern regions. The Akan are a culturally-homogeneous people who inherit from their mother's line. The only exceptions are the patrilineal Akwapim of Larteh and Mampong, who inherit through their paternal line (Pobee 1979, cited in Awuah-Nyamekye, 2009). The Akan are also found in the south-eastern section of La Cote d'Iviore, in addition to Ghana (Beeko, 2005).

The Akan worldview refers to the Akan people's traditional conceptions of themselves and the cosmos, as well as how they should interact with it in order to live a functional life. Life has two dimensions in the Akan traditional viewpoint, namely the spiritual and physical, with the physical encompassing the surroundings as well as the secular activities that take place inside it (Essel, 2020; Awuah-Nyamekye, 2009). Personal spirits, both human (ancestral) and non-human, are part of the spiritual dimension of life, which is unseen or immaterial. The Akan, on the other hand, believe that the spiritual and physical are inextricably linked, and as a result, they do not separate their secular and spiritual lives (Awuah-Nyamekye, 2009). The Akan, also, recognise many degrees of supernatural creatures and respect them accordingly, with the Supreme Being the highest in terms of hierarchy (Abeku-Essel, 2018; Frimpong, 2011; Awuah-Nyamekye, 2018; Awuah-Nyamekye, 2009).

The Supreme Being

The universal belief in an all-powerful Deity who is understood to be the creator of the earth and the resources on which their livelihoods depend is common to Akan traditional worldviews as well as all African worldviews (Frimpong, 2011). The traditional worldview of the Akan conveys faith in a Supreme Being known as *Onyame* or *Onyankopong*. *Onyame* is an intelligent, eternal, and all-powerful being (Agyarko, 2013). *Onyankopon*, on the other hand, is regarded as the Supreme Being, whose goodness spreads to all individuals. *Onyame* is credited with the formation of the universe, and is regarded as the universe's ruling principle. The Akan believe in mother earth, lesser divinities, ancestral and other spirits, and material objects, in addition to

Onyankopon. All of these spirits, as well as other material objects, are said to have been created and sustained by *Onyankopon.*

The earth spirit is connected to the Supreme Being. Indigenous people regard the land (Earth) as a source of life, a gift from the creator that nourishes, nurtures, and teaches them. Despite the fact that indigenous peoples' rituals, culture and their effect on the land differ significantly, they always see the earth as a parent and revere it accordingly (World Bank, 1999). In the Akan view, the earth takes on a feminine aspect and is regarded as more tolerant than the Supreme Being. The earth as a spirit, is regarded by the Akan as the second most important deity after the Supreme Being, and it is the second deity to be presented with a drink during worship (libation). In Asante and some other Akan culture, Thursdays are set asside as her rest days, and she is, therefore, refered to as known as *Asaase Yaa* and among the Fante (an Akan ethnic community along the seashore), refer to her as *Asaase Efua*, with Friday as her rest day (Frimpong, 2011).

Divinities or Deities (Spirits)

The Akan also believe in the existence of spirits, deities or divinities. The common idea in Akan civilisation about divinities is that they are created by Deity to serve specific duties, and that they do not exist on their own volition. As a result, their abilities are restricted to performing specific jobs, and none of them has the infinite powers bestowed on it by the Supreme Being. They are thought to present themselves in a variety of corporeal forms, including water, rocks, and caves, as well as house deities and other natural objects. *Obosom* (single), *Abosom* (plural) is the name given to these divinities in Akan (plural). The divinities are elevated above humans due to their nature

and purpose. They are thought to have broader powers, yet they each have their own areas of expertise and jurisdiction. As a result, spirits of war, fertility, plagues, agriculture, fishing, and a variety of other human endeavours exist. They are, nonetheless, specific in the functions that the Supreme Being has assigned to them. In general, these divinities are said to bring remedies to a variety of societal, personal, and mishap concerns, as well as uncover witches, and bear witness to the truth of an event. They are also said to possess destructive abilities (Agyarko, 2013 & Frimpong, 2011).

A deity's popularity is largely determined by his or her ability to provide material and spiritual wealth to his or her followers. The divinities can be a male or female, benign or bad, and such spirits are given homes in the natural world, such as hills, rivers, trees, rocks, and even animals. They are, nonetheless, identifiable from the habitats and remain 'basically spirits.' As a result, the spirits are not represented by trees, rivers or stones. The spirits have unrestricted mobility and can enter and exit their dwellings at will (Agyarko, 2013).

In addition, certain Akan groups believe that, some deities live in aquatic bodies. Such supernatural objects are thought to be benign, as they preside over rivers, lakes, lagoons and oceans that are vital to the people's survival. They are treated with tremendous veneration, regardless of where they live. Their hallowed nature, water sources, including, rivers, seas, lagoons and lakes, among others, are accompanied by rigorous religious taboos that govern their use. Some water or marine spirits have shrines and priests dedicated to them who undertake elaborate rituals in their honour (Awuah-Nyamekye, 2018; Frimpong, 2011). Before embarking on fishing, those in

coastal areas must first obtain permission from the sea and river spirits or deities (Agyarko, 2013). It is, for example, forbidden to excrete near a water body, particularly a river basin, or for a menstruating woman to cross or collect water from a river (presumably to avoid pollution from menstrual blood), or to farm near a river's source (Frimpong, 2011).

The Akan's spiritual relationship to phenomena such as land, forest, water bodies, and specific flora and animals influences their attitude toward those objects. As a result, they frequently sacrifice and perform rituals before using them. So, in order to gain their forgiveness, libation performed before the ground is tilled or particular trees are felled and fashioned into canoes in reference to the coastal fishermen. To conserve these resources, they are subject to taboos and myths that limit their use. To secure the conservation of such resources, the Akan, for example, use the notions of sacred groves and sasa (Awuah-Nyamekye, 2009).

Sacred groves are usually sections of woodland or mangrove that have been declared as such by local traditional authorities (Awuah-Nyamekye, 2009). Local taboos, conventions and belief systems in rural communities protect the groves, and failure to follow the taboos and standards may bring bad luck, sickness, death, or social repercussions (Dercher 1996). These groves are thought to be the home of the deities, ancestors, and other spiritual entities, and they may also function as the community's royal mausoleum. Usually, the reigning deity of the grove looks after all sorts of vegetation and water bodies (many times, these water bodies are the reigning deities of the grove) in the grove, and people are not allowed to access such locations. The accredited members of the community (typically priests/priestesses, chiefs,

family leaders, etc.) are normally allowed to visit the sacred groves to perform the necessary rites on behalf of the other community members (Awuah-Nyamekye, 2009).

The Akan also believe in a spirit known as Sasa, which they think resides in certain trees and animals. Certain trees, such as odum (Chlorophora excelsa), tweneboa (Entan drophragma), onyina (Ceiba pentandra) and mahogany among others, are thought to have spirits, and anyone who wishes to use them for any purpose must perform rituals. Some animals can be described in the same way. Akan hunters, for example, will have to perform purification rituals after killing an elephant or a buffalo. These creatures are thought to be a home to a particular spirit called as sasa in Akan, which has the ability to predispose the hunter to a succession of misfortunes, madness, unusual sicknesses, or even death (Awuah-Nyamekye, 2009).

Tuesdays are a holy days for the sea in the Akan coastal fishing communities, and as such fishermen use these days to rest, leisurely mend their nets, conduct meetings to discuss issues that affect them, and attend to other familial and social obligations. It is time for the fishermen guild's chief fisherman (Apofofohen) to deal with some concerns, including disputes between and among members in the fishing and sand mining businesses (Adjei and Sika-Bright, 2019; Awua-Nyamekye, 2009). The reverence for the sea forces fishermen to refrain from using harmful chemicals for their catch, lest they pollute it. Some fishes should not be fished at particular times of the year, and catching fingerlings is deemed unethical and so sinful (Awua-Nyamekye, 2009).

Ancestors

In addition, ancestors are revered and venerated in the Akan cosmovision. An ancestor is an ideal, immortal, dignified and revered person to the Akan, who is seen to mediate between spiritual beings and the individual Akan, as well as among lineage members. The Akan community includes the ancestors. They are thought to be the guardians of the land, laws and traditions. They are thought to have the supernatural power to punish or reward in order to maintain the group's equilibrium as caretakers of law and morality (Nukunya, 2010). The ancestors can be reached by placing food on standards that represent them, because it is believed that in their spiritual stage of existence, they continue to live the same kind of life they did on earth, and they require food and drink to survive.

Indigenous Knowledge

The concept of indigenous knowledge is crucial when considering a wide range of issues relating to nature-human connections. It serves as a foundation for individuals to interact with, perceive and exist in the environment, as well as to utilise its resources. Berkes (1993) described it as a set of knowledge and ideas about the relationships of living beings (including humans) with one another and with their environment that has been passed down from one generation to another through cultural transmission.

Other authors have defined indigenous knowledge as local people's cultural traditions, values, beliefs, and worldviews, which include unique beliefs, rules, and taboos that are part of a certain group's customary law (Mu Xiuping, Kissya, & Yanes, 2010 and Brook & McLachlan, 2008). It is a collection of indigenous people's wisdom, knowledge and practices

accumulated over time via experience, changing through adaptive processes, and passed down orally from generation to generation (Ajibade 2003; Salick & Byg 2007). The environment is, frequently preserved by coastal and rural people around the world because it is inextricably linked to their culture (Anoliefo et al., 2003). This is also evident in people's farming techniques, as well as their concern for the land, woods, wild animals, trees and the ocean. As a result, it is easier for them to pass on environmental knowledge from one generation to the next. Traditional institutions provide significant ecological and biodiversity preservation without governmental jurisdictional limits, according to a growing agreement (Dudley, Liza, -Zogib, & Mansourian, 2009).

Indigenous knowledge is, therefore, a kind of knowledge that originates from the indigenous people, in a particular society within a geographical area, which encompasses the local, traditional, non-western beliefs, practices, values, rules, taboos and customs. It usually refers to the informal forms of knowledge that influence the ways of life of the people that are passed on from one generation to another, and has survived for a long period of time, and aimed at providing solutions to existing problems at the time (Boelens, Chiba & Nakashima, 2006).

Significance of Indigenous Knowledge

The larger social and cultural components of indigenous knowledge are extremely important to many indigenous cultures (Shilabukha, 20). Many local people have turned to indigenous knowledge as a sign of reclaiming control over their cultural information. In many regions of the world, reclaiming and documenting indigenous knowledge has become a primary

approach for cultural conservation, preservation and revitalisation initiatives (Shilabukha, 2015).

The larger social and cultural components of indigenous knowledge are extremely important to many indigenous cultures (Shilabukha, 2000). Many tribes have turned to indigenous knowledge as a sign of reclaiming control over their cultural information. In many regions of the world, reclaiming and documenting indigenous knowledge have become a primary approach for cultural conservation, preservation, and revitalisation initiatives (Shilabukha, 2015). For instance, Posey (1998) claimed that many aboriginal groups in Alaska and Northern Canada, have been conducting their own traditional knowledge studies in order to develop their culture, educate their youth, establish land and resource claims, and assert their rights. This regeneration is about empowerment and political control, not just a cultural exercise. The relevance of traditional knowledge as a collective heritage for humanity must be weighed against the need for indigenous tribes to control their knowledge.

Indigenous knowledge is very important traditional wisdom because it serves as a source of environmental ethical inspiration. Many indigenous communities' belief systems include the idea that, humans are a part of the natural world, and that their interactions with nature can be described as peaceful coexistence. According to Callicott (1994), some traditional ecologists view humans and nature as being in a symbiotic connection, with mutual rights and obligations towards the other.

Importantly, indigenous knowledge exists to guide, organise, and regulate the ways of life of a people, as well as, to serve as the foundation for

their livelihoods in areas such as agriculture, food preparations, educational curriculum, health care, environmental conservation, law, nation building, and political administration (Awua-Nyamekye, 2009). As a result, indigenous knowledge asserts that all humans are deeply enmeshed in and reliant on the natural and spiritual realms. The interaction of the three realms is crucial to humanity's survival, as is the harmonisation of these worlds (Botchway. & Sarpong, 2015;.Awuah-Nyamekye, 2009).

Indigenous knowledge systems are a valuable resource that can help improve the efficiency, effectiveness and the long-term sustainability of environmental conservation in rural communities, especially in developing countries. They serve as the foundation for local decision-making in areas such as food security, human and animal health, education and most importantly, natural resource management (Ayaa & Waswa, 2016).

Indigenous knowledge has recently been considered as a reflection of the need to derive ecological insights from indigenous activities, as well as the necessity to establish a new ethic of values based on indigenous wisdom, as a result of the foregoing observations (Shilabukha, 2000). Access to indigenous wisdom and knowledge passed down from generation to generation is supposed to ensure optimal resource utilisation.

Sources of Indigenous Knowledge of Coastal Resources

Indigenous knowledge is claimed to be socially constrained and used by local people to make a living in a certain context (Warren, 1991). It is transmitted from the older to the younger generations through various means. Indigenous Africans had education based on their culture, taboos, totems and respect for ancestral spirits prior to conquest, and the adoption of western

education (Risiro, Tshuma, & Basikiti, 2013). These were passed down from generation to generation, through their forebears' stories, which were often learnt in an informal socialisation process (Esia-Donkoh, 2011).

Indigenous people were the guardians and legislators of environmental management, and their traditional values were honoured and practised by them. Fear of the unknown was strong enough to prevent people from tampering with marine resources, holy forests, or other animal species. Offenders who abused these resources faced a variety of consequences, including disease, death, drought and disappearance. These guaranteed that forests, water resources, and wildlife were not destroyed or extirpated. The way these resources are managed could be influenced by spiritual views about the environment. As a result, local residents maintained the ecosystem because, they did not want to go against their convictions (Risiro et al., 2013).

Wane (2005) examined indigenous knowledge sources based on four main features. First, he believed that, humans are aware of, and believe in unseen forces in the ecology. Second, everything in the environment is inter-connected. Third, personal relationships strengthen the ties that bind people, communities and ecosystems. Fourth, it is formed inside communities, but it is geographical and culture specific, not systematic or written, but oral, holistic and emphasises the notion of loyalty.

In their study of traditional knowledge systems in Zaka the District, Masvingo Province, Zimbabwe, Risiro, Tshuma, and Basikiti (2013) discovered that, rituals and taboos were passed down from generation to generation as a means of safeguarding natural resources. Indigenous wisdom

was passed down from generation to generation in order to bring solutions to the difficulties that existed at the time.

Decline in Indigenous Knowledge

In as much as many of the literature hype indigenous knowledge and its relevance in resource utilisation, the fear is that, now such knowledge and practices are on the verge of extinction. It is reported that, the practices are being marginalised or even forgotten among a number of rural communities in different parts of the world (Ayaa & Waswa, 2016; Shilabukha, 2015). Various attributions have been made as to why such gradual relegation of local people's indigenous knowledge to the background, though very important for their very existence in a particular geographical milieu.

Factors such as Christianity and its Western education, modernisation, economic and social pressures, and population growth have been mentioned in literature in that regard (Ezeanya-Esiobu, 2019; Adjei and Sika-Bright, 2019; Ayaa & Waswa, 2016; Risiro et al., 2013; Esia-Donkoh, 2011; Awuah-Nyamekye, 2009; Mensah, 2003; Atte, 1992). For example, Esia-Donkoh (2011), citing Opoku, (2007), was of the view that, the reliance on Western science to guide formal development, foreign religious beliefs and urbanisation remain a continous challenge to the foundation upon which sacred groves are created.

According to the World Bank (1998), indigenous knowledge systems are in danger of extinction, due to rapidly changing natural environments, global economic, political and cultural changes, and the intrusion of foreign technologies or development concepts that promise short-term gains or solutions to problems, without being capable of long-term sustainability.

Briggs (2005), suggested that, a number of problems or challenges have resulted in indigenous knowledge not being as useful as hoped for or supposed to. He mentioned tension between indigenous knowledge and western science, power relations, and non-contextualisation of indigenous knowledge some of the factors inhibiting utilisation of the concept.

On the subject of religion, the literature suggests that, the arrival of Christianity, missionary activity, and Western education has diluted the significance and respect accorded indigenous education and cultural beliefs. This is due to the fact that some cultural ideas are now considered primitive and superstitious, and as a result, they have been abandoned. Indigenous peoples have come to believe that, their knowledge is inferior, fetishised, and bad as a result of this (Chebanne, 2008).

Traditional customs are being discarded as a result of colonisation, according to Eyong, Mufuaya, and Foyi (2004). Since then, the indigenous knowledge system has been subjected to deception tactics employed by Western colonial education and religion for decades (Awuah-Nyamekye, 2009). The claim is that Christianity has led to a loss in totems, taboos, holy groove protection, and ritual performance, as well as a deterioration in the usage of indigenous environmental knowledge systems throughout time. Many of the environmental concerns that diverse societies face has ramifications (Ayaa and Waswa, 2016).

In Ghana, the advent of foreign religions in general, and Christianity in particular, and their accompanying worldviews, have been blamed of being for the relegation to the background of traditional beliefs, taboos, customs and traditions. Most Christians, in particular, regard indigenous knowledge as

fetish, diabolic, demonic, savage, useless and regressive, though it plays a key role in environmental protection (Dosu, 2017). For example, Adjei and Sika-Bright's (2019) study on traditional beliefs and sea fishing in selected coastal communities in the Western Region of Ghana, found that there were enormous role Christianity played in eroding traditional beliefs in fishing communities. Also, Esia-Donkoh's (2011) study on preservation of biodiversity in selected traditional communities in the Central Region, revealed that, disregard of beliefs and practices by the church has restricted the onward transmission of indigenous biodiversity preservation practices from the older generations to the younger ones.

Also, modernisation and economic development have also been cited as one of the reasons for the unwillingness of most people to comply with the taboos and other belief systems in traditional societies. Hitherto, the fear for the unknown was good enough for one not to temper with sacred and marine resources. Tempering with marine resources, sacred forests, taboos and totems caused illness, death, drought and disappearance, and these ensured their preservation. However, this fear of the local taboos and myths as a means to protect the environment is believed to be waning due to modernity (Risiro et al, 2013). Adjei and Sika-Bright (2019) contended that, taboos were pervasive in traditional societies as part of the general ignorance about the physical world, but as these societies modernise, traditional beliefs and taboos get eroded.

Masalu, Shalli, and Kitula (2010) conducted a research in Tanzania on the role of indigenous knowledge in the management of fish stocks and coral reefs, arguing that knowledge of taboos and beliefs was becoming increasingly threatened and disappearing as a result of modernisation and economic

development. They mentioned that, modernisation and economic factors are linked to demographic changes, urbanisation and globalisation, changes in education systems, commercialisation and commoditisation of aquatic resources, technological changes, external assistance agency policies and national economic policies.

The current study recognises the impact of these influences on traditional coastal ideas. According to the World Bank (1998), as a result of exposure to global and national influences, newer generations are developing alternative attitudes and lifestyles, and traditional communication networks are breaking down, implying that elders are dying without passing on their expertise to offspring.

In terms of population, it has been suggested that, cultures with rapid population expansion, or a corresponding reduction in resources due to external pressures, may require new technology adaptations to enhance food production and diversify livelihoods. To meet current livelihood demands or maximise profit, rapid learning of new skills will be required. People learn new knowledge quickly in such situations in order to respond to new livelihood concerns. Due to high population density and smaller agricultural field areas, crop diversity, is generally diminished in favour of main staple crops (World Bank, 1998). Similarly, some individuals' drive for material gain at the expense of resource preservation causes them to disrespect the community's indigenous practices (Esia-Donkoh, 2011).

The impact of immigration on the decrease of indigenous knowledge in the host society is linked to the issue of population expansion. Rapid immigration to a particular location has shifted the focus of expertise for

agricultural or pastoral production and environmental protection, creating new opportunities and limits (World Bank, 1999). As more migrants arrive at local community, the socio-economic structures that create this knowledge may crack and contradictory additions may occur. As a result of the infusion of varied beliefs and traditions brought by migrants, coastal towns are no longer homogeneous entities (Esia-Donkoh, 2011).

People find themselves in a new environment in which their previous expertise of the area is no longer useful. These types of shocks have the potential to wipe out all existing local knowledge systems. The implication is that, indigenous people face a lot of pressures to merge with larger civilisations, and as they do, the social institutions that generate indigenous knowledge and practices can break down. For example, in their study on traditional beliefs and sea fishing in the Western Region of Ghana, Adjei and Sika-Bright (2019) concluded that, many coastal communities had a blend of traditional culture and modernity. They, however, contended that, fishing communities has created two worlds, in which tradition and modernity in some cases compete with or complement one another.

However, many traditional beliefs and traditions have been abandoned as a result of this rivalry. To deal with the challenge, Kelman, Mercer, and Gaillard's (2012) argued that, since neither scientific nor indigenous knowledge could be used in isolation to solve community problems, there is the need for a more integrative process consisting of bottom-up and top-down actions, local and scientific knowledge, and a vast array of stakeholders.

Summary

This chapter reviewed literature on the theories that underpinned the study. The first theory that was discussed is the Symbolic Interactionst Theory, by Herbert Blumer (1986), which postulated that, humans react to things based on the meanings associated with them. His second proposition was that, meanings of such things are derived out of social interaction and, finally, meanings are handled and modified through an interpretative process.

The second theory, Theory of collective Action, was also discussed as a marcro theory that ugmented the symbolic Interactionism, which looked at issues from the individual or micro perspective. The Theory of Collective Action by Ostrom (2007) argued that, there should be clear boundaries for the use of the common pool property resources, else, it will lead to over-exploitation of such resources. She also emphasised that, user of common properties must participate in the rules that govern the resources.

The other section of this chapter reviewed literature on the cosmovision of indigenous knowledge systems. The first issue that was looked at is the Akan conception of nature and natural resources. The literature showed that the Akan conception of the natural resources goes beyond their physical properties, but also, possess spiritual ones. This formed the basis oftheir knowledge that, influenced how they interacted with such resources. The section also looked at the concept of indigenous knowledge, sources, and the factors such as, population growth, modernity, Christianity, that have caused the decline of such knowledge.

CHAPTER THREE

INDIGENOUS KNOWLEDGE ON COASTAL LIVELIHOOD RESOURCES

Introduction

This chapter reviews literature on how coastal communities, influenced by their indigenous knowledge, exploit the resources available for their sustenance. The sub-topics under consideration are: indigenous knowledge on coastal resources such as mangrove forest, fisheries, coral reef, sand, and salt; how indigenous knowledge influence resource utilisation; and livelihood challenges, and sustainability.

Indigenous Knowledge and Coastal Livelihood Resources

Livelihoods strategies in coastal communities, largely depend on the people's worldviews, availability of resources and the capital to invest. That is to say that, the people's knowledge on the resources at their disposal determines how they will exploit them to satisfy their needs. Indigenous knowledge has been successfully utilised in many areas of the world, including fisheries management, pollution control, forestry management, mangrove management, and catastrophe risk reduction (Hiwasaki et al., 2014). It has been discovered as a technique of preserving water courses, streams, water pans and wells, as well as the vegetation that surrounds them, through laws that ensure their long-term viability. More significantly, the shrines, caverns and woodlands that surround the springs are never disturbed since it is believed that ancestors or malevolent spirits reside there (Ayaa & Waswa, 2016). The belief is that, marine spirits exist in water bodies as deities, and as such, they (water bodies) symbolise the spirits of the people, and as means of

conserving coastal resources for future generations (Sarfo-Mensah and Oduro, 2007)

Apart from the sacred groves, coastal dwellers, especially, in coastal regions in Ghana, have taboos on days that are set apart as rest days for the sea spirit. Most of these communities use Tuesdays for the observance, and to honour the privacy of the spirit. For example, Dosu (2017) investigated Ghanaian fishermen's and fisheries officials' perceptions of socio-cultural beliefs and taboos in the Jamestown fishing community in the Greater Accra Region of Ghana, and revealed that, the most widely practised and enforced socio-cultural taboo in the fishing community was the 'no-fishing on Tuesdays' rule.

Similar findings were found in Adjei and Sika-Bright's (2019) study on traditional beliefs and sea fishing in selected coastal communities in the Western Region of Ghana, where the indigenous people considered fishing on Tuesdays a taboo, and this customary law is still adhered to by the contemporary fishers. The researchers reported that, their participants believed in the supernatural properties in sea that protected and guided their fishing activities. Adjei and Sika-Bright (2019) also found that, women were still prohibited from sea fishing due to traditional beliefs that they were physically unfit for such work.

However, Ansah et al (2020), have blamed the violations of the Tuesday non-fishing custom to the specific political and legal conditions in the communities, as they are facilitated by traditional authorities. The authors claimed that as the those in authority perform rituals to allow the violation of these customs in certain circumstances, it the paves way for sustained

violation as community perceptions surrounding the custom transformed when there were no immediate repercussions for their activities. They also identified livelihood issues as well as financial and community development issues, in which fishers choose to violate the customs for the achievement of immediate livelihood and community needs.

In Ghana's coastal districts, there is a customary division of labour when it comes to fishing. In the numerous coastal villages, males and females have been restricted to specific activities. Despite the fact that both men and women have equal access to fishing rights, women do not go to the sea because of a long-held conviction that fishing is not for women (Owusu, 2009). This is because in the Ghanaian fishing communities, men are more or less considered as feminine if they engage in fish commerce, whereas women are seen as out of place when they take on the role of canoe owners and begin to manage them. Overå (2003) has also argued that, activities like paddling the canoe, bringing the beach seine ashore, and anchoring the canoe and net, require a lot of energy, which fishers believe that, women are incapable of providing.

Resource Utilisation and Livelihood Strategies

This section focuses on how indigenous knowledge influence the utilisation of coastal resources and livelihood strategies that coastal people adopt in relation to the availability of the resources. This emanates from the argument that livelihoods strategies in coastal communities depend on the resource's availability, capital to invest and the worldview of the people concerning the resources (Ruddle, 2011).

It is believed that in many coastal communities' small-scale fisheries and other auxiliary livelihood activities contribute significantly to national economic growth, yet many of the people live at the margins of subsistence (FAO, 2005). This, in effect, poses a lot of livelihood challenges the coastal dwellers. Firstly, their subsistence activities make it difficult to have access to loans from the formal banking sector. The point is that, the banks often require collateral and in some cases no interest charged on loan which are either unavailable of too dear to pay by the people (Ruddle, 2011). For these reasons, many coastal dwellers rely on the informal credit facilities to invest in the livelihood activities, since they often come family members and close associates, with less or no interests unlike financial services.

Small-scale fishing is thought to have contributed significantly to national economic growth in many coastal towns, although many people still live on the edge of subsistence (FAO, 2015). According to a study by Hauck (2010), fishing and selling fish can be used to fund other livelihood methods such as farming and gardening. Sowman and Cardoso 92010) claimed that, fishermen's local biological knowledge revealed that, there were reservoirs that had not yet been utilised for fishing. Fishery only, fishery and farming, fishery and non-farm, and fishery, non-farming, and farming were identified as the main livelihood activities in coastal communities (Amevenku, Asravor, & Kuwornu, 2019). They go on to say that the head of household's marital status, the number of months a household goes without food in a year, access to credit, access to extension services, distance to regular markets and the district capital, as well as experience in fishing, are all major determinants of livelihood strategies.

Diversification or alternative livelihoods have been the next answer in cases where people's current livelihood activities are not viable. Fishing and selling fish, for example, might be used to invest in other livelihood strategies such as farming and gardening Hauck, 2010). However, in their study on alternative livelihoods as a tool for Sustainable Fisheries Management in Ghana, Asiedu and Nunno (2013) discovered that, roughly half of coastal inhabitants lack the necessary skills to work outside of fishing and related industries. As a result, every well-designed alternative livelihood program must address how to enhance appropriate skills among fishermen.

Sustainable Livelihoods

Having discussed how indigenous knowledge influence the utilisation of coastal resource and its accompanied livelihood strategies, there is the need to look at the issue of sustainability for both the resources and livelihoods. For this reason, the Sustainable Livelihood Approach is reviewed as a guide. Chambers and Conway (1992) defined livelihoods to comprise the capabilities, assets (stores, resources, claims and access) and activities required for a means of living. In their discussion of livelihoods, Chambers and Conway (1992) further identified three fundamental concepts, which consisted of capability, equity and sustainability. These concepts are not only fundamental, but are linked to each other, because each of the concepts are both an end and a means.

These assets, according to Jongschaap (2007), could be tangible assets including infrastructure, housing, equipment, and animals. It could also take the form of human assets such as education, health, knowledge, and skills, as well as social assets such as community relationships, participation in political

and social activities, decision-making, and having a platform of representation, while natural assets include land, environment, and marine resources, all of which are important in this study.

By examining the utilisation of natural resources to increase people's people's well-being, Lienert and Burger (2015) integrated capacities and livelihoods. The authors stated that resources are typically viewed as public commodities that may be shared by a large number of people, resulting in resource depletion, environmental degradation and biodiversity loss. As a result, the availability and capacity of resources that contribute to citizens' well-being are jeopardised. Unlike Chambers and Conway (1992), who divided livelihoods into three categories: capability, equity and sustainability, Lienert and Burger (2015) claimed that available resources should be used to measure livelihoods. However, natural resources are often misused on a global scale, causing significant stress on ecosystems and biodiversity loss.

According to the Sustainable Livelihood Approach, a livelihood is sustainable when it can cope with, and recover from stress and shocks, maintain or enhance its capabilities, resources or assets, and provide sustainable livelihood opportunities for the next generation; and contributes net benefits to other livelihoods at the local, national and global levels, in the short and long terms (Chambers & Conway, 1992). That is, it is the ability to preserve and develop livelihoods while also maintaining or improving the assets that support livelihoods (Ellis, 2009). This, however, could be socio-economic or the natural resource base. On the former, Fofana (2009) observed that, in order to improve livelihoods, the local people need to develop the capacities, choice and diversity of livelihoods strategies

The preceding arguments suggest that, the meaning of livelihood is straightforward to assess and analyse, but the complexity of it is revealed in the real-world analysis of coastal people's livelihoods. Despite some of the differing perspectives on livelihood, many scholars and development agencies have adopted the Sustainable Livelihood Approach to explore the livelihoods of distinct local people (Scoones, 2009).

The most difficult task in using the Sustainable Livelihood approach, is achieving long-term durable and stable sustainable livelihoods in the face of shocks and unforeseen circumstances (Scoones, 2009). These analysis are critical to research on sustainable livelihood approaches, as they provide the foundations and criteria for answering research questions about indigenous knowledge, and its impact on resource use and environmental sustainability. The scope of the current study does not allow for a complete use of this approach. In terms of resource utilisation and sustainability in the research areas, this study was primarily interested in exploring access to capital assets that are available and represent the key aspects of the meaning of livelihoods to local communities. The primary goal of the sustainable livelihood method is to examine the outcomes of households' activities in relation to the assets they have at their disposal (Chambers & Conway, 1992).

The approach to sustainable livelihoods has been revisited in order to analyse how individuals gain access to assets or resources, and how they use them to live sustainably. Individual assets serve as the foundation for their output and long-term viability. To make a living, most rural residents employ various survival methods such as diversification. Even if the majority of rural people are engaged in one major occupation, such as fishing in Apam and

Moree, in the Central Region, the income generated from this occupation can be invested in other ventures, such as purchasing a vehicle for commercial purposes, building a house for renting, or petty trading, to generate additional income.

As an analytical tool in sustainable livelihood approach (SLA) work, the sustainable livelihood framework (SLF) is used to understand interconnected factors which influence and contribute to the sustainable development of people's livelihoods which eventually lead to environmental sustainability. However, due to limitations, the current study only focused on elements considered necessary to address the research questions. Nonetheless, it is considered necessary to provide an overview of the framework in order to understand how the model works.

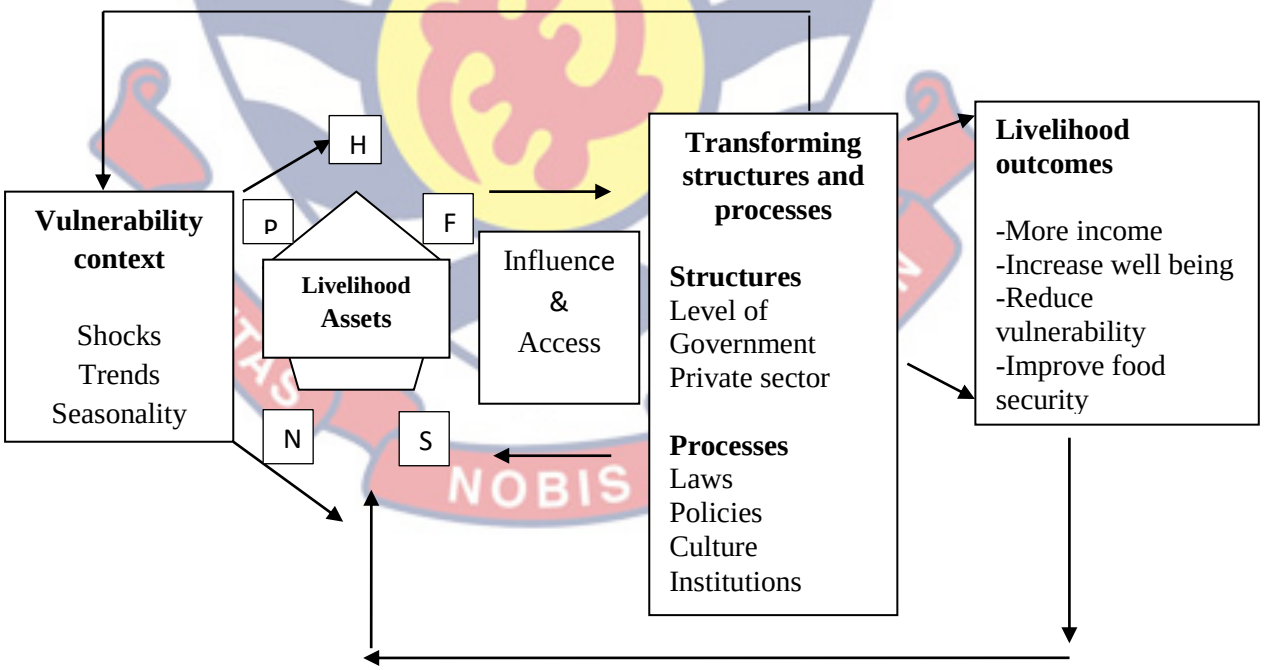

Figure 1: Sustainable Livelihood Framework
Source: Department for International Development [DFID] (2000)

Vulnerability context

The vulnerability context, which consists of external factors that may improve or reduce access to assets in the short to medium term, is another important part of the method. It is also reported that, local people are frequently unable to regulate issues in this environment (Sheets, 1999). Notably, changing structures and procedures have a direct impact on the vulnerability situation (Scoones, 2009). Risks, stressors and shocks that livelihood assets are exposed to contribute to the vulnerability context externally, while defencelessnes may limit people's ability to cope without incurring an irreversible loss inside. Oil spills from offshore oil extraction, policy changes that affect local populations, and fishery collapse are all examples of uncontrollable shock impacts on marine resources.

According to Asiedu et al. (2013), coastal fishers in Ghana face a lot of threats and shocks as a result of increased fishing efforts and the use of illegal fishing methods by sophisticated, industrial fishing vessels, as well as pirate attacks gradually gaining ground in the country's territorial borders. According to Duxbury and Dickinson (2007), the exploitation of coastal resources has resulted in a slew of issues, including coastal population growth and natural capital degradation, as a result of the neglect of the four capitals that contribute to sustainability: natural, built, social, and human. Meanwhile, inadequate planning, incoherent and fragmented land or sea governance, as well as a lack of knowledge, legislation and enforcement, exacerbate the issues.

Another source of challenge to the fishing industry, in particular, is the fact there has been consistent shortage of premix fuel in the various coastal

towns of the country for the years which affects fishers negatively (Frimpong, 2011). The shortage and the corresponding increase in price of premix fuel has been attributed to issues of corruption, diversions and smuggling to neighbouring destinations, which has made the commodity costly to fishermen Anim, Nkrumah and David (2013) had a rapid overview of coastal erosion in Ghana and argued that, the coastline of the country is at danger due to erosion, as a result of unregulated and open cast mining provides sand and gravels for construction. This practice was common in coastal areas for personal and commercial purposes.

Many individuals in coastal areas are believed to be suffering from diminishing incomes and rising financial instability, primarily, as a result of greater completion over the declining fish population and hence making artisanal fisher relatively poor (Campbell, Whittingham & Townsley, 2006; Kleih, Alam, Dastidar, Oudwater, & Ward, 2003). Kleih, et al (2003), further contended that, the seasonal nature of the artisanal fishing industry makes it difficult for the operators in the industry to have sustainable livelihoods, as cash income flow is often relatively short period per year, and that put pressure on household's food security during the lean season.

Such poverty incidence among fishing households and their dependents' livelihoods have increased so much as a result of depleted fish stocks in Ghana's coastal waters that very high rates of school dropouts, child prostitution and teenage pregnancy have become common sights in fishing communities along the country's coastline (Asiedu et al., 2013). This has resulted in low levels of production and, hence, low incomes, poor living conditions and chronic indebtedness (Mensah & Antwi, 2002)

In order to escape the terrible conditions of poverty, coastal residents' resort to improper fishing practices such as the use of harmful chemicals such as the banned DDT, dynamite, and light fishing over the exploitation of other coastal resources. Many additionally harvest juvenile fish, using small mesh sizes, while others extract mangroves, which serve as reproductive grounds for many fish species, for use as firewood. These non-sustainable practices have also contributed to the depletion of numerous fish stocks, perhaps resulting in the extinction of some fish species (Asiedu, et al, 2013).

Livelihood Assets

The assets that people utilise in conjunction to produce livelihoods are referred to as "capitals" or "resources" by economists. Assets, according to Scoones (1998), include resources that improve people's skills, including claims and rights. Transformation and reproduction are also made possible by livelihood assets, which give people the power to change and challenge resource-use laws (De Haan, 2009). For example, most regulations to safeguard coastal resources are based on scientific research that is frequently funded by government, ignoring indigenous knowledge and its contribution to the development of these policies.

Although the objectives of these policies are meant to enhance judicious use of coastal resources, indigenous people are reportedly, not extensively consulted. But, consulting and involving the indigenous people might prove worthy since they interact, and are more or less in direct contact with these resources. On 11th August, 2019, the Ministry of Fisheries and Aquaculture wanted to announce the close season for all kinds of fishers in

Ghana, but this was challenged because it would have affected the livelihood assets of the indigenous people in the coastal areas.

One of the key factors that that, livelihoods depend on is access to assets. These assets include, natural resources (the sea, sand and salt at the coastal communities under study), financial capital, physical capital, human capital and social capitital (Scoons, 2009). The people in coastal locations are fortunate to have access to marine and other resources, which serve as their major source of income. To operHusesainate efficiently with the resources, indigenous people require the necessary skills, knowledge and good health.

People pursue various livelihood strategies, depending on the resources they have access to, including accessible claims. Fishing, sand and salt mining, for example, have been the principal livelihood activities in the study area due to the availability of the sea and its associated resources. Livelihood strategies are the options available to help people achieve their livelihood objectives. They involve short-term contemplation and long-term problem avoidance (Scoones, 1998).

However, artisanal fishers often face challenges when it comes to access to finance capital as banks often do not want to lend money to them. Anokye, Abane and Ekumah (2015) opined that, high interest rates charged by the banks, are often too prohibitive, and fishermen find it difficult to also provide the usual collateral required for bank loans. Thus, artisanal fishers in Ghana have financial difficulties because of their inability to save with the banks, hence their inability to secure loans from such facilities. This was because one needed a heavy capital investment to acquire a canoes, nets, outboard motors and other ancillary fishing gears to successfully embark upon

a fishing expedition and indeed work in the industry (Anokye, Abane, & Ekumah, 2015, citing Orchard & Abban, 2011).

Hussain and Hoq (2010) discovered that, during the lean season when the water bodies are contracted, the majority of the fishers preferred to remain underemployed or unemployed rather than engage in other ventures they had limited experiences in. In addition, Hussain and Hoq (2010) maintained that, fishermen in the area, generally face a lot of struggles and try to cope by starving for, at least, one meal a day than they do on normal days. However, Asiedu, et al (2013) in their study claimed that, majority of fishers were willing to adopt an alternative livelihood as a sustainable management tool in Ghana.

Transforming Structures and Processes

Changing structures and processes have an impact on livelihoods because they affect the level of care that various variables (government, private sector, policies, and institutions) have for them. Institutions can change people's behaviour in this scenario by implementing laws and regulations. Institutions, both private and governmental, adopt policies on a variety of sizes, including geographic, political, economic, social and legal. Informal institutions are shaped by cultural practices and traditions that influence social ties, whereas formal institutions, such as trade rules and laws, are shaped by formal institutions (Morse & McNamara, 2013).

Institutions are widely accepted and used to regulate how actions are structured, through a society's norms and rules (Morse & McNamara, 2013). Traditional institutions, such as chiefs, elders, and clan leaders, can affect the conduct of its members, by instilling in them the society's norms, beliefs, and

values, so that they would strive to safeguard and use the available marine and natural resources. Traditional institutions can aid the government in establishing and enforcing rules and laws that govern who has access to and uses particular assets (Scoones, 2009).

Livelihood Outcomes

Livelihood outcomes are the opposite of poverty, and result from livelihood strategies (Scoones, 2009). Local goals are central to the analysis of potential livelihood outcomes. Central to livelihood outcomes is human-centred sustainability, thus enhancing livelihood outcomes while using the sustainable livelihood framework may be at the expense of the environment. Morse and McNamara (2013) stated that, non-monetary livelihood outcomes are critical to well-being; hence it has to be incorporated into the analysis, if sustainable livelihoods are to be achieved.

Despite the significance of the Sustainable Livelihood approach, it has received a lot of criticism. Critics argue that, literature on sustainable livelihoods typically glosses over themes of power and politics, implying a more theoretical concern for people (Scoones, 2009). Power can be strategically valuable because it can expand strategic awareness, through studying political and social realities, and it can influence relationships and people's capabilities in the long run (Unsworth in Scoones, 2009). Furthermore, if the real complexity of livelihoods is to be captured, sustainable livelihood approach research must avoid the bias towards the locals and interactions on the local-global level require investigation (De Haan, 2009).

In summary, it should be recognised that coastal resources underpin development, and are critical to human livelihoods. The approach also examined how much attention has been paid to coastal resources and sustainability by the international community throughout the years. Several arguments have been made in favour of indigenous knowledge and values in the management of coastal resources, however, it is unclear to what extent these are incorporated into international, national or municipal policies. Marine resources face the dilemma of free riding in their management when exploited as a common good.

Coastal Livelihood Resources

Having discussed how indigenous knowledge influence the utilisation of coastal resources, there is the need to take a cursory look at the resources, their significance and limitations, since the tropical coastal zones contain a variety of resources (Shilabukha, 2015). Coastal resources form a resource base for many communities around the world. One of such important resources is the mangrove forests. These include mangroves, fisheries, marine coral reefs, sand and salt, among others.

Mangroves Resources

Mangroves are plant communities of the intertidal coastal zone in the tropics and subtropics (Spalding et al., 2010). These include trees, shrubs and herbs that have developed physiological and reproductive strategies to adapt to the harsh saline, waterlogged and anaerobic environmental conditions (ITTO, 2012; Spalding et al., 2010).

The adaptation techniques of mangrove species can be classified as true mangrove and mangrove associates (Ong & Gong, 2013). True mangroves are species that are only found in mangrove habitats and do not extend into other plant groups on the land. Human societies living in coastal locations benefit from mangroves in a variety of ways (Clough, 2012; Shilabukha, 2000). Wood and non-wood forest products, fisheries, recreation, ecotourism, bio-filtration, coastal protection and carbon storage and sequestration are among the many advantages (Spalding et al., 2010). People who live in coastal mangrove communities employ mangrove-derived items to treat a variety of diseases and medical disorders. Traditional indigenous mangrove-dwelling cultures have long recognised the importance of mangroves for coastal protection (Clough, 2013)

Local people in many nations with mangroves rely on mangrove products to meet their subsistence needs for fuel and construction (Clough, 2013). Users harvest what is most readily available due to the widespread reliance of coastal populations on mangrove wood products (Ewel, et al. 1998). As a result, the influence of mangrove resources used by local communities can be long-term because they are an intrinsic element of the ecosystem's ecology and functioning (Spalding, 2010). However, most mangrove forests are degrading to varying degrees, as a result of population development and increased demand. The deterioration of mangrove ecosystems is sometimes exacerbated by large-scale commercial and harmful uses (Spalding, 2010).

Fisheries Resources

Fisheries is an integral component of coastal resources. For many people, these are aquatic animals found in the sea. Since the dawn of human history, people have been fishing for their livelihoods (Walters, et al., 2008). Generally, the majority of people living in coastal areas are fishers. This implies that, they derive their livelihood from fishing and related activities (McGoodwin, 2001). Hence, marine fisheries comprise a substantial, if not a major source of protein to the world's population. Globally, fishing contributes over $85 billion to the agricultural industry annually (FAO, 2009).

Pauly et al.(2002) opined that, historically fishing expanded rapidly to the global scale in the 20th century due to a number of factors such as the existence of motorised vessels, inexpensive oil, refrigeration, increasingly global commodity markets, and heavy government subsidies to increase fleets. However, the advent of technology has given humans the power to regulate marine fish resources negatively. The author asserted that, wrongful application of some of these forces have negatively affected the marine resources, including over-fishing. Such negative tendencies have been identified to include light fishing, the use of chemicals and other explosives such as carbide and dynamite, use of under-size nets and monofilaments which are able to catch mature and immature fishes (Afoakwah, Osei, & Effah, 2018; Pauly et al., 2005).

Another threat to fisheries is bottom trawling, in which fishermen suspend large nets from boats to the bottom of the oceans and end up catching other marine organisms such as corals, which can kill and damage animals and the ocean environment (Jackson et al., 2001; Pauly et al., 2002). Furthermore,

the marine ecosystem can be polluted directly or indirectly through human activities. Direct pollution occurs through disposal of sewage, litter, boat exhaust and oil spills, while indirect pollution occurs through deposits of phosphates and nitrates from agricultural run-off (McGoodwin, 2001).

Members of many fishing communities utilise their coastal resource by pressing fishing occupations that are interwoven through the communities' culture. Here, there is a systematic division of labour along gender and age (Hviding, 2003). In relation to gender, women in coastal communities tend to be fishmongers, with the sole responsibility of selling fish and seafood.

Basically, women are more involved in post-harvest and marketing activities. On the other hand, men appear to be the central players in fishing since they most often own the boats, and do the actual fishing (Lentisco & Lee, 2015; Anokye, Abane, & Ekumah, 2015). In most coastal communities, the young ones learn from the elderly in order to step into their positions in their absence. During the process of learning, the older generation transfer to the younger ones, the appropriate methods and strategies of fishing that will ensure proper utilisation of the marine resource (Anokye et al, 2015).

In order to maintain marine resource or fisheries, coastal communities have developed other cultural adaptations to manage the risks and uncertainties associated with fishing activities. These may include symbolic regulation, beliefs, rituals and taboos which may ensure the health of the ecosystem health and conservation. It has been observed that, most communities rely heavily on indigenous practices rather than those instituted by the government and its agencies to utilise coastal resources (Awua-Nyamekye, 2009). As a future way of assessing the future of coastal resources

and their utilisation, there is the need to consider how values influence attitudes towards the management and conservation of the fishery.

Apart from fishery resources from the sea and the lagoons, they are also reported of possessing medicinal properties. For example, Nani, Majid, Jaafar, Mahdzir and Musa (2016) argued that, deep sea water has the potential for the treatment of health problems, particularly those related to lifestyle-related disorders such as cardiovascular disease, diabetes, obesity, cancer and skin problems. Similarly, Bak, Kim, Son, Kim & Kim (2012) claimed that, concentrated deep-sea water could help prevent the development of atopic dermatitis.

Marine Coral Reef

The marine coral reef is another essential part of coastal resources that can be utilised. The coral reef is the most diverse and complicated marine ecosystem on the planet. Humans benefit from it in a variety of ways, including food from reef fish, tourist recreation, coastal protection and lime for the construction industry (Rysgaard, Christensen, Sørensen, Funch & Berg, 2000). Locals rely on coral reefs for their survival and well-being. For example, the coral reefs of Eastern Africa support a large-scale, mostly artisanal fisheries that employ thousands of people (Johnstone, Muhando & Francis, 1998).

Sand Resources

The beach sand is an important resource at coastal areas. Anim, Nkrumah and David (2013) claimed that, sand mining is a kind of open-cast mining that provides material in Ghana for the construction industry. The

author argued that, sand mining activities have persisted dating back to the pre-independence era, though illegal, and has been identified to be widespread across all the four coastal regions in Ghana. Sand is considered as a mineral which is often mined for personal or commercial reasons. Sand winning occurs in both inland and along the coast; which affects the natural environment (Anim, Nkrumah & David, 2013).

The mining of sand, on the other hand, can be extremely destructive (Akabzaa, 2009). Sekhar & Jayadev (2003: reported that, sand mining has wrecked the livelihoods of hundreds of fishermen and others who rely on fishing for a living along Kerala's Alappuzha Coast. As a result, hundreds of individuals who rely on the land for rice farming and the coastal coconut palms, for their income and survival, have lost their jobs and livelihoods. According to Jonah (2015), sand mining looks to be one of the most serious dangers to Ghana's coastline, as such activities induce chronic erosion, which has a negative impact on coastal infrastructure and precious coastal resources.

Sand mining has a direct impact on riparian habitat (a strip of vegetation that runs along the edge of a body of water) as well as non-riparian habitat, flora and fauna (Ashraf, Maah, Yusoff, Wajid, & Karama, 2011; .Peck, Zulfarina, & Rohasliney, 2010; Kelley, Ramsey & Byrnes, 2004). The removal of sand from riverbeds causes gullies to form on the floors of riverbeds. The groundwater table is depleted as a result of these deep trenches in riverbeds and wells and other such locations go dry (Peckenham, Thornton & Whalen, 2009). The authors continue to say that, due to high turbidity levels, a loss in dissolved oxygen, and high temperatures in such water bodies, sand mining also reduces water clarity and quality. This results in bio-security

and pest hazards, which reduce crop production efficiency and contribute to food insecurity (Rinaldi, Wyzga & Surian, 2005). The loss of protection from storm surges associated with tropical cyclones is another important effect of beach sand mining (Anim, Nkrumah & David, 2013).

The World Bank (2018) showed concern about what can be done about West Africa's disappearing sand at the shores Just as other scholars, the World Bank Group acknowledged the importance of sand mining for the construction industry. It is, however, argued that some coastal beaches in West Africa appear to be stripped bare.

Sand mining has environmental, economic, political and social consequences for individuals living along the coast, and for the entire West African region. The World Bank (2018), citing studies from Ghana, reported that yearly coastline erosion rates of 1.13m in Accra and 1.10m in Moree and Cape Coast are substantially higher than the natural rate, owing to coastal sand mining (Jonah & Adu-Boahen, 2016).

Mensah (1997), in a research on the causes and impacts of coastal sand mining in the Ahanta West District, of the Western Region of Ghana, stated that coastal sand has been exploited to meet human demands, but that sustainable development requires efficient and effective resource management. He also urged that, policymakers, sand contractors, engineers, traditional rulers and local communities to work together to find a solution to the coastal environmental disaster.

Anim, et al. (2013) suggested that, sand mining was one of the various man-made-induced causes of coastal erosion in Ghana. The majority of beaches around the world are mined for sand, which is utilised in the

construction of houses, bridges and roads. These practices mostly harm coastal resources since they are frequently mismanaged, and Ghana is no exception. Although sand mining is prohibited in Ghana, it continues to be a source of sand for the construction industry. Sand miners rely on the vast quantities of sand on the country's beaches to make a living. The theft of beach and dune sand contributes to the deterioration along numerous coastlines.

The coastal sand is seen to be serving as a barrier between the land and the sea Mensah (1997), and improper sand mining can result in a variety of coastal environmental issues (Anim, et al., 2013). As a result, it has the potential to harm beach wildlife and plants, as well as other coastal ecosystems such as wetlands linked with the beach.. Anim, et al. (2013) went on to say that, sand is essential as a storm energy buffer in times of rising sea levels. Sand mining has wreaked havoc on the ecosystem along the shore in numerous places.

The Ghana Minerals and Mining Law (PNDCL 153) of 1986, revised by the Minerals Commission Act of 1993 [Act 450], was enacted to govern and manage the use of sand resources in the country as a result of the challenges caused by sand mining (Ghana Minerals Mining Law, 1986). This regulation applies to all prospective sand winning contractors in order to restrict indiscriminate mineral extraction and avoid environmental concerns such as land degradation, air pollution and noise pollution, all of which have a detrimental influence on the community's socio-economic existence.

Summary

The chapter reviewed literature on how indigenous knowledge of the costala communities influenced their utilisation of the coastal livelihood

resources. Some of the issues that were discussed included resource utilisation and livelihood stategies coastal people adopt and the sustainability of such strategies. So, issues such as, vulnerability cotext, livelihood assts, transforming structuresand livelihood outcomes were discussed. The chapter also, looked into the concept of coastal livelihood resources in this study. They inclueded fisheries, sand and salt resources and mangroves.

CHAPTER FOUR

INDIGENOUS KNOWLEDGE AND COASTAL RESOURCE SUSTAINABILITY

Introduction

One of the 17 Sustainable Development Goals (SDG'S) adopted by the United Nations General Assembly to improve people's lives is environmental sustainability. Goal 11 of the SDGs, emphasises' sustainable cities and communities,' which includes environmental sustainability (United Nations, 2010). The importance of environmental preservation prompted the United Nations to create and encourage governments to remain committed to accomplishing this objective by 2030 (United Nations, 2018).

Humans pursue environmental sustainability, primarily to defend their own lives. Food, housing, breathable air, plant pollination, waste absorption, and environmental life-support services are all recognised as being dependent on other species (Goodland, 1995). Scholars have approached the concept of environmental sustainability in various ways, much as they have indigenous knowledge and coastal resources. As a result, the contributions of a sustainable environment to development, variables affecting coastal resource sustainability, and the role of indigenous knowledge in coastal resource sustainability are all examined in this chapter. The chapter concludes with a conceptual framework that served as a foundation for the research.

Contributions of Sustainable Environment to Development

The role of sustainable environment to socio-economic development of the society can never be overemphasised. This stems from the contributions the environment provides to cater for people's well-being. The concept of

sustainable development, as defined by Agenda 21, is built on three conceptual pillars: economic, social and environmental sustainability. In the past, conventional development science has led economic sustainability through growth, development, and productivity. Equity, empowerment, accessibility, participation, sharing, cultural identity, and institutional stability are all aspects of social sustainability. It aims to protect the environment through promoting economic growth and alleviating poverty (Bizikova, 2011 citing Colls, Ash & Ikkala, 2009).

Environmental sustainability is defined as a state of balance, resilience, and interconnectedness that allows human society to meet its needs, while not exceeding the capacity of its supporting ecosystems to regenerate the services required to meet those needs, nor reducing biological diversity through people's actions (Butle, 2009). Environmental sustainability refers to the natural livelihood resources, and how they can continue to be productive and resilient in order to support human life. The integrity and carrying capacity of these resources must not be over-stretched by withdrawals and additions in order for them to be sustainable (Brodhag & Taliere, 2006). This is possible if natural resources are not depleted faster than they can be replenished, and trash is not discharged faster than it can be absorbed by the ecosystem.

Since the Rio 'Earth Summit' of 1992 (UNCED 1992), individual citizens and governments have been encouraged to ensure the sustainability of their environments. In line with achieving the goal of sustainability strategies, which involves significant and active participation by all citizens. The natural environment must be preserved since it contributes to long-term development.

Coastal ecosystems such as wetlands, mangroves, coral reefs, oyster reefs, and barrier beaches, according to Bizikova (2011) citing Colls, Ash, and Ikkala (2009), provide natural shoreline protection from storms and flooding, among other services crucial to human well-being. As a result, every effort to preserve resources such as fish stocks, fuel, and clean water that vulnerable communities rely on for subsistence and livelihood is maintained (Hale, et al., 2009). The ability of the society to improve the quality of ecosystems and their services is especially important in dependent communities that rely on natural resources for the majority of their income.

Environmental policies can be feasible, according to the departments of Environment, Food and Rural Affairs [DEFRA] (2002), if they are not imposed from above. That is, it will not take root until people from all walks of life, especially indigenous peoples, participate actively. This is founded on the understanding that, every culture has a history of resource knowledge that directs its growth process (Butle, 2009). As a result, it has been argued that, conserving biodiversity without conserving associated indigenous knowledge systems is only a short-term solution for long-term sustainability, because future generations will not benefit from their ancestors' centuries of experimentation and knowledge accumulation (Claxton, 2010)

Sustainable development, according to Claxton (2010), is only conceivable if society's creative capacities are engaged on the development process, and for that to happen, development action must be based in the culture of the country in question. Those creative sources are primarily cultural, 5 The inspiration, energy, and capacity to adapt, initiate, innovate, invent, and re-invent are all provided by a society's indigenous culture and

creative resources. The ways in which a growing society has traditionally dealt with the problems posed by its physical environment, as well as its cultural traditions, indigenous knowledge, and practices, all contribute to its creativity (Claxton, 2010).

Factors Affecting Coastal Resource Sustainability

Over the years the sustainabilty of coastal has become much of a concern to researchers , since the deteroration of the resources have dire consequences on both the current and future generations. There have been reports on destruction of native flora and fauna, pollution of air, water, and land, instability of soil and rock masses, landscape degradation (Gutti, Aji and Magaji, 2012). However, the key problems affecting the sustainability of coastal livelihood resources have been identified as population growth in coastal communities, bad fishing techniques, pollution, poor management practices, and the uncontrolled character of the resources.

Increase in population

One major factor causing the unsustainability of coastal livelihood resources has been increasing population growth in coastal areas, which have been described to be highly densely populated than the hinterland and exhibit higher rates of population growth (Merkens, Reimann, Hinkel & Vafeidi, 2016; Neumann, Vafeidis, Zimmermann & Nicholls, 2015).

The linkages between population dynamics and fishery resources, according to researchers such Marquette, Koranteng, Overå and Bortei-Doku, (2002) are more complex than the concept of overfishing. The authors viewed fishing as a market (rather than subsistence) activity, with consumption

demands often coming from populations far away. In addition, growing population and consumption pressures together to the contribute to over-exploitation of common property-based resources (World Bank, 2002)

For Neumann, Ott and Kenchington (2017), the growing human and environmental pressures on coastal areas have significant impacts on coastal systems, requiring urgent attention in many coastal areas, globally. However, Jones and Carswell (2004) argued that, people respond to more than just population densities in adjusting their interaction with the environment. They claim that, effect of population growth on the environment depends on how people adjust. In such threatening situations, informal institutions change to mediate between society and environment.

Mangrove forests, for example, are significant ecosystems found along coastal areas of Ghana, where they provide a source of income for local populations, act as windbreaks, and help to mitigate the impact of coastal storm surges. They are also vital for plant and animal life, as well as serving as spawning sites for a variety of species. However, rising human population, food production, industrial and urban expansion, and the lack of mangrove management and policies have resulted in over-exploitation, pollution, and conversion to other land uses, causing the mangrove resource base to dwindle (Derkyi, 2007).

Bad Fishing Practices

The fishing business in Ghana has been regarded as an appealing sector for both local and foreign fishermen, making it a significant source of employment, livelihood, and a way of life (Afoakwah, Osei, and Effah, 2018). Unauthorised fishing activities, on the other hand, have been identified as a

major contributor to the unsustainable use of these coastal resources. As a result of surplus fishing capacity (number of boats), and a rise in the number of fishermen, the fisheries resources are said to be over-fished. Furthermore, light fishing had become exceedingly widespread in Ghana's exclusive economic zone. Fishermen employ pesticides such as DDT and Carbide, as well as explosives such as dynamite. Afoakwah et al (2018) claimed that, these practices kill or disable the fishes, making it easier to catch them.

According to Afoakwah et al (2018), these procedures make the fish unsafe for human eating. Illegal fishing gear and materials, such as inadequate nets and monofilament nets that are used to catch adult and immature fish, including fingerlings, have also contributed to the depletion of fish stocks in the Ghanaian seas. Several factors inspire and/or affect illicit fishing, including the tax law enforcement, depleted fish stocks, rising demand for seafood, and the infiltration of the fisheries sector by the so-called "profit-only-oriented" private business people.

Often the state officials who are charged with the duty of protecting the coastal resources tend to be the channels of over-exploitation. For example, Derkyi (2007), in his research in Senegal, concluded that evidence from both the study area and other countries in Africa showed the nature and implications of state-corporate crime in fisheries, including the role of corruption; bribery and extortion.

Pollution and Sand Mining

Another human activity that affects the quality and quantity of coastal resources beach is litter and sand mining. These have been seen to be defacing the beauty of the coastal landscape. Population increase has made waste

generation outweighs its management capability. A lot of solid pollutants such as plastic .and cans which are often swept away by the sea affect aquatic life (Nelms, Ducan, Broderick, Galloway, Deityfrey Hamann, Lindeque, & Deityley 2015).

Furthermore, beach debris has the potential to entangle nesting females or hatchlings. For example, Ganguly (2018) investigated plastic pollution and its negative effects on the ecology and ecosystem in India, and concluded that, most species of jelly fish are affected by plastic pollution, which causes oesophageal obstruction in them and accumulates in the stomachs of whales. Even small fish eat the microscopic pieces of plastic that accumulate beneath the ocean's surface. Plastics are accidentally consumed by tuna, swordfish, and lantern fish, and become part of the ocean food chain. On his part, Parker (2018) claimed that plastic pollution has the greatest impact on sea turtles, as well as some jellyfish species, because it causes oesophageal obstruction and accumulates in whales' stomachs.

Sand mining operations have been blamed for contributing to coastal soil erosion and flooding. Sand mining, particularly in Ghana, has become a challenge to the coastal management system. Despite the fact that coastal erosion is a natural process, its trends have been largely increased by human-induced variables (Jonah, Adjei-Boateng, Mensah & Edziyie, 2015). Addo and Adeyemi (2013) linked the phenomenon of sand mining to the impact of sea-level rise on a vulnerable coastal community in Ghana, stating that Gleefe, a coastal village in the Creater Region of Ghana, has experienced regular floods in recent years as a result of the increased prevalence of storm surge and sea-level rise.

The extraction of sand and gravel resources, which has a lot of negative environmental consequences, was said to be the cause. Mensah (1997), also claimed that the process of sand mining has accelerated coastal environmental degradation to an alarming rate in many areas, and that there is the need for a concerted effort by policy makers, sand contractors, engineers, traditional rulers and local residents to find a solution to the coastal environmental crisis.

Aside the degradation of coastal resources, there are also infrastructure destruction that often forces residents to flee their homes, while flooding of wetlands destroys the habitats of migratory birds and endangered wildlife species such as marine turtles. To maintain this vital coastal environment, the ecology of the wetlands, and the livelihoods of the community's residents, effective adaptation measures must be implemented (Addo & Adeyemi, 2013).

Poor Management Practices

Coastal resources are generally regarded as common properties, making it difficult to control govern people's access to and use of them. Coastal resources, being public property, are frequently subjected to unrestricted use, jeopardising their long-term viability. In line with this, Akpalu, Eriksen and Vondolia (2018) conducted a political economy analysis of the Ghanaian fisheries sector, arguing that the unregulated management regimes characterise much of the coastal resources, particularly fisheries. These, to the authors, have resulted in significant losses of economic rents and deteriorating socio-economic conditions of fisheries-dependent coastal communities.

It is said that, in many developing countries, renewable and non-renewable resource abundance is an important cause of policy failure (Auty, 2003) Thus, most developing countries are resource-rich, but for political expediency these resources are not managed properly which cumulatively distort the economy. This, eventually undermines economic growth and environmental sustainability. The author appears to blame the structures in the society particularly, politics as the actor of environmental non-sustainability, as they are the architect behind the misuse of resources. The point is that, if political actors implement environmentally-friendly policies, they will enhance environmentally sustainable management of resources and reduce pollution (Auty, 2003). From the private individual point of view, poor planning and incoherent land or sea governance have affected the well-being of the coastal people directly and indirectly (Duxbury & Dickinson, 2007; Visbeck, Kronfeld-Goharani, Neumann, Rickels, Schmidt, Van Doorn, ... & Quaas, 2014). In the same way, Fabio, Braimah, Bortey, Wadzah, Cromwell, Dacosta, & Salvati (2003) identified poor prioritisation of needs as one of the causes of poverty.

The Role of Indigenous knowledge in Coastal Resource Sustainability

Natural resources, to indigenous peoples, include land, forest, agricultural areas, and rivers as well as coastal areas, in which land is central and often understood to encompass all natural resources collectively. Traditional communities are believed to have a close relationship to land and resources and see themselves as part of the whole ecosystem. Natural resources are significant not only as a means of production, but also as part of indigenous peoples' spiritual and cultural traditions, central to their identity as

a people (Lasimbang, 2006). For this reason, their sustainability is key to the livelihoods of both the current and future dependents on these resources. Over the years, different societies have generated knowledge systems that have enabled them to survive in their relation with their natural environments (Bahta, 2017).

According to Lasinbang (2006), indigenous people are environmentally conscious, value conservation and continuity, and promote the environment's long-term viability. That indigenous resource management encompasses both physical and spiritual dimensions, and is easily embraced by all indigenous people in their everyday activities, to the point where it has become a way of life for the community.

Indigenous people believe that, the state of the universe and the near environment, especially the human environment, is determined by the balance between the spiritual and physical realms. Natural (coastal) resource knowledge is intertwined with indigenous social, cultural, spiritual, economic, governance, legal, health, technological, and educational knowledge. These cultural and customary natural resource management practices are, generally passed down over generations, and unwritten rules are passed on by parents or the elderly in the community. In traditional communities with traditional elders, institutional control over resources is still robust, as seen by the use of customary rules and the socialisation of the entire society (Lasinbang, 2006),

Indigenous people are more effective at biodiversity conservation, according to the World Bank (2016). For example, Farooquee, Majila and Kala (2004) investigated indigenous knowledge systems and sustainable natural resource management in the transhumant Bhotiya society of central

Himalaya to discover the links between subsistence economy and natural resource utilisation and conservation. The study found that, the people had domesticated a variety of wild plants and commodities, and have invented their own techniques for indigenous cattle production,. People are aware that biological diversity is a critical aspect in generating natural resources on which they rely for existence. These strategies of natural resource conservation have ensured their survival in harsh, inhospitable environments at high altitudes.

Bendsen and Motsholapheko (2003) investigated the role of indigenous technical knowledge in Ngamiland's natural resource management (Botswana). The authors came to the conclusion that indigenous technical knowledge in Ngamiland is an amalgamation of tactics, skills, rules, and procedures learned via common adaptive man-environment interactions in order to make a living and endure natural and economic hardships

However, Atteh (1992) claimed that, the centralisation of the governmental and administrative structure, the introduction of formal education, and changes in socio-economic conditions all contributed to the erosion of indigenous knowledge in Ngamiland. The study discovered that, while some components of local knowledge are slipping away in urban areas, it continues to play an important role in the livelihoods of the rural inhabitants in Ngamiland. The author stated that, in an unpredictable environment, the rural population maintains a diversified income and a low-input subsistence strategy based on indigenous knowledge as a means of avoiding risk.

Zerihun (2005) said that traditional cultural heritages pertaining to natural resource management has been weakened due to various factors, not

the least of which is the effect of the many development projects which lack adequate cultural and social compatibility. The author recommended that, sustainable development largely depends on traditional cultural values and communal social structures, as well as involving the local people in all development and natural resource conservation activities.

Conceptual Framework

This section of the literature looks at the need to demonstrate and establish the relationships between the variables used in a study. This gives pictorial representation of how the various variables in a study are related (Imenda, 2014). Grant and Osanloo (2014) argued that conceptual framework offers a logical structure of connected concepts that provide a picture or visual display of how ideas in a study relate to one another. It gives researchers an opportunity to specify and define concepts within the problem. Awuku (2016) provided a framework that highlights the relationship between indigenous knowledge and water management policies (Figure 1). The main variables in her conceptual framework are indigenous institution, indigenous knowledge, water management policies and sustainable water and efficient management.

The endogenous knowledge hypothesis of community development informs the framework (where community leadership and knowledge are considered an asset to community development). Indigenous institutions, it is proposed, are made up of actors such as chiefs, elders, family leaders, and all the community members as a whole, who interact in a hierarchical fashion. Indigenous information, such as a community's norms and traditions, is held by these actors. In order to do this, it is advocated that, these norms and practices be included into formal laws and policies that are utilised to manage

water resources in the basin, resulting in long-term water resource management.

Unlike Awuku's framework, the current study has indigenous institution, indigenous knowledge, resource utilisation and livelihoods and environmental sustainability as its main variables. This is explicitly displayed in Figure 1, which shows that, indigenous institutions are made up of actors or stakeholders, including chiefs, elders, chief priest, queen mothers, clan heads, family heads, chief fishermen and fishmongers, crew members and canon owners as a whole who may interact with one another. Reference to the framework

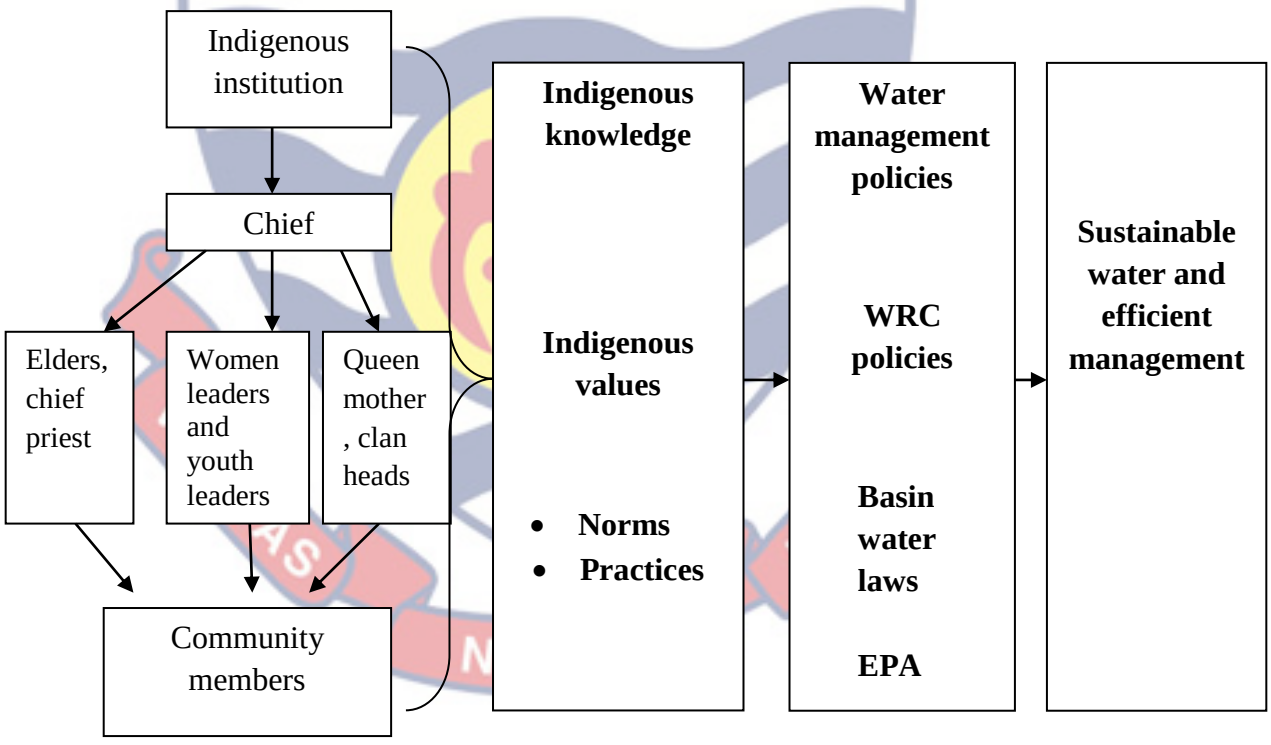

Figure 2: Indigenous Knowledge in Water Resource Management Policies
Source: Awuku (2016)

The community members in the framework are believed to be possessing indigenous knowledge which may include: community's norms, taboos, myths and practices. In furtherance of this, the acquisition of

knowledge which is mainly transferred from generations to generations can determine resource utilisation. Put differently, the belief system of the indigenous people can influence the manner in which resources (salt, sand, fishes, and tourist sites among others) can be utilised. When it is effectively and efficiently utilised, it positively affects their livelihood which eventually influences environmental sustainability and vice versa. Below is a conceptual framework that explains how community member's indigenous knowledge influence their interaction with resources at their disposal, in a sustainable manner.

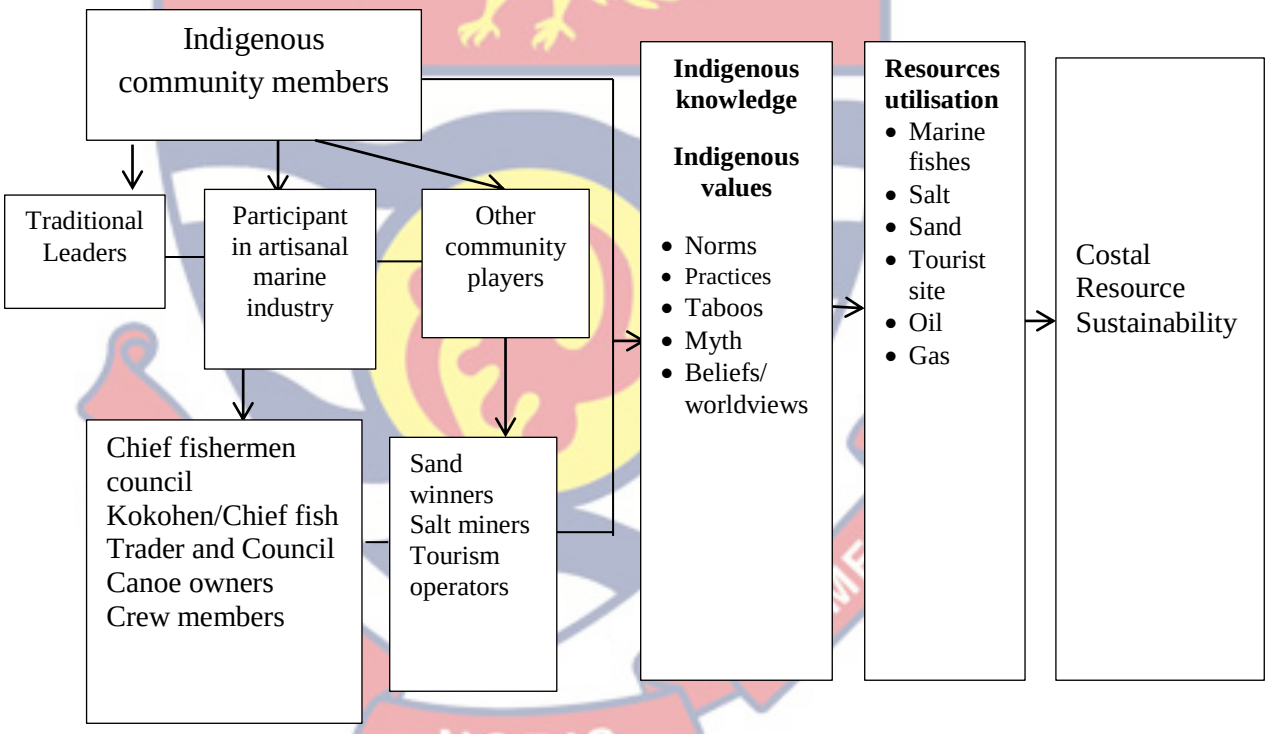

Figure 3: Conceptual framework for indigenous knowledge, resource utilisation, and sustainability
Source: Adapted from Awuku (2016)

The current conceptual framework was adapted from Awuku (2016). Similar to Awuku, the current framework for this study considers indigenous knowledge emanating from the indigenous institution with chiefs, elders, queen mothers, clan heads among others playing instrumental role. The

proposed framework grouped these individuals as members of an indigenous community who by virtue of their stay in the community might have acquired some form of knowledge. The members of the indigenous community in the current study, was not arranged in hierarchical order, as indicated in Awuku's (2013) framework. The rationale behind this is that indigenous knowledge is independent of one's position or level. That is, some people might have knowledge about the culture and traditions, but may not have occupied certain positions in the community.

The community members in the current proposed framework go beyond to include fishmongers and fishermen, sand winners, salt miners, and tourism operators. The inclusion of these individuals in the current study and framework is because of their contact with the coastal resources, hence they might know the essence of sustaining them. Awuku's framework was limited to developing water management policies on using indigenous knowledge. These policies were meant to help manage water resources in the basin. The proposed framework, however, is not limited to water in the basin, but the coastal livelihood resources. In addition, the current study introduces an important concept of resource utilisation. The indigenous knowledge helps the local people to effectively and efficiently utilise their marine fishes, salt, sand, tourist site, oil and gas. This will help enhance both livelihoods and environmental sustainability.

Summary

This chapter reviewed literature on people's indigenous knowledge and they use it to preserve and protect the coastal resources. The issues that were captured in the chpter included contributions of sustainable environment to

development and factors that affect the sustainability of coastal livelihhod resources. among the factors were increase in population, bad fishing practices, pollution and coastal sand mining, and poor management practices. The first section ended with the discussion on the role of indigenous knowledge in the coastal resource sustainability. The conceptual framework that underpinned the study was presented and discussed in this chapter too.

CHAPTER FIVE

STUDY AREA AND METHODOLOGY

Introduction

This chapter describes the study areas as well as the methods that were used to conduct the study. First, a brief demographic background of the study locations, Apam and Moree are presented. This is followed by the study's philosophical underpining, research approach and design. It also, covers population, sample, research instrument, data collection procedure, data analysis, study limits, and ethical considerations.

The Study Area

The coastal settlements of Moree and Apam are located in the Central Region of Ghana were the study area. The communities along the West African coast bordering the Atlantic Ocean have a reputation for being key centres for marine fishing (Marquette et al., 2002). Fishermen and fishmongers have been recognised as the most skilled and hardworking individuals for years. Throughout the year, marine fishing takes place. The primary fishing season runs from June to August, with the minor season runs from November to January, while the lean season running from February to May. According to the Ministry of Food and Agriculture's Fisheries Department, the annual catch was 13,000 metric tons (Marquette et al., 2002).

Governance

Both communities had matrilineal lineages that regulate land access and wield authority over marriages, burials, religious, and social ceremonies. Political governance at the local level is based on a historic set of microstates

or chiefdoms. The Asebu Traditional Council governs the Moree community. Apam, on the other hand, is the capital of the Gomoa West District, and traditionally, under the Gomoa Akyempem traditional council. The communities elects and enstools a supreme chief (Omanhene), to lead the Traditional Council (Danquah, Roberts & Appiah, 2021).

Smaller chiefdoms exist, as they do in other Akan political systems. Chiefs are the spiritual heads who execute ancient rites for the ancestors, settle disputes, and penalise wrongdoers because, they act as a link between the people and the ancestors (Marquette et al., 2002). However, due to chieftaincy issues at the time of this research, Moree was yet to appoint a chief. As a result, the chief fisherman was an important traditional leader, backed up by his elders and traditional priests/priestesses.

Socio-Economic Characteristics of the Study Communities

At Apam and Moree, the communities' socio-economic characteristics are centred primarily on a complex network of cultural traditions and extractive activities focused on the sea (Danquah, Roberts & Appiah, 2021). The main source of income is fishing, which is supplemented by subsistence farming, sand mining, and mining. A few members also work in other unofficial jobs such as petty trade, vehicle maintenance, commercial driving (long and short distance taxi), and vulcanising. Women's non-agricultural activities include retail trade and commerce, dressmaking, and hairdressing, which are key economic activities at both Moree and Apam (Marquette et al., 2002).

Fish mongering is a unique economic activity that sustains the lives of the women, and provides them a prominent place in the Moree and Apam

communities. This is because, despite the fact that the fishermen provide the fish for the women to process, it is the women who feed their husbands and children from the meagre profits generated by the sales. In the Moree and Apam communities, the first male child was taught to fish, and the first female child was taught to fish monger (Marquette et al., 2002).

The majority of the populace work as petty traders, artisans (masons and carpenters), and farmers, in addition to fishing and fish processing (Baseline Survey Report, 2015). The Gomoa East district has huge reserves of clay that can be used in the pottery industry. In contrast to Moree, Apam also features Benyah Lagoon, which is used for salt production at Apam (Akutse & Samey, 2015).

With their traditional vocation (fishmongering), women in Moree and Apam have powerful positions in society (Danquah, Roberts & Appiah, 2021). Moree women smoke the fish caught by the males, and sell them in Ghana's major cities and towns (Marquette et al, 2002). In Moree and Apam, women mix their traditional vocation with domestic tasks and household leadership roles.

Apam has a very busy and vibrant fishing sector with large numbers of canoes without-board motors lining their beach area. The fishermen use both the prescribed and unprescribed fishing nets. Those who go to see in the night usually use the light system of fishing to harvest more herrings and other small pelagics. The sanitation issue at the coast of Apam has been described to be very much appalling, as majority of the areas are littered with solid wastes. Also, most of the households have been reported have no toilet facilities, and the people two public toilets but the people prefer open excretion, often pitch

them against the Environmental Health Unit of the District assemly (Akutse, &Samey (2015).

However, in recent past there have been a series of clashes between the District Assemblies in the study communities and the local people over the exploitation of the coastal resources, especially sand mining. Though this phenomenon might not be peculiar to these two communities, the researcher purposively selected them as an ethnographic-case study. Below is a map showing the study area, Moree and Apam communities.

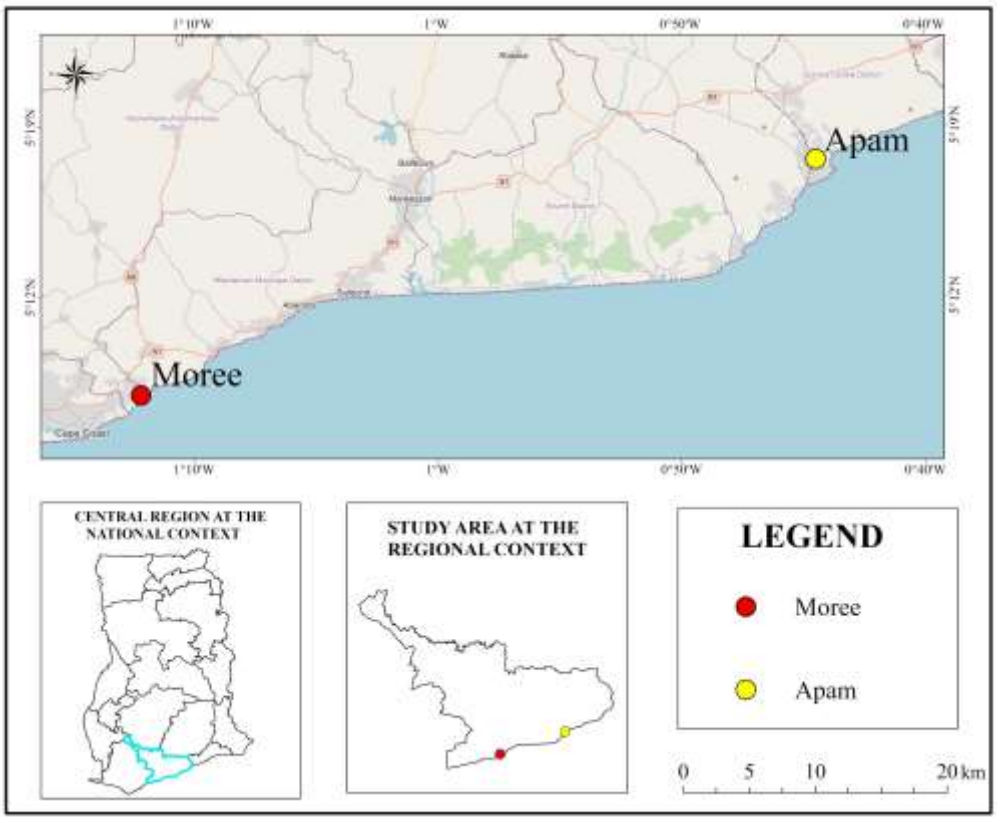

Figure 4: A Map showing the Study Area
Source: Cartography Unit of the Department of Geography and Regional Planning, University of Cape Coast.

Research Philosophy

Researchers often conduct their studies based on their beliefs about how data regarding a phenomenon should be collected, analysed, and used.

This study was founded on interpretivism, which holds that, reality can only be fully understood through subjective interpretation (Creswell, 2003). The interpretivist philosophy emphasises the study of a phenomenon in its natural environment, such as the study area, as well as the recognition that scientists cannot resist influencing the phenomenon being studied. Since the key concept of the interpretative paradigm is that reality is socially produced.

The study employed interpretivism to grasp a specific environment in which the participants in the research regions operated. This was based on the idea that the greatest approach to comprehend what's going on is to immerse one's self in it and move into the culture or organisation being researched, or to experience what it's like to be a part of it (Willis, 2007). As a qualitative researcher, rather than approaching measurements with the intention of creating a fixed instrument or set of questions, the researcher had in mind the aim to enable the questions to arise and change as the researcher became more familiar with the study material (Krauss, 2005). The epistemological stance in this study was based on my ability to move into the participants' social settings, observe, interact, and conduct interviews with them in order to understand and make sense of their life experiences as to how indigenous knowledge could affect coastal resource utilisation and sustainability.

This study used Blunner's (1986) strand of symbolic interactism to address the research questions, which allowed the researcher to understand the world in which indigenous people live and work by constructing and defining their own meanings of their actions, within the social contexts in which they find themselves. The interpretivism concept aligns with the study of indigenous knowledge systems of local people in the study communities, in

order to acquire a better understanding of what influences people's interactions with the resources available to them.

Research approach

Using the local people of Moree and Apam as the units of analysis, the study employed qualitative rather than quantitative research approach to track and analyse how participants' indigenous knowledge had influenced their resource utilisation and sustainability. Qualitative research is concerned with the nature of reality and its properties, or what is known about the world. It, thus raises the question of whether or not there is a social reality that exists independently of human ideas and interpretations, as well as whether or not there is a common social reality (Bryman & Bell, 2007).

According to Walliman (2010), the description of an observed situation, the historical enumeration of events, an account of the various opinions that people have about an issue, organisational functions, and the description of a community's living conditions are all issues that cannot be reduced to numbers and must be described in words. It is important to emphasise that the researcher's goal was not to count and show the number of indigenous people who are familiar, with and appreciate traditions, norms, and sacred resources, nor to generalise the conclusions of the study (Bryman & Bell, 2007).

However, the study investigated how their indigenous wisdom encourages them to use or not use their coastal resources in current times, such as fish, sand, salt, and natural tourism spots. The current study attempted to capture and comprehend the realities as they were experienced by the target group in the social world, in order to contribute to and fill knowledge gaps on

their indigenous knowledge that affects resource utilisation in a completely different social context.

The use of a qualitative approach was justified by the fact that understading indigenous knowledge among people is difficult to capture using quantitative methods. Nonetheless, using a quantitative technique, which is perhaps, less suited to the task than using a qualitative one, it is impossible to capture the social processes in individual lives (Becker, 1996). Furthermore, according to Tewksbury (2011), knowledge collected from qualitative research is more informative, richer and also provides better understandings.

Similarly, because the study attempted to identify the people's indigenous knowledge, adopting qualitative techniques was more effective. Another rationale for employing a qualitative technique was that it relies mostly on inductive approaches to social phenomena investigation. Inductive research is founded on the idea that a small observation or notion can be turned into a broad theory. As a result, examining indigenous people's knowledge of their culture and traditions will aid in determining whether or not it has influenced how they use their marine resources and the ecosystem as a whole (Mthethwa-Kunene, 2014) .

The qualitative approach was also considered relevant for the study because the goal was to give an in-depth information and rich descriptions of indigenous knowledge practices of the local people in the study communities in the areas of resource utilisation and sustainability. In this study, reality is multifaceted, context-bound and as perceived by study participants (Creswell & Tashakkori, 2007). Researchers, according to Creswell (2007) should conduct their studies in the field where participants live and work, in order to

gain a better understanding of what they say and do. As a result, qualitative data collecting, which is inevitably personal and participatory, is prevalent in this worldview (Mertens, 2010; Mthethwa-Kunene, 2014).

In this study, using a qualitative approach proved to be challenging in a variety of ways. First, compared to other ways, the qualitative approach takes more longer and necessitates a better clarity of aims (Berg, 2007). This was likely to happen in the study, as the researcher sought information from traditional leaders, fishermen, sand and salt miners, artists, and fetish priestesses in the study locations. The researcher was able to complete the data collection in a decent amount of time with the help of the experienced research assistants. Objectivity in qualitative methods, according to Fraenkel and Wallen (2006), is exceedingly improbable. This is due to people's subjective opinions, which may jeopardise the research's trustworthiness. While qualitative research can be costly and time-consuming, several disciplines of study use qualitative methodologies that have been designed expressly to give more concise, cost-effective, and fast results (Boamah, 2014).

Research Design

Research design is va ery important aspect of any research enterprise because, it is the overall strategy that serves as the blueprint for the study, which includes the plans and the procedures for research that elaborate the decisions from broad assumptions to detailed methods of data collection and analysis (Creswell, 2008). The study employed the exploratory research design using ethnography-case study methods, with the aim of understanding the indigenous knowledge practices of the people. This was based on the argument that case the study design is an important source of data, either on its

own or to supplement other kinds of data (Cohen, Manion and Morrison, 2011).

The ethnographic-case studies was employed in conjunction with the case study design. The goal of the case study design was to find answers to issues about how social experiences are generated and given meaning (Creswell, 2009). It was also to assist the researcher in gathering information from the participants in their natural environments and under specific time and boundary constraints (Cohen et al., 2000; Hamilton & Corbett-Whittier, 2013).

Furthermore, it gave an opportunity for the identified traditional indigenous knowledge practitioners to be interacted with, utilising various data gathering approaches (Yin, 2009; Creswell, 2014). The hope was that the data gathered using ethnographic-case study method, would reflect the participants' subjective views on the topic under investigation. As a result, there was no numerical explanation for the analysis and interpretation of observed qualities, the goal of which was to establish associations' meanings and patterns (Dantzker & Hunter 2012). This design entails deciphering behaviour and meanings using the researcher's own words (Dantzker & Hunter 2012). It allowed the researcher to obtain more insights through conversational contact in a way that quantitative data could not.

The adoption of ethnographic-case study enabled the researcher to understand in details, the meaning of indigenous knowledge and how such knowledge is incorporated into resource utilisation and environmental sustainability in the study area. The participants in this study were males and females who are indigenes at Apam and Moree, and had much information about the culture, traditions, norms, values and belief systems of the

communities, and as such, could share their social experiences and realities with the researcher; with respect to how they utilised their resources and how that had affected the livelihood resources.

Sources of Data

The data for the study was gathered from both primary and secondary sources. The primary source of information was used by the researcher, because using primary data allowed the researcher to know exactly how the data was generated (Kitchin & Tate, 2000). The primary data for this study was gathered from numerous individuals at their places of employment, and at their homes. The researcher used in-depth interviews (semi-structured and unstructured interviews with individuals), focus group talks, and nonparticipant observations to gather primary data.

To supplement the primary data, the study gathered information from secondary sources, including government documents of coastal resource management, literature on indigenous knowledge, resource utilisation and sustainability. The study also used information from text books, pamphlets, newsletters, leaflets magazines, articles, journals, internet sources and other published and unpublished theses.

Study population

The study population for both communities was homogenous in the sense that the people of Apam and Moree have common cultural characteristics that defines indigenous knowledge. They share the same culture, values, and norms. In terms of fishing, farming, festivals and other economic activities, both populations shared common characteristics. Hence,

the social experiences, views and opinions of homogenous (ethnicity, culture, socio-economic backgrounds) population were similar.

For the purpose of this study, the target population for both communities included chiefs or their representatives, queen mothers or their representatives, chief fishermen, chief fish mongers, traditional priests or priestesses, fishers, and fish mongers. Others included artisans, sand and salt miners, fisheries, and environmental health officers. The inclusion criteria for the target population for this study were indigenes who were 18 years and above, and were residents in the study communities. The rationale for this was that the researcher felt that the knowledge of these participants concerning the subject matter might be in-depth. Also, by 18 years, a male or female in fishing communities were ready to engage, fully, in the livelihood activities of the area.

Sample and Sampling procedures

It has been argued that an appropriate sample size should not be too tiny, but rather the sort that allows the researcher to gain a novel and deeply textured understanding of experience; nor should it be too large, allowing for extensive interviewing and analysis (Taherdoost, 2016). As a result, the sample size for this study was broad enough to allow the researcher to gather information and analyse a variety of the local people's experiences with the coastal resources, their utilisation and sustainability.

As the goal of this study was not to find representativeness, the non-probability sampling method was appropriate. This was to help the researcher to collect detailed information from participants who shared similar socio-economic charateristics, convenience, purposive, and snowball selection

strategies were adopted to select participants in the study locations (Creswell & Plano- Clark, 2011).

The purposive sampling technique was used to select key informants such as the chief fishermen and their elders, fisheries and the environmental health officers, and fetish priestesses, for their experience and knowledge with regard to the coastal resource utilisation and their sustainability (Creswell & Plano-Clark, 2011). These participants could not be selected through a random sampling procedure since the specific characteristics required of the participants were not randomly distributed in the population.

However, the fetish priestesses were reached and interviewed through the help of a gate keeper, the chief fishermen. The researcher first, went to the study area with introductorry letters from both the Department of Sociology and Athropology and University of Capa Coast, UCCIRB. These letters were presented to the chief fishermen, officers from the Fisheries Commission and Environmental Health Units of the District Assmblies in the study area for participation. The chief fishermen then led the researcher to other key informants to be interacted with for their consent to participation in the study

The other participants, including fishers, fish mongers, and salt dealers were selected conveniently. This was due to the fact that, the researcher did not intend to make generalisation of the findings and the participants were readily available at the beach undertaking their normal activities. Due to the attrition rate in the fishing, and the mobile nature of the fishers, it was difficult to get reliable sample frame for the fishers and fish mongers and such the researcher selected participants from these categories as and when they were

met at the beaches. However, this did not affect the quality of data that was gathered since they were participants with homogenous characteristics.

However, the sand dealers were reached out through the snowballing technique. Apparently, the government had banned commercial sand mining in the communities and as such, it was difficult to identify such participants. The snowball sampling technique, therefore, proved worthwhile as it helped the researcher select eight discussants for the FGDs in Moreee, and two participants for the interviewing schedules at Apam. The ability to provide far more thorough information than is available through other data collection methods, such as surveys, was the fundamental benefit of in-depth interviews (Boyce & Neale, 2006). A total of 36 people were selected to be interviewed for the purpose of this study. Chief fishermen, fetish priestesses, fisheries, and environmental health officers were among them. Others included fishers, fish mongers, and salt and sand miners.

Data Collection Instruments and Procedures

The instruments used to collect the data were interview guide, focus group discussion guide, an and observation guide. These are discussed in the sub-sections below.

Interview Guide

In a qualitative research, interview guide is frequently utilised as a method; either used alone or in conjunction with other data collection methods. As a qualitative research, the researcher attempted to comprehend the experiences of the persons under investigation by investigating social phenomena in their real-life context (Boyce & Neale, 2006). The in-depth

interview guide (Appendix A) was therefore, used as the data collection instrument to elicit information from the participants to answer the research question.

The interview guide solicited views on traditional knowledge systems and the social organisation of the participants on how traditional knowledge system among the people influence resource utilisation in the area. It also covered the views of the people on sustainability of their livelihoods and the impact of resource utilisation and sustainability. It finally, interrogated the strategies adopted by participants to maintain the sustainability of the resources, given their current livelihood strategies.

Focus group discussion guide

Another important data collection tool, the researcher used was Focus Group Discussions (FGDs); small group interviews that are structured. FGDs, according to Taylor-Powell and Renner (2003), are focused in two ways: the first is because participants are similar in some manner, and the second is because the goal of such interviews is to obtain information about a certain topic guided by a set of focused questions. In this study, the FGD guide (Appendix B) was used to acquire information from participants who were similar in some way and to solicit information about the topic through a series of focused questions. This was to assist me in gathering information to enhance those provided in the interview guide.

The FGD guide was used to collect data from crew members, fish mongers, community elders, and sand miners. The researcher moderated each of the discussions and guided participants to limit the deliberations to the issues under discussion. The researcher also, requested for clarification and

additional information when the need arose. The discussions centred on the state of indigenous knowledge system in the communities, livelihoods industry of the area, and sustainability of the livelihood resources.

Observation Guide

A non-participant observation technique was also employed, in addition to the in-depth interview guide and the focus group discussions. It involved the systematic use of observation guide (Appendix E) of the beaches, normal fishing activities of the people, waste disposal facilities, among others. It was undertaken mainly during interviews, a walk along the beach or when participants were engaged in their routine and unusual activities. The important issues that were observed included the landing of a canoe, off fishing activities, heaps of beach sand, sanitation along the beaches. The relevance of these observations was to get additional information beyond what participants had told the researcher.

However, there were few drawbacks to using these instruments, including the possibility of researcher bias, as well as the fact that they were time demanding to conduct interviews and record FGDs. In the context of this study, the benefits of in-depth interviews outweighed the chellenges, as the researcher chose 36 participants from both study areas to gain a better understanding of indigenous knowledge and how it affects resource utilisation and sustainability. Before the instrument could be used in the field, the researcher checked for accuracy, which was done by evaluating its validity and dependability. Table 1 summarises the split of the participants, the sample size, sampling processes, and the tools used to gather the data.

Table 1: Breakdown of participants according to sample size, sampling technique, and instruments

	Apam	Moree		
Participants	Sample size	Sample size	Sampling method	Instrument for data collection
Chief Fishermen)	1	1	Purposive	Interview guide
Priests/Priestess	1	1	Purposive	Interview guide
Chief fish sellers	1	1	Purposive	Interview guide
Fishers	5	5	Convenience	Interview guide
Fish Mongers	2	2	Snowballing	Interview guide
Masons/Sand dealers	1	2	Snowballing	Interview guide
Salt Dealers	0	2	Purposive	Interview guide
Coastal Mgt. Officers	1	1	Purposive	Interview guide
Environmental health Officers	1	1	Purposive	Interview guide
Fisher Mongers' Group	8	8	Purposive	FGD guide
Crew members' Group	8	8	Purposive/Snowballing	FGD guide
Elders' Group	8	8	Purposive/Snowballing	FGD guide
Sand dealers' Group	8	0	Purposive/Snowballing	FGD guide
TOTAL	17	19		

Source: Anokye (2020)

Trustworthiness of the Instruments

One major issue that qualitative researchers are often confronted with is the inseparable close relationship between the researcher and what is being researched, with the perceived inherent biases and subjectivity in the overall quality of the study. In this regard, Lincoln and Guba (1985) looked at trustworthiness in terms of the criteria of dependability, credibility, transferability, and confirmability in place of reliability and validity in conventional quantitative research. This is to reduce the biases and subjectivity on the part of the researcher (Creswell & Plano Clark, 2011; Chebanne, 2008). These have to do with the kind of activities undertaken by a

qualitative researcher, to ensure that the instruments and the data collection processes can be trusted and dependable (Shenton, 2004).

To ensure the trustworthines of the instruments in this study, the researcher, personally, conducted the interviews with the participants, which allowed him to dig deeper, clear up any misunderstandings caused by miscommunication, and guarantee that the data was appropriately documented. To clear up any possible misunderstandings, follow-up questions were asked. With the permision of the participants, all the interviews and the FGDs were tape recorded, and played back the recorded voices several times before the transcription. This was to be sure the researcher transcribed exactly what the participants had said.

In order to ensure dependability in the current study, the researcher made sure that the number of questions on the interview guide was kept to a minimum to avoid participant weariness and boredom, which could impair the accuracy of their responses (Maree & Fraser, 2004). To get a clear and accurate impression of what the participants had said, audio recordings were listened to numerous times and field notes were read several times.

In terms of credibility a number of activities were undertaken, including prolonged engagement with the participants and persistent observations to get detailed and additional information to enrich the quality of the data (Lincoln and Guba, 1985). The field notes and transcriptions from the audio recordings of all the interviews and FGDs were translated from Fante to English and back to Fante.

All the findings and interpretations came out of the data, the researcher collected from the field, which informed the conclusions, that

emanated from the study. Also, the reasons for selecting theories, conceptual framework, methodology, and analytical tools were all provided throughout the entire study.

Data Collection Procedure

The data was collected over a nine-month period, specifically, from February to October of 2020. Before heading to the field, the researcher initially submitted the instruments to the University of Cape Coast Institutional Review Board (UCCIRB) for review and approval of the ethical content. Following the review board's response, the researcher sent an introductory letter from the Department of Sociology and Anthropology, signed by the administrator, to the leaders of the study communities (the chiefs or their representatives), to seek permission before conducting the interviews and FGDs with the participants.

When the permission was granted to the researcher to commence the data collection, four research assistants (graduate students) from the University of Cape Coast who were proficient in and understand English Language, as well as Fante, were chosen and trained to assist in the data collecting. The field assistants received extensive training in order to gain a better grasp of the study's aims, instruments and content. Other skills included development exercises in interviewing and inter-personal communication and awareness ethical issues.

The research team (the researcher and the two assistants) visited the study areas to conduct the interviews. Upon reaching the study area, the researcher introduced himself and the assistants to the leaders of the community (the chief fishermen) to lead the team to the other participants,

except the government officials. In addition, the researcher presented introductory letters from the Department of Sociology and Anthropology. This convinced the officers of the fisheries and environmental health units in the two communities to grant the team audience and the necessary documents for the study. The government officials were reached out in their respective offices through their immediate heads. Meeting times were scheduled for the interviews to be conducted at their own convenience times.

As part of their customs and traditions, the people of Moree and Apam communities, like other coastal communities in the Central Region of Ghana, observe Tuesdays as rest days for both fishmongers and fishermen. The women did a lot of housework during those days, while the men (fishermen) spent their time mending their nets in preparation for the next day's fishing expedition. As a result, most of the interviews took place in the evenings, when the participants were less busy. The research team was able to directly witness how the participants lived by conducting most of the interviews in their houses at various times.

In gathering the primary data, the media of communication were the Fante and English languages. Indigenes who could not express themselves in English language were allowed to speak Fante. This is in reference to Punch (1998), who stated that, language is central in qualitative research, with data in the form of words. That is, language is the material from which qualitative social research is constructed. To avoid interruptions, the researcher spoke little and allowed the participants to do most of the talking.

Data Analysis Method

The qualitative approach was used to analyse the data collected for the study. To ensure that readers gotclear understanding, the study findings were presented, interpreted, and discussed qualitatively according to the objectives of the stdy and the sub-themes that emerged from the coding of the data. To establish relationships with empirical results, the research findings were linked and compared to the theoretical and empirical literature that were reviewed for the study. Themes such as the indigenous knowledge systems and coastal resources; indigenous knowledge systems among the people that influence resource utilisation; people's perspectives on the sustainability of their livelihoods; and the impact of resource utilisation on resource sustainability were all examined. Table 2 shows the summary of the data gathering steps for easy identification and understanding.

"Table 2: A summary of data collection and analysis methods"

Specific Issue	Type of Data	Source	Target Population	Sampling Procedures Size	Sampling Method	Instrument	Analytical Method
1. Indigenous Knowledge Systems and the Existing Coastal Resources	Qualitative	Primary	Persons of 18 years and above in the study area	92	Convenience/ Purposive/	Interview Guide Observation Guide	Descriptive Analysis
2. Identify and relate the indigenous knowledge systems to the environment of the study area	Qualitative	Primary	Persons of 18 years and above in the study area.	92	Purposive/ Convenience/ FGD Guide	Interview /FGD Guide	Variable-oriented content analysis
3. Examine how the indigenous knowledge system among the people influence resource utilisation	Qualitative	Primary	Persons of 18 years and above in the study area	92	Purposive/ Convenience/ Snowballing	Interview Guide Observational Guide FGD Guide	Variable-oriented content analysis
4. Explore the views of the people on sustainability of their current livelihoods;	Qualitative	Primary	Persons of 18 years and above in the study area	92	Purposive/ Convenience/ Snowballing	Interview Guide FGD Guide	Variable-oriented content analysis
5. Assess the impact of resource utilisation on the sustainability of the resources	Qualitative	Primary	Persons of 18 years and above in the study area	92	Purposive/ Convenience/ Snowballing	Interview Guide FGD Guide Observation Guide	Variable-oriented content analysis
6. Document the strategies adopted to maintain the sustainability of the environment with their current livelihood strategies	Qualitative	Primary	Persons of 18 years and above in the study area	92	Purposive/ Convenience/ Snowballing	Interview Guide FGD Guide	Variable-oriented content analysis

Source: Anokye, 2020

To identify common themes, patterns, and inter-relationships, the data from the participants was organised into relevant themes. The information gathered was transcribed and coded in order to find themes and trends. The initial step in the analysis was to code the data, which is an important step in qualitative social research analysis (Simmons, 2018; Babbie, 2013). Coding, according to Babbie (2013), requires classifying or categorizing particular pieces of data-coupled with some sort of information retrieval mechanism. After the initial manual coding, the data was analysed using the computer software programme Nvivo (version 10 for Microsoft Windows). The application of this programme was justified due to the qualitative nature of this investigation. The investigation began with the creation of a programme employing the software. The transcripts were loaded into the Nvivo software programme after coding and editing the data and organised into a folder and labeled interviews, which served as the source for the study. After that, the researcher read through the transcripts to find and develop emergent themes and patterns connected to the research questions and objectives into free nodes that combined the related themes and patterns.

Ethical Considerations

To ensure that ethical principles are followed in this study, the researcher had the instruments reviewed by the Institutional Review Board at the University of Cape Coast (UCCIRB) to assure accuracy before data collection began. Before conducting the research, he also requested for permission from the chief fishermen of Moree and Apam since they were the main gate keepers in the communities. For the interviews, only those who agreed to take part in the study were chosen. Before recording participants

responses, the researcher informed and asked for their permission, as part of the principle of informed consent.

Also, the participants were informed that their participation in the study was entirely voluntary, and that they were under no obligation to do so, if they so desired. As a result, they had the option of opting out of the study at any moment. Furthermore, no one was forced to provide information involuntarily, thus only individuals who showed interest in participating in the study were included. Those who agreed to participate were assured that the study would be entirely for academic purposes and that strict confidentiality would be maintained.

In ensuring confidentiality, the researcher put a password on the recorded information such that no one could have access to it. Information gathered from the participants was be kept in privacy and only used for the purpose of the work. Also, the ethical concept of anonymity was followed, to ensure that, participants' responses could not be traced back to them. The researcher made sure that the participants' responses in the analysis could b e tracked back to them. To maintain anonymity, their names and social/professional situations were not disclosed in the interview.

Challenges Encountered in the Study

One of the major challenges the reseacher faced in the research process was the upsurge of the Corona Virus (COVID-19) in December, 2019. The data collection process got started in December, 2019, and the upsurge COVID-19 pandemic. This was because, the government of Ghana declared a lock-down in March, 2020, due to the then increasing number of COVID-19 cases in the country. This was followed by a number of COVID-19 protocols,

including social distance, that made it difficult, if not impossible to conduct face-to-face interviews. For this reason, the data collection resumed December, 2020, for fear of the pandemic. The COVID-19 pandemic did not only delay the data collection but it also created additional cost to be incurred. The researcher had to purchase hand sanitisers and nose masks to all the participants, to use before all the interviews and the FGDs.

Another challenge that hindered the progress of the work was the difficulty in interviewing the sand miners at Apam. The government had banned commercial sand mining along the beaches, and this made such activities illegal to undertake. The District Assembly had used the police to arrest and prosecute some of the miners. For this reason, the people feared the researcher was there to do investigation towards their arrests. That notwithstanding, the researcher managed to get a few who presented themselves as masons. However, it must be stated that the situation in Moree was different. This was because Moree was not a district capital and the police was not effectively present in the community. This seemed to have given them the leverage to engage in the illegal sand mining without fear.

Summary

The chapter described the study area and the methods that were used to conduct the research. The first aspect gave a brief description of the study area, Apam and Moree. Issues such as their governance systems, socio-economic features, and the rational for choosing those communities were discussed.

The second part of this chapter discussed the research philosophy, approach, and the design that informed the data collection and analysis. These

included interpretivist philosophy, qualitative approach, and an ethnographic-case study design. The sample, instruments, and the data collection processes and analysis were captured in the chapter. The chapter ended with ethical considerations and the challenges the researcher encountered in the course of the study.

CHAPTER SIX

FINDINGS AND DISCUSSIONS

Introduction

This chapter seeks to discuss the demographic characteristics of the participants and the first findings on the first objective of the study. The demographic characteristics of participants are divided into two sections. The first section describes the background of the fishermen, fishmongers, fetish priestesses, sand and salt miners. The second section presents the background of key informants such as officers at fisheries commission, environmental health and sanitation officers and fisheries extension officers. It covers their age, sex, marital status, level of education, position, the number of years stayed in the community, number of children, primary and secondary occupations that serves as survival strategies for the participants.

The presentation and discussions of the findings on the first objective is centred on the identification of the indigenous knowledge systems about the coastal resources in the two coastal communities and the nature of their resources. Specifically, the available coastal resources, the belief in the coastal resources, sources of the knowledge, changes in the belief system, and factors responsible for such changes are discussed in this chapter.

Background Characteristics of Participants

This section describes the background characteristics of fishermen, fishmongers, fetish priestesses, and sand miners at Moree, but Apam had additional category of salt miners. Table 3 presents the summary of the socio-demographic backgrounds of the study participants in Apam and Moree.

Table 3: Socio-Demographic Characteristics of the in-depth interviewed Participants

Characteristics	Moree		Apam	
	Frequency (n=10)	Percent	Frequency (n=10)	Percent
Sex				
Male	7	70	7	70
Female	3	30	3	30
Age (years)				
30-39	4	40	2	20
40-59	5	50	6	60
60-70	1	10	2	20
Marital Status				
Single			2	20
Married	10	100	6	70
Widowed			2	20
Religion				
Christian	8	80	7	70
Traditionalist	2	20	3	30
Occupation				
Fisherman	6	60	5	50
Fishmonger	2	20	2	20
Fetish priestess	1	10	1	10
Sand miner	1	10	1	10
Salt miner			1	10
Level of Education				
No formal Education	6	60	5	50
Primary	1	10	5	50
Junior High School	3	30		
Years stayed in the community				
21-40	6	60	4	40
41-60	2	20	5	50
61-80	1	20	1	10
Number of children				
0-3	6	60	3	30
4-7	4	40	6	60
8-11			1	10

Source: Anokye (2020)

In all, 20 participants (Moree=10; Apam=10) were involved in the face- to-face in-depth interview schedule. Out of the 20, participants

constituted more males (n=14) than females (n=6). Specifically, data were gathered from 7(70%) males and 3(30%) females in both Moree and Apam respectively. This was because the males in the study area had more direct contact with the natural resources than the females. It was the males who engaged in the fishing and sand mining business. This suggests that the direct fishing occupation is male dominated.

The ages of participants were grouped into three categories, namely the youthful age (20-39 years), middle age (40-59 years) and the old age (60 and above). As shown in Table 3, the age of the participants ranged from 20 to 70 years. However, the age specifics of participants ranged from 31 to 70 years. Thus, the least recorded age was 31 years and the highest recorded age was 70 years. In Moree, for example, there were four people in their 30s, three in their 40s, two in the 50s and the other in the 70s. The situation in Apam was quite different, as two people were in their 30s, five in their 40s, one in hisor her 50s and two in their 70s. The age ranges of participants showed that most of the participants (Moree= 50%; Apam=60%) were in their middle ages (40-59 years). A few (Moree= 40%; Apam=20%) were in their youthful age (20-39 years) while the least (3) represented group was the elderly (Moree= 10%; Apam=20%).

In terms of marital status, the majority of participants (Moree=100%; Apam=75%) were married. It was further revealed that, in Apam, two participants were single and two were widowed respectively. It can therefore be deduced that most of the participants were married, with a duty to socialise the children on the norms of the society. As far as religion was concerned, the study had the majority of the participants (Moree=90%; Apam=90%) being

Christians with just two identified as traditionalists by virtue of their occupations as fetish priestesses. None of the study participants identified was a Muslim.

The occupation of the participants covered activities (such as fishing, fish processing, salt and sand mining), that served as their source of livelihood. It was revealed that 6 (60%) of the participants in Moree were fishermen while 2 (20%) were fishmongers, a sand miner and a fetish priestess. In addition, 5 (50%) of the participants in Apam were fishermen while 2 (20%) were fishmongers, a salt and sand miner as well as a fetish priestess.

Another important characteristic of participants was their level of education. Unlike Moree where 3 (30%) of the participants completed junior high school, none of the participants in Apam had completed that level of education. In fact, 5 (50%) of the study participants in Apam completed primary school, while the other half had no formal education. Similar to the findings in Apam, half (50%) of the study participants in Moree also had no formal education. A plausible explanation could be that fishing is a traditional occupation that does not require formal education to learn. As a result, one does not need to have formal education or certification to venture into such economic activity. This could probably be the reason why many of the study participants had no formal education or dropped out at the elementary levels.

Whether the participants had requisite indigenous knowledge about coastal resources or not largely depended on the number of years they had stayed in the coastal community. It was, therefore essential to find out, from the participants, the number of years they had stayed in the community as well

as the years they had been involved in their livelihood activities. While some were residents by birth, others were settlers. The study found that 6 (60%) of participants in Moree had lived there between 21-40 years while 4 (40%) had lived there for more than 40 years. However, at Apam, 4 (40%) had stayed in the community between 21-40 years, and 5(50%) had stayed there between 41-60 years. Participants in both study areas had stayed in their respective communities for more than 20 years, which was long enough for them to be in a position to share their experiences about the coastal resources and practices of sustainability.

Participants of the study had children, who sometimes assisted them in fishing activities although many of the participants encouraged their children to go to school. In Table 3, it is fount that six participants in Moree had three children each, two had four, one had six and the other had seven. On the other side, three participants in Apam had three children each, three had four children each, two had six children, one had seven children, and one had eight children. Unlike Moree where 60% of the participants had between 0-3 children, 60 percent of the participants in Apam had between 4-7 children. It can be deduced that all the participants had more than a child.

Background Characteristics of Focus Group Discussants and Key Informants

The 20 participants earlier discussed were engaged in focus group discussions and individual interviews. The background characteristics of these participants are summarised in Tables 2 and 3. At Moree, eight elders, crew members, fish mongers, and sand miners were engaged in four separate groups involved in the Focus Group Discussions (FGDs) while Apam had three

groups for the same exercise. There was a conscious effort to have sand miners in Apam included in the sample in order to seek their perspectives on coastal resources and sustainability, but the researcher could not have that opportunity. This is because the District Assembly had declared and enforced the ban on sand mining, and was arresting the perpetrators. As a result, only fish mongers, the crew members, and the elders were engaged in the focused group discussions in this part of the study area. However, for the purposes of clarity in the subsequent discussions, the groups have been identified as FM1 to FM8 and CM1 to CM8 represent fish mongers and crew members, respectively, who were involved in the FGDs in the two communities. Also, as CE1 to CE8 refers to community elders, SD1 to SD8 stands for sand dealers in this study.

Table 4: Background of Participants of Focus Group Discussion

	Characteristics of Participants			
Participants	**Age (year)**	**Sex**	**Marital Status**	**Position**
		Moree Fishmongers		
Group One				
1	43	Female	Married	Fishmonger
2	37	Female	Married	Fishmonger
3	39	Female	Single	Fishmonger
4	54	Female	Divorced	Fishmonger
5	60	Female	Widowed	Fishmonger
6	55	Female	Married	Fishmonger
7	32	Female	Married	Fishmonger
8	33	Female	Married	Fishmonger
		Crew Members		
Group Two				
1	44	Male	Married	Crew member
2	37	Male	Married	Crew member
3	33	Male	Single	Crew member
4	33	Male	Single	Crew member
5	32	Male	Single	Crew member
6	40	Male	Single	Crew member
7	42	Male	Cohabiting	Crew member
8	33	Male	Cohabiting	Crew member

Table 4 Cont.

Community Elders/Leaders				
Group Three				
1	56	Male	Married	Elder
2	60	Male	Married	Elder
3	66	Male	Married	Elder
4	40	Male	Single	Elder
5	40	Male	Single	Elder
6	54	Male	Divorced	Elder
7	55	Male	Married	Elder
8	70	Male	Married	Elder
Group Four	**Sand Dealers**			
1	34	Male	Single	Sand Miner
2	45	Male	Divorced	Sand Miner
3	50	Male	Married	Sand Miner
4	32	Male	Single	Sand Miner
5	33	Male	Single	Sand Miner
6	35	Male	Married	Sand Miner
7	55	Male	Married	Sand Miner
8	56	Male	Married	Sand Miner
Group One	**Fish Mongers**			
1	50	Female	Married	Fish Monger
2	25	Female	Married	Fish Monger
3	25	Female	Married	Fish Monger
4	38	Female	Married	Fish Monger
5	40	Female	Married	Fish Monger
6	28	Female	Married	Fish Monger
7	30	Female	Married	Fish Monger
8	32	Female	Married	Fish Monger
	Crew Members			
Group Two				
1	45	Male	Single	Crew member
2	34	Male	Married	Crew member
3	33	Male	Single	Crew member
4	33	Male	Single	Crew member
5	33	Male	Single	Crew member
6	54	Male	Married	Crew member
7	50	Male	Single	Crew member
8	33	Male	Married	Crew member

Table 4 Cont.

		Elders/Leaders		
Group Three				
1	61	Male	Divorced	Elder
2	55	Male	Married	Elder
3	45	Male	Single	Elder
4	40	Male	Single	Elder
5	51	Male	Single	Elder
6	55	Male	Married	Elder
7	55	Male	Married	Elder
8	47	Male	Married	Elder

Source: Anokye (2020)

In addition to the individual interviews and focus group discussions, key informants from the fisheries and environmental health sections were also interviewed to seek their views on measures put in place by the government to sustain the coastal resources. The background of the officials was essential, considering the roles they played in relation to the utilisation and sustainability of coastal resources in the study area. The researcher therefore, interviewed the Chief Fisheries Extension Officer and Assistant District Environmental Officer in Moree as well as the Chief Environmental Health Assistant in Apam. The ages of participants in the focus group discussions were between 30 and 72 years. As the FGDs groups for the crew members and the elders were males, the sand miners and the fish mongers were females. Women in the traditional fishing communities were socialised by their forbearers into various categories of fish processing.

Table 5: Background characteristics of Key Informants

Participant	Age (year)	Sex	Marital Status	Position	Level of Education
			Moree		
1	31	Female	Single	Chief Fisheries Extension Officer	First Degree
2	35	Male	Married	District Environmental Officer	First Degree
3	48	Female	Widowed	Environmental Health Assistant	Diploma
4	70	Female	Widowed	Fetish Priestess	No formal education
5	68	Male	Married	Chief Fisherman	Secondary
			Apam		
1	45	Male	Married	Fisheries Officer	Masters Degree
2	47	Male	Married	Environmental and Health Officer	First Degree
3	60	Female	Widowed	Fetish Priestess	No Formal Education
4	69	Male	Married	Chief Fisherman	MSLCE (Standard 7)

Source: Anokye (2020)

Elders, who were key stakeholders in the decision-making process in fishing communities, were males. In other words, women had little influence with regard to decision-making in both study area, though they played important role in financing fishing activities. Their roles were limited to the issues related to the women's welfare in the industry. Half of the participants engaged in the focus group discussion in Moree were married, 10 were single, three were divorced, two were cohabiting and one was a widow. The dynamics in Apam included thirteen married participants, nine singles and two divorcees.

Their scope of work covered the Apam and Moree fishing communities so they regularly visited the participants to ensure their livelihood activities tallied with the local bye-laws that governed the operations of the people. All the key informants were in the ages between 35 to 70 years. The female key informant was a widow with a diploma certificate occupying the position as a Chief Environmental Health Assistant. The two married male key informants who a held Masters and a First Degree occupied the positions of Chief Fisheries Extension Officer and Assistant District Environmental Officer respectively.

In addition, the fishermen and two fetish priestesses of both Moree and Apam were also interviewed due to their peculiar experience and knowledge about the resources and people's living conditions of the study area. As the chief fisher man of Moree had secondary education, and that of Apam had completed elementary school. Both were advanced in age and married. However, the fetish priestesses were widowed, advanced in age, and had no formal education. For the purpose of anonymity, the offices of the key informants were not used in the data presentations and the analysis.

Objective One: Indigenous Knowledge Systems and the Existing Coastal Livelihood Resources

The first objective of the study was to identify and relate the indigenous knowledge systems to the coastal resources in Moree and Apam. Indigenous knowledge is often referred to as ideas, beliefs, norms, values and rituals, which are native and embedded in the minds of local people (Akullo & Kanzikwera, 2007). The overall goal was to gather information on the knowledge acquired by the local people over the years, through the

accumulation of experiences and intimate understanding of the coastal resources in a given culture.

Pursuant to achieving this goal, there was the need to eke out the various existing coastal resources identified by participants, and have subsequently discussed their beliefs and rituals about them, and their sources of knowledge. The discussion is, therefore, divided into two main parts and considered as the emerging themes about indigenous knowledge. The first part presents data on the beliefs, rituals and customs about the identified coastal resources, while the second part deals with the sources of knowledge about the existing resource.

To initiate conversations that would bring out beliefs on the coastal resources, questions were asked in different ways. Participants were first asked to mention the various coastal resources available to them; then based on their responses, they were asked them to prioritise the said resources. Based on their response, the researcher went ahead to ask them to describe the beliefs in those resources. Asking the questions in this manner was to offer the researche, the opportunity to identify and to also generate as many responses as possible so as to guide the study. Although most of these beliefs were transferred from their ancestors to them, some emerged through their experiences. Based on these experiences, the narrative analysis technique was employed to enable researcher to tease out the varied experiences that came out.

Coastal Resources in Moree and Apam Communities

Before the discussion on the beliefs of coastal resources, it is essential to point out that, in the Moree and Apam communities, the major coastal resources, available to the participants were mentioned in order of their

relevance to the people were the sea, sea sand, salt, and land (trees, stones and rocks). The participants revealed that the sea, among other resources was the priceless asset nature has bequeathed to them particularly due to the fact that it was the major source of livelihood for the majority of the inhabitants. Next to the sea was the sea sand and salt-resources they obtained from the sea. These extractions were apparently part of the reasons why the participants in Moree and Apam placed high value on the sea.

The sea-sand, according to the participants, had also benefited them because, just like the sea, the sea sand does not deplete and has served the purpose for which it was created by the 'Supreme Being'. For decades, the local people had used the sea sand for domestic and commercial purposes. As many of them had fetched the sea-sand to build their personal structures, and in recent times, companies come in with big trucks to fetch their sand for commercial purposes. These activities had led to the rapid depletion of that particular resource and consequently, a ban had been placed on fetching the sea sand by the local authorities.

Salt is an important mineral obtained from the sea by the participants in Apam. Salt mining activities were not recorded at Moree, probably due to the steep nature of the topography of the area. Aside using salt for domestic purposes and preservation of fish, participants lauded it as an ingredient used by many industries for the production of soaps, and also for dyeing, bleaching and pottery. It is also worth mentioning that, the participants did appreciate the existence of trees, stones and rocks on the land due to their associated benefits to the local people. All the participants in both communities identified the sea as the most outstanding resource for their livelihoods and survival. Based on

their preceding responses, their beliefs were further explored on the coastal resources which are discussed below.

Belief in Coastal the Resources

One of the significant items of the indigenous knowledge that came up in the discussions was their belief in coastal resources. The sea, as mentioned earlier, was the most essential coastal resource among the people of Moree and Apam communities, as it was their major source of livelihood. But, whether the participants could utilise and sustain their resources effectively and efficiently largely depended on their belief systems, which could influence their behaviour and attitude, towards the resources. It was, therefore, imperative to find out, from the participants, their beliefs about the coastal resource. The data as emanated from the study were categorised into four main themes: The coastal resource as Deity's creation; coastal resource as the host of lesser deities, beliefs in fishing and related activities (fishermen and fish mongers); the and belief in the usefulness of the resource.

Coastal Resources as God's Creation

The participants in both study areas indicated that, the sea, sea sand, salt and the land (trees, stones and rocks) were important resources created by the Supreme God to support humans. According to the participants, they came to meet these resources and would definitely leave them for the next generation hence it was important to conserve them. The dominant thinking about the coastal resources in the olden and modern days had been that the people were blessed with these resources by the Supreme God, and that they had the prime responsibility to protect God's creation provision. They,

therefore, believed that coastal people should play a leading role in protecting the coastal resources.

Their belief in the sea as God's creation was also evident in the daily and sporadic rituals performed by the people and leaders of the community during the celebration of their festivals. The engagement revealed that as part of their rituals and customary law, they revered the Supreme God for blessing them with these resources, and further emphasised the contingent nature of the participants to the coastal resources. The onus, therefore, lay on the people to conserve the coastal resources because it belonged to the creator who, though, invisible saw and knew everything. As a result, any deviant activity directed towards the resources would attract sanctions in their present lives or the next.

It can be deduced that the people of Moree and Apam communities shared a common belief system with regard to the coastal resources (sea and land) being God's creation, and they highlighted the need to conserve these resources for the next generation. The leaders of the communities had made conscious effort to show regards to the Supreme Being, for creating these resources during their festivals- an admission that the resources were God's creation.

Beyond making a logical argument that cements their beliefs about the sea being God's creation, there appeared to be an intersection between the perceived God's law governing the sea and their fishing laws. They were highly convinced that, God made rules for the sea that guided their operations and that, included fishing. For instance, it was the belief that God has periods for major and minor fishing seasons, they had to comply with. Hence, their

fishing expedition was part of God's plan for the people. Below are some voices from participants.

> *I believe that the sea is God's creation, and he gave it to us for our own benefit. The sea is guided by rules and we will be blessed with more fishes if we abide by them. I believe that God has appointed time and seasons for the appearance and disappearance of different kinds of fish in the sea, and as fishermen we must follow these laws to get more fishes.* (FGD-CM 5, Moree)

> *God used principles to create the land and the sea is one of them. So, God made rules about the sea as to when we can get fish from it. So, we go for fishing according to god's plan. There are times that the fishes go beneath the water and at another, they appear from their hideout. So we go for fishing based on these rules. There are periods that God brings bad waterin such a way that, we cannot get fish.* (FGD-CE 3, Apam)

In addition to the belief of the sea as God's creation, the participants also had an enduring belief about the land they lived on. It came out that the richness of the land supply the people with mangrove forest, space for habitats, minerals and agriculture. The land, referred to as '*Asaase Efua*' (Mother Earth) by the participants, was created and controlled by God who has enormous authority over everything, including the earth's resources. An assessment of the narratives clearly shows that the people of Apam and Moree benefited less from the land for agricultural purposes (except for subsistence in few cases and forest reserves except serving as a space for habitat). For instance, a participant fostered a strong belief that the land, as a coastal resource, is Deity's creation by stressing:

> *The land is also a creation of Deity. We believe that God blessed us with the land because the sea would not gives everything all year round. The land has spirit we call 'Asaase Efua' that controls the activities of the residents on the land. We believe that the Supreme Being created the land and instilled authority in the hands of the earth*

> *deitydess (Asaase Efua) to control and direct the affairs of resident in the community.* (41-year-old fisherman, Moree)

Coastal Resource as Abode of Deities

As part of the discussion on the coastal resource as God's creation, it came out that lesser spirit or deities were part of God's creation. If that was the case, then it was imperative to ask questions such as; where did those these spirits reside? This is one of the issues of contention as far as the existence of coastal resources was concerned. There has been the general perception that spirits are found in the sea, forests and rocks in many Ghanaian communities, and the study area was no exemption (Awuah-Nyamekye, 2009). The existence of spirits in these resources is also backed by the belief systems which were handed over to people by their ancestors.

Based on the investigations, it was revealed that the participants held the belief in the coastal resources in the Moree and Apam communities as abodes for the which could be destructive or helpful, depending on the kind of human interaction with them. That is, they tended to be helpful when the people followed the taboos, customary laws, norms and values, but destructive when they deviated from them. This was revealed in both the interviews and focus group discussions, as sample of their view are presented below.

> *I believe the sea has a spiritual component and not just a natural resource. It is dangerous and mysterious. It shows us a lot of mysterious things when we go for fishing expeditions. It gets very angry and sometimes in her anger, it comes to the nearby homes to destroy our properties.* (FGD-C M 2, Apam)

> *The confluence of the sea and the lagoon serves as the place of abode for the epa spirit or deity. This deity is believed to be regulating the activities in the lagoon. The other deity is called efa. He mostly reveals himself to people. He is found at the sea shore where the sand is*

> *extremely white. No one is allowed to fetch sand or anything around the lagoon or the shore near it. That place is reserved for the deity. Hence, we try as much as possible not to defile the deities by fetching the sand from that stretch of the beach.* (A 61-year- old fisherman, Moree)

A closer examination of the responses deepens one's understanding on the diverse belief systems around coastal resources, which form an integral part of the culture of the people. Not only could the people find deities in the sea, but in rocks as well those that are found both at the shore and in the lagoons. Similarly, those spirit had unique names, and a lot of significance was attached to them. There were specific mentions of deities such as *efa* and *epa* at Moree and *apaa, basaa* and *eku* at Apam.

Each deity in the area performed a specific, but different function as in the case of the *epa* and *efa* deities at Moree. The *epa* deity at Moree was responsible for regulating the daily activities of the people in relation to the utilisation of the lagoon and its adjacent resources. Nana *efa*, on the other hand, was seen as the deity that protected the beach and revealed itself to people when it was unhappy about their activities. But, the greatest deity in Moree was Nana *Mfam*, who was recognised by the participants as the deity that protected the members of this community, even from curses.

Similarly, the Apam community was named after the great deity that resided in a rock near the shore, *Nana Apaa*, and was responsible for the welfare of the people, and punished them when offended. With such beliefs in the resources as abodes of deities, the resources were, in effect, used cautiously. In relation to the sea, rocks, and lagoons hosting spirits, these were some of the responses gathered from participants:

> *The lagoon hosts the greatest deity in the community. It is called Nana Mfam. Nana Mfam is the deity that protects the members of this community. Nana Mfam is capable of protecting people from curses, even including those who are cursed outside the town. He will protect you once you are in his territory. It does not allow other deity entry into the community to harm you.* (A female key informant, Moree)

> *Some of the rocky areas around serve as the place of abode to a number of deities and the sea spirit in the community. For example, Nana Apaa resides in a rock near the shore of the Sea. There is another rocky area close to Fort Patience, hosts Nana Basa so I go there to perform rituals to it. There are several deities around in this area, including; Nana Apaa, Egya Eku, Onyina Kwabena.* (A female key informant, Apam)

Reasons for the Belief in lesser spirits or Deities

There were reasons for participants' beliefs in the lesser deities, however, it must be emphasised that, not all of them held onto those belief systems. The results showed that the belief in the deities was based on participants' personal and social experiences, the acts of the deities when they are offended by the people, and the rituals they performed towards the deities. Participants shared both the good and unpleasant experiences that made them believe in the existence of the deities. In as much as the participants were aware of the existence of spirits in the sea and the lagoons as coastal resources, they also outlined their roles towards their livelihood and communities' development.

First, among the reasons for the belief in the deities was the participants' conception about a marine spirit *(Mammy water)*. The spirit, according to the participants, appeared in different forms, as most of them stressed seeing *Mammy water* during their fishing expeditions. According to the participants, the spirit was often seen during non-fishing days (Tuesdays),

and when people violated the customary laws or norms in the community. In that regard, violators were likely to encounter bad experiences, as voiced by a participant below.

> *It will be a lie to say there is no spirit in the sea. The crew I belonged to once encountered a spirit-like object, when we were casting our net around 5 am. We saw something weird; a spirit-like object. It suddenly came up and dived into the water in the form of fire blaze afterwards. Our father then told us it was one of the harmless spirits, known as Okomodo Ayensi Spirit.* (FGD-M1, Moree)

Another reason why the people of Apam and Moree communities shared the same beliefs in the deities was perhaps due to the acts of the supernatural beings, especially, when taboos and other social norms were violated. Taboos are restrictions that, when broken, instantly place the offender in a condition of ritual incapacity, which can only be eased by a purifying ceremony (Barre, Grant & Draper, 2009). It looked as though people who violated the social and religious taboos experienced spiritual attacks, which some of the participants were witnesses to. Sometimes, the victims of social actions called on the deities to retaliate on their behalf, and this had strengthened their beliefs in the power and authority of the deities who happened to exist in the coastal resources (especially, the sea).

In addition, participants had observed people cursed with the sea water for committing some offenses in their communities. Apparently, at both Apam and Moree communities, there were customs against stealing and infidelity. The study revealed that, there were instances where people called on the deities using the sea water to curse others when they felt that they could not achieve justice from the leaders in the communities. According to

the participants, the deities could not be bribed, neither would they show favouritism.

They also believed that, the deities often acted swiftly to their wishes and the efficacy of their powers was unquestionable, as they were reported to have caused the death of so many people in the Apam community. In this regard, cursing was reported to be common in the communities, especially Apam. In some intances, people used the sea water to curse others for sexual improprieties with another man's wife, and other offenses. For that reason, the traditional authorities had made the act of cursing a taboo in the study area. These taboos triggered reactions from victims who intend to prove their innocence. The participants also explained that a person, who got drowned by the sea and the cadaver was found and eventually buried could not be attributed to the spiritual authority in the sea. It was only when the corpse could not be found and buried that the spirits were believed to be involved. The following quotes depict some of the views of the participants.;

> *Traditionally, we have certain taboos that guide and regulate our activities and our relationship with the resources. For example, a lady in her menses does not enter the sea. If she does the deities will be angry and strike her.* (A 50-year-old fisherman, Apam)

> *There is a norm here that no one should steal from the fellow fishers. Such acts attract the wrath of the deities. There was an instance where a friend was cursed after he denied it several times of stealing from another person. In the end, he died a miserable death. It was really shocking. I have come to believe in the existence of the supernatural forces since then. However, those who accept their guilt and confess early, are taken through some rituals to appease the deities to avert the punishment. But, those who refuse to tell the truth are exposed and dealt with by the deities.* (A 50-year-old fisherman, Apam)

> *Some of the men also engage in extra marital affairs with other people's wives and deny it when they are summoned*

> *before the elders. In such cases either the accused or the victim is asked to invoke a curse to prove his or her innocence or to seek for vengeance from the sea deitydess, respectively. Although we often do not see people do it openly because of the rituals they will go through, they still hide and do it. It also happens when disputes are not settled among the people in a satisfactory manner. The deities have never failed us when they are called upon in such circumstances.* (47-year-old fisherman, Apam)

> *Just yesterday, a boy got drowned in the sea. Because the spirits were involved, we could not find the body. We are often able to retrieve the bodies of those who get drawn accidently, without the involvement of the deities, for burial.* (A mason/sand miner, Apam)

To further demonstrate their beliefs in the deities, the performance of rituals to the spirits was seen as paramount among the participants. The rituals and traditions had been passed down over many centuries. Each generation ensured they passed down those traditions to avoid the wrath of the deities. This was an indication of the firm belief of the people in some supernatural beings and the need to pay tribute to them. The fact that those rituals had survived the passage of time, with different social changes happening further confirmed the belief of the participants in the deities.

The cutting down of special trees for the manufacturing of boats and canoes demanded the performance of rituals with the ultimate aim of protecting the chainsaw operators and the owner of canoes or boats. However, there were variations in terms of preference for the type of rituals they had to perform before such operations take place. While some participants sought for assistance from fetish priests and priestesses, others opted to go to pastors from the Christian fraternity. Ignoring those rituals, would lead to avoidable problems, including a low harvest.

Not only did the deities aid them in their occupation, their service as interveners was another fundamental reason for the performance of the rituals. Indeed, the chief fisherman and his council in Apam were responsible for providing money to purchase the items needed to perform periodic rituals for the deities on behalf of the whole community.

Drawing inferences from the reasons for the belief in deities, it was clear that, the participants in the study area were convinced by their experiences and perceptions in relation to their belief in the sea deitydess (Mammy water), the 'acts' of the deities or spirits and the performance of rituals in their respective communities. Recurring natural and human events, to a larger extent, had created within and among the people, not only fear, but respect for and their belief in the deities in the community.

It must also be emphasised that there was no single route to resolving issues in both communities considering the diverse religious backgrounds of the people. While some resorted to the Christian approach, others used the traditional religious method. But it appeared the people trusted the fast process of the traditional religious approach in addressing their problems in their communities; hence, performed the needed rituals to achieve their goals. In instances of disagreements over resources and the search for the absolute truth, the traditional religious approach was the much-preferred option. Participants in both individual interviews and focus group discussion shared the same view on these deities as presented below:

> *Growing up, what we used to do was that whenever we observed that there was shortage of fish in the sea, we performed rituals on the Tuesday to pray for fish to harvest. We often got enough fish the Wednesday after the rituals.* (FGD-CE6, Apam)

> *The "odoom" tree has a lot of spirits in it. When a man is going to the tree, he has to strip naked. Birds cannot hover on the "odoom" tree. Women cannot approach the tree. Before a male can approach the tree, he has to go for a spirited seed (Di Abanu). The chainsaw operators have spirits protecting them. They are required to pacify the deities before cutting the tree. Fishers who fail to perform the necessary sacrifices and rituals before using a boat made out of odoom wood often hear strange cries from the wood and that affect their fish catch.* (Fetish Priestess, Moree)

> *Just this morning a priestess came to be chief'f palacefor money to purchase the needed items to perform rituals. The chief priest had declared that the deities had ordered him to perform some rituals otherwise we were going to lose some of the elders. We had to collect fish from the various fishing groups to anable us to raise enough money for the atonement* (A 50-year elder, Apam).

Beliefs in the Coastal Resources as a Means for Livelihoods

It is popular knowledge that fishing is the commonest economic venture in coastal communities, including Moree and Apam. Traditionally, a resident in a fishing community was more likely to be a fisherman or a fishmonger, sand and salt miner, crop farmer and with relatively few of them into other engagements (probably because of the non- lucrative nature of the fishing business due to inadequate fish stock for artisanal fishers). Regardless, whatever livelihood activities undertaken by the people (fishing, salt mining, and sand mining) were directly or indirectly, linked to the sea. The activities of the participants, guided by important beliefs that were inherited from their forefathers, were regarded as distinctive traditional heritage customs, beliefs, values and norms of fishing and other coastal related livelihood activities.

A careful analysis of the responses, relating to the above, exposed two interesting issues inherent in their beliefs in fishing activities: ranging from the day of no fishing and the reliance on celestial bodies (stars and moon) to

regulate and direct mainstream fishing activities. With respect to the fishing days and the rationale behind it, Tuesdays, and in some cases, Sundays were declared as no fishing days. As Tuesdays were seen as the general rest days for the deities and fishers, participants claimed their communities had added Sundays to it, probably, as many of them have become Christians and would attend church services.

The day of 'no fishing' seemed to be a universal norm along the coastal belt of Ghana, going beyond ethnic lines. Tuesdays, were considered days for the sea deity and other spirits to rest. Such day was supposed to be sacred and observed as such. The sea deity and other spirits used such periods to also operate as supernatural beings. Rituals were also performed during such days to feed the deities so they could perform their duties of blessing the sea with abundance of fish for harvesting. With the observance of such rituals, the fishers could be sure of good catch afterwards.

The fishers also used that rest day as an opportunity to mend their boats, nets and perform other maintenance works. The fishmongers went to Mankessim and other markets to sell the processed fish while others rested and cleaned their ovens and grills used for smoking fish, in order to ensure proper hygiene. It was claimed that defaulters were punished by acts of divinity and fines from the Chief Fisherman, and this served as a deterrent to prospective offenders who flout the no fishing day norm. For example, a male key informant from Apam had this to say:

> *We do not go for fishing on Tuesdays. The reason is that on this day, we have some deities in the sea who use those days to rest since the rest of the days are full of fishing activities. Fishermen also rest on the Tuesday, mend their torn nets and boats for the next fishing expeditions. Those*

> *who did not observe the sacred day in past times came to tell us stories about their mysterious encounters.*

The other key element to the fishing activities was the presence or absence of celestial bodies, such as the moon, stars and the wind. The narratives of the participants go to confirm the firm belief in divinity, with respect to the fishing activities. With many considering the celestial bodies as deities, there was the reliance on those to see to their well-being at sea as well as bringing them back home safely. The participants reported that, it was very difficult to make a good harvest when there was a full moon, since the moonlight reflected in the sea and fishes would not like to come out.

Apart from the moon, the stars were reported to be used by the fishers for direction while at sea. The participants had knowledge about the different kinds of stars and their significance of their location during fishing at sea. They also depended on the direction and the smell of the wind to determine the direction and presence of fishes. In fact, the participants depended heavily on the direction of the wind to trace their route back to the shores (home), so in a situation where the wind became still, they could get lost in the middle of the sea. One fisherman from Moree said;

> *We actually have stars that we follow for directions when we go for fishing. There are different kinds of stars that determine or signify our position on the sea.*

The participants, also had varied responses, in terms of land utilisations. Some claimed that, the land was used for subsistence farming activities, especially during the off-fishing seasons. Others said that the land was only meant for settlement purposes. To the latter, their proximity to the sea had made the land unfavourable for crop farming activities. Two of the participants presented the view these ways:

> *The land was created by Deity for us to get a dwelling place. Some of us engage in some farming activities in addition to fishing. The farm helps us with food stuffs and this enable us cut down the cost of living.* (41-year-old fisherman, Moree)

> *We know and believe the Supreme Being created the land. But, the only thing we use our land for is to build house and live in it so that we can go for fishing.*. (54-year-old fisherman, Apam)

Sources of Indigenous Knowledge

This section of the chapter presents findings on the sources of the indigenous knowledge of the participants. The belief in coastal resources, as the previous section discussed, emanated from the knowledge acquired by the local people over the years through cumulative experiences and intimate understanding of the coastal environment. This knowledge emerged from different sources. Generally, the people in Moree and Apam gathered their knowledge through socialisation from their ancestors, long engagement with the resources, via spoken language of traditional authorities, and folk songs. Specifically, the transfer of knowledge from the ancestors cut across both study areas. However, while the people of Moree acquired indigenous knowledge through spoken language from traditional authorities, the long engagement with coastal resources became the avenue for knowledge transfer in Apam.

Transfer of Knowledge through Socialisation

It was evident from the study that, in Moree and Apam, knowledge on coastal resources was transferred through their ancestors. The transfer of knowledge and skills was largely visible in their occupation. During such period of social interactions, socialisation process emerged as a reinforcing

tool in enhancing the acquisition of fishing and fish preservation skills from their parents, elders and grandparents. Thus, participants described the significant roles the family (parents, elders and grandparents) played in socialising the younger generation to acquire indigenous knowledge about the coastal resources; ultimately improving their fishing and fish preservation skills. There was gender-based socialisation in which, the men in both communities learnt the art of fishing from their fathers and elders, while women learnt fish preservation and marketing from their mothers. Apparently, some fishmongers in Moree and Apam, occupied that status through their marriage to fishermen. In addition to receiving indigenous knowledge from their predecessor, some of the fishermen and fishmongers had either transferred the knowledge and skills acquired to their children or had the intention of doing so.

Specifically, the participants made claims that their predecessors educated them about the deities, ancestors, and taboos, and their functions regarding their fishing activities, resources utilisation and sustainability. They were of the view that, the deities were responsible for the production of rain, and replenishing the sea with fish stock. The ancestors were credited by the participants for the current skills and knowledge about the fishing activities including fishing techniques, behaviour of some of the sea creatures, times and seasons for fishing, and general safety measures at sea. On taboos, the Tuesday, non-fishing day was handed to the participants, a legacy they had followed to protect the sea against over exploitation and as rest day.

It is important to stress that, just as participants saw how relevant it was to transfer knowledge and skills gathered from their forefathers to their

children, they were also cautioned that, fishing was bedevilled with some challenges. To the participants, the fishing business was not as profitable as it used to be. As such, they preferred to enrol their children into schooling or other productive ventures that would give them better opportunities in the future rather than fishing or engaging in salt and sand mining.

It can be deduced that, the family remained a key agent of transfer of indigenous knowledge of the coastal resources as well as the fishing activities. Knowledge on coastal resources were gathered from personal experiences in tandem with stories and folklores from their elders and forefathers. Observation, imitation, and learning by doing were the means of knowledge acquisition and transfer. However, there seemed to be a gradual shift in the orientation of the younger generation into fishing activities, as the participants encouraged their children to go to school or learn handicrafts. They attributed the shift to the decline in fish stock and income as well as other challenges in the artisanal fishing, salt and the sand mining activities.

These were some of the views of the participants:

> *Actually, I got the knowledge from my departed elders. Most of those elders are dead and we have taken over. We are now the ones helping the young ones to acquire the skills and knowledge about fishing* (A 45-year-old Fisherman, Moree)

> *In my early years, I used to help my mother in smoking fish. I learnt it by observing how she bought fish from the fishermen through bargaining on the prices. It became easier when I married a fisherman, since there was the need for me to become a fishmonger so I could sell his catch.* (A 32-year-old fish monger, Moree)

> *Just as my mother handed over to me as her first child, I will also hand it over to my first child, who is also a girl. I do teach my first child about my work. Sometimes we go and perform the rituals together*. (A female key informant, Apam)

Long Engagement with the Resources

Although socialisation played an important role in the transfer of knowledge, the fishermen and fishmongers' engagements with the resources could not be overlooked. In other words, their engagements with the resources gave them enough experiences and exposures which had ultimately deepened their beliefs in the coastal resources. This was common in Apam as some participants indicated that, their interaction with the resources while on the job gave them the opportunity to learn more about them. This was because the majority of the participants had lived in the community since birth and as a result, they had engaged with the resources long enough to have gathered the requisite knowledge. Specifically, the participants had learnt the spawning periods of the fishes, the movements of the winds and other celestial bodies and their implications. Two of the participants had this to share with the reseacher.

> *The immense knowledge I have acquired about these coastal resources is due to the number of years I have worked as a fisherman. For me, our engagement and interactions with the resource in the day-to-day activities have been the key to the knowledge I have gathered.* (A 54-year-old fisherman, Apam)

> *Our long engagement with the resources has enabled some of us to gain experience in fishing by using various observation techniques in the business. For example, we often observe the appearance and positioning of the stars or the moon to determine when we could have a great catch in a fishing expedition. This observation has also helped us todetermine the time and seasons to go fishing and some of us are still using these experiences.* (A male key informant, Moree).

Transfer of Indigenous Knowledge through the Traditional Authorities

Traditional authorities such as chiefs, and fetish priests/priestesses had also been instrumental in the knowledge transfer in the study area. The participants gathered indigenous knowledge from their traditional authorities during special occasions such as festivals and durbars. It was during those periods that the participants learnt more about the traditions and customs regarding the coastal resources. Those authorities used the occasion as an opportunity to educate the people, through the performance of rituals, how important the resources were to the community and the need for them to be respected. Some participants noted:

> *We celebrate the deities during festivals. The fetish priests and priestesses come together and summon their deities, and communicate the grievances of the community to them. During such ceremonies, the deities prescribe the appropriate sacrifices to be performed. We all learn a lot of lessons from the processes.* (A male key informant, Apam)

> *Our belief is that the sea was created by Deity and we have to conserve Deity's creation. We make people aware of this belief during festive occasions when we perform rituals at the beach to honour Deity. For instance, during our festivities we give thanks to the Almighty for blessing us with res,ources in this town and let the people know we need to conserve it in order to receive more blessings from Deity. It deters people from destroying Deity's creation.* (A 35-year-old fisherman, Apam).

Transfer of indigenous knowledge through Songs

Some of the participants also did not mince words about the role folksongs play in their quest for knowledge about their resources and social life. They saw singing as something that could not be separated from their daily economic and socio-cultural activities. They sang when they were at sea and at the shore pulling nets or pushing canoes, offloading fish or mending

their canoes and nets. The relevance was that they were able to work effectively in groups, thereby enhancing their inter-personal relationships and served as an emotional booster. Thus, with the songs they could work for a longer period without getting tired. Also, the songs helped them interact effectively with both the natural resources and the supernatural forces dwelling among them.

Most importantly, some of the songs portrayed their belief that, the resources were created and controlled by the supernatural beings. The younger generation learned those songs and their implications on the uses of the resources. Thus, one could not utilise the resources without acknowledging the deities. For instance, a 54-year-old male fisherman from Apam gave an example of such songs that showed the role of the sea deity.

> *With songs of the resources, there is one I recall that says: 'The sea deity created the sun and all that is in the sea. Do respond when your children call upon you, for you are a caring mother. (*A 41-year-old fisherman, Apam)

Participants'Perceptions of changes in the Beliefs and Practices associated with the Coastal Livelihood Resources

As society's survival and development are based on both social stability and social change, and the belief system of the study area were believed to have experienced the same. Although the beliefs and practices remained significant to the people in the study area, there had been so much change. This section presents data on some of the perception of the participants on the changes in the beliefs and practices regarding the coastal resources and related activities of the people in Apam and Moree

Although their attitudes and beliefs about the coastal resources and other related activities had remained important to them, over time, a lot more had changed, and these changes experiences and thoughts, had had negative impacts on their socio-cultural and economic lives. They had seen changes in diverse aspects, including the observance of their taboos, fishing activities, quantity of sand at the sea shore and their overall relationship with the resources. On taboos, participants complained about the gradual disregard of Tuesdays as purely a non-fishing day. Some fishers were reported going for fishing on Tuesdays, so the authorities were not able to enforce the rules strictly. To add to the woes was the fact that some of the people had become Christians and did not believe in the traditional restrictions any more. For instance, a participant noted:

> *We no longer make libation before going for fishing as it used to be. If you go to church you have to pray when you are on the sea. These days, the practices such as making libation are no more. Our world is now in two folds, those who believe in Christianity and those who are Traditionalists.* (A 45-year-old fisherman, Moree)

The participants also, partly, blamed their leadership for the changes in their belief systems that had occurred over the years. They claimed that, there were customary laws and taboos that had been passed down from generations to them. The chiefs, elders and chief fishermen were reported to be the custodians of those laws and taboos. For instance, majority of the participants at Apam were concerned about the relaxation of the observance of the sacred fishing days rule, a situation that had paved the way for many fishers to fish on Tuesdays; thus violating one of the customary laws that controlled fishing.

Apart from the relaxation of some of customary rules, the leaders did not strictly apply the existing ones, thereby undermining the free and fair application of that non-fishing day, the rule on approved fishing methods and nets, as well as laws governing fishing activities. The reason was that, some violators of the laws escaped punishment because of their relationships with the leaders. The study also found that, the leaders had neglected certain rituals that facilitated their belief in coastal resources and fishing activities. For example, some of the participants had these to say:

> *In the past, anyone who disobeyed the sacred day rule was made to handover all the fish harvested, and fined upon returning from the sea. But now because the leaders are the owners of some these fishing boats and violate the rules themselves, we do not see them punishing anyone*. (A 52-year-old fisherman, Moree)

> *The elders have not sponsored the performance of the rituals for the deities in the community for the past five years. Most members of the community do not believe in them anymore and so they do not recognise and perform the traditional rituals as required. For example, the Apofohene and his elders are supposed to give me a number of fish every week to sell so that I can get money to purchase the things needed for the rituals but they do not mind me when I go to them.* (A female key informant, Apam)

A phenomenon had also emerged in Moree that was aired by the participants, regarding the building of residential structures along the lagoon, a place that had been reserved for the deities, an activity which was, hitherto, vehemently prohibited by the local authorities. The erection of structures had been possible because of a number of factors. First is the lack of fear for the supernatural in recent times, due to the infiltration of Christianity and modernity. Second is poor leadership, and third is the paucity of space for building in the coastal areas.

Participants also reported their observations about the changing trends of fish stock and sand deposits in the study area. The fishers claimed they have to sail deep at high sea before they were able to catch some fish. They claimed that illegal fishing activities had become a common phenomenon in recent times. They, specifically mentioned trans-fishing activities, use of chemicals to fish, light fishing, and pair trawling. In addition, they had seen their lagoons that served as a buffer in the lean seasons drying up, and attributed it to the encroachment by the people, who use the adjacent lands for buildings and dumping of waste into the water bodies. For example, a participant shared his views in this way.

> *I have seen some changes as a fisherman. Some of the changes are that, right now we cannot go deep sea to fish because of the Saiko boat (trawlers) so right now (and as such) we are restricted to the nearby shores. When I was being introduced to fishing as a boy, our forefathers did not use any form of light for fishing. It was only the net they used, and they caught enough fish, but now what we do is different from what existed in the past. When we drop the light under the sea, a lot of fishes come around it and we cast our net to catch them.* (A 44-year-old fisherman, Apam)

Participants had also observed drastic changes in the level of the beach sand. To them the quantities of sand that they used to harvest in the past are no more available. They reported that, the beach sand was formerly thick and of great quantity, and they could feel it when they stepped in the sea. To the participants, there was enough sand for harvesting in the past, which they could fetch for sale, and for their housing projects. Apart from that, the community members also used the beach sand for recreational purposes as they used to relax in it after a day's work and during festive occasions. The participants had observed that, the depth of the sand had drastically reduced,

exposing the rocks beneath. The following are some of the views of the participants:

> *The sand at the seashore is limited in supply. Formerly, the sand was so much. We even used to relax in the sand along the shore after fishing and later swim before going home since the sand was in great quantity. Unfortunately, we do not have the same quantity any longer.*
>
> *Also, the gravels, pebbles, and seashells were collected for terrazzo flooring in the housing industry, but they are now limited at the shore* (A male key informant, Moree*).*

The above narratives point to the fact that, the impact of social change on indigenous knowledge about the sea and other coastal resources had led to a reduction of fish catch, insecurity, exposure of their canoes to waves and a threat to their lives that affected livelihoods. By far, these changes have negative implications on the economic and social lives of the people in both communities.

Causes of Changes in the Beliefs and Practices

A renounced philosopher, Heraclitus (544- 483) once said 'everything changes except change'. It was, therefore, not surprising that the participants' beliefs in the coastal resources had changed. But, the question is, What were the possible factors responsible for those changes? Their responses to the question were categorised into internal and external factors. The internal factors which were within the control of the local people included but not limited to loss of fear in the supernatural, livelihood challenges, socialisation processes, greed, and lack of respect for these resources.

However, the introduction of Christianity, upsurge in population, socialisation of immigrants, and Western education were indicated as external factors that were seen to have watered down the traditional beliefs on the

coastal resources and the performance of rituals. Due to these factors, the majority of the participants had turned away from their beliefs in the resources.

The participants believed that Christianity had caused so much hatred and lack of respect and fear for the deities. In extreme cases, people did things detested by the deities or performed actions to scorn their place of abode leading to the migration of some deities from the communities. Once they left, there was no deity. Any action performed, therefore, proved futile. Fish catch reduced and livelihoods were lost. It was observed that, the key leaders in Moree, in the absence of a chief in the community, were also leaders of Christian denominations too, making it difficult to support rituals to the deities. The following quotes typify some of views of the participants.

> *Most of the natives are now Christians so they do not believe in the African spirituality anymore. So, the need to observe these sacred laws is looked down upon and they are breache with impunity. In the past, the deities were believed to dwelt in these resources, as such people were mindful of the wraths of the deities should they abuse them. The coming of Christianity has demystified those beliefs and as such people do not mind whether it is a deity or not, they abuse the resources as it pleases them.* (FGD-FM7, Moree)

> *Now the churches are everywhere and many of us are Christians. So the members of such religious groups are criticised and suspended from the churches by the pastors for participating in traditional rites and for that matter many of us have stopped partaking the trqaditional rites and rituals. Because of the churches we cannot perform those rituals anymore to the deities in the community. The churches are destroying our tradition because they see them (traditions) as idol worshiping.* (FGD-FM1, Moree)

Again, migrant fishers present in the communities, perhaps had no cause to obey regulations by the local authorities. The participants were of the

view that human population was increasing and a lot of people had come in to fish, with their different belief systems, and thus found it difficult to understand the rationale behind some of the indigenous practices. The study revealed that, some of the fishers had migrated from other ethnic groups, such as the Nzema, Ewe, and the Ga, to the study area, who had different socialisation in relation to the supernatural. This had made it difficult for such immigrants to get accustomed to the local taboos and rituals. For instance, a participant expressed his view in this way:

> *Our population has increased due to migration. Many people of different backgrounds have come to live with us. Some of these migrants have different beliefs and in this modern society, one cannot compel them to obey our customary rules and taboos.* (A 55-year-old fisherman, Moree)

It was revealed that, many of the young generation who had access to Western education developed different attitudes towards the indigenous ones. To the participants, their children now listen to what their teachers tell them in school more than their parents and that influence their belief system. They teach them science and other subjects that dispute traditional beliefs. Participants, thus accused teachers for teaching their children Christianity and pushing anything traditional and cultural to the background. The implication was that it had created the situation in which the new generation did not believe and respect culture and tradition. The corollary is that, it is gradually changing the way the youth think about the rituals, taboos, belief systems, and the traditions in the communities. The argument by a participant about being a major cause of the changes in the beliefs and practices is represented in the quote below:

> *The young generation does not want to accept our taboos because of modern education. Our children go to school and the teachers teach them things that influence their beliefs. They teach them science and other subjects that dispute our traditional beliefs. The schools organise church services and teach them Christian doctrines but not our traditions and culture and these have created hatred and disregard for our taboos. Now they do not want to take part in the rituals and other belief systems.* (FGD-CE3, Apam)

Discussion on Indigenous Knowledge Systems and the Coastal Resources

In identifying and relating indigenous knowledge systems to coastal resources, the study revealed that, the sea was a priceless asset that the supernatural had bequeathed to the people, hence they attached a lot of significance to it. The reason was that, the coastal people benefited more from the sea and its resources for their livelihoods than the land. This supports Stark and Chew's (2001) argument that, the coastal people appreciate how important the sea is because of its vital services in maintaining and providing marine products such as seafood and sand for decades.

At the heart of their indigenous knowledge was the belief that, the coastal resources were God's creation; hence the need to protect and preserve them. This finding from the study resonates with the assertion by Anoliefo, et al. (2003), who argued that, it is noticeable among coastal and rural communities to protect and preserve their farming systems, care for the land, forests, wild life, trees and marine because it had inextricably linked to their culture at the Uli, Ihiala Local

Government Area of Anambra State Nigeria.

Their activities on the coastal resources including the performance of rituals and fishing were guided by the laws of the sea, made by the Supreme

Being. This finding supports Ayaa and Waswa's (2016) research on the role of indigenous knowledge systems in the conservation of the bio-physical environment among the Teso community in Busia County, Kenya, where traditional rules guided people's actions to protect water resources, streams, water pans, and wells, as well as the associated vegetation.

The coastal people's beliefs in the existence of marine spirits and the existence of deities in the coastal resources were a common feature in this study. This is similar to the argument made by Sarfo-Mensah and Oduro (2007) that, most ethnic groups in Ghana have beliefs in the existence of spirits in water bodies as deities, and they are believed to represent the deities of the communities. As a result, most ethnic groups in the coastal areas who live near the sea and other water bodies worship them, since they believe that, these spirits protect them, provide drinkable water, a source of livelihood for the community's residents. It also supports Agyarko's (2013) claim that the traditional Akan believe that, all forms of life, as part of their cosmovision, are bestowed with an essential value termed sunsum (conscious vitality), which is a spark of Deity's like force - a constituent of Deity's nature. In fact, they demonstrate respect and affection for nature, which is why, before going fishing, permission is generally obtained from the sea and rivers.

The study also highlighted people's belief in a sacred day when no fishing was allowed and their reliance on heavenly bodies to control their fishing activity. This is consistent with Dosu's (2017) discovery that, the fishermen in the Jamestown community in the Greater Accra Region do not go fishing on Tuesdays, based on their perceptions of socio-cultural beliefs and taboos. In Adjei and Sika-Bright's (2019) study on traditional beliefs and sea

fishing in selected coastal communities in the Western Region of Ghana, the indigenous people believed, fishing on Tuesdays to be ta aboo, and this customary norm is still followed by modern fishermen. This is because the local people perceive the sea as a deity and must be respected, hence violators of these norms face spiritual and societal negative sanctions as this is also espoused by Adjei and Sika-bright (2019). In addition, the current study is consistent with Turaki's (2000) assertion that, African traditionalists, including coastal people's beliefs in African divinities and deities took the forms of the sun, moon, and the stars that aided their fishing activities.

Generally, the coastal people in Apam and Moree gathered knowledge on coastal resources from their ancestors and forefathers. In most cases, the young ones learnt from the elderly in order to step into their positions in their absence. During the process of learning, the older generation transferred indigenous knowledge to the younger ones through informal means such as myths, taboos, storytelling, method of fishing that ensured proper utilisation of the coastal livelihood resource (Anokye et al, 2013; Esia-Donkoh, 2011).

This finding of the current study is also consistent with the idea that indigenous education was passed down to the generations through their forefathers' stories and songs, which were often performed late at night in the courtyard and were based on their culture, taboos, totems, and respect for ancestral spirits (Risiro, Tshuma, & Basikiti, 2013). Many of the interviewees claimed that, they had observed the socio-cultural practice of no fishing on Tuesdays, to a greater extent. Adjei and Sika-Bright (2019) argued that despite the influence of modernisation and Christianity, some old rituals are still important in every society. That many fishermen in coastal towns, for example,

observe a day of no fishing. This is supported by Dosu (2017), who claimed that, the most widely observed and enforced socio-cultural taboo in the Jamestown fishing community is the 'no-fishing on Tuesdays' rule.

There had been changes in the belief systems, including the observance of sacred fishing days where many had added Tuesdays to their fishing days. The p[articipants believed that their leaders had contributed to the phenomenon for compromising the rules for their personal expediencies. This conhfirms Ansah, et al's (20220) that, the violations of the Tuesday non-fishing custom are caused by specific political and legal conditions in the communities, as they are facilitated by traditional authorities.

Dosu (2017) affirmed this position by stating that these practices are fading away, due to changes that are attributed to the lack of fear in the supernatural, formal education and Christianity. This finding of the study is in line with what pertain in literature (Adjei & Sika-Bright, 2019; Awuah-Nyamekye's 2009; Dosu, 2017; Ezeanya-Esiobu's, 2019). The lack of fear of the supernatural, however, tends to contradict Risiro, Tshuma, and Basikiti's (2013) argument that indigenous people's respect and fear of the unknown is good enough for one not to tamper with marine resources, sacred forests and other animal species.

The study identified a number of social factors that had eroded indigenous knowledge systems in the fishing communities. Modernisation, formal education, and the introduction of Christianity were mentioned as some of the major factors that had eroded traditional beliefs in the fishing communities (Adjei and Sika-Bright, 2019; Esia-Donkoh, 2011). In all the factors identified, the advent of new religion (Christianity), emerged as a

stronger force influencing the way of life of the participants. This study's finding is consistent with Dosu's (2017) argument that the arrival of Christianity, Islam, civilisation, and the technology that accompanied it in Ghana have pushed belief, taboos, customs, and traditions to the margins.

Similarly, Atteh (1992) claimed that the advent of formal education caused the demise of indigenous knowledge and belief systems in Ngamiland. This supports Ezeanya-Esiobu's, (2019) and Awuah-Nyamekye's (2009) claims that, Western education and missionary activities have diluted the significance and respect accorded indigenous education and traditional values.

In spite of these changes, some of the local people still managed to abide with the 'no fishing day' on Tuesday traditional practices in order to conserve the coastal resources. This confirms Adjei and Sika- Bright's (2019) claim that, despite the threat of modernisation eroding traditional beliefs, fishing communities have mainly preserved certain activities that merit the term traditional.

The study's findings are in line with Blumer's (1986) interpretation of the symbolic interactionist theory that, people act toward things based on the meanings associated with them. These may include things within the social and physical worlds. In the coastal communities, individuals attached meanings to the sea, sand and land resources, and these affected their utilisation of the resources. The people of Apam and Moree attached significance to the no fishing day on Tuesday because of their respect for the sea resource which accommodated deities and divinities. The local people came to understand the meaning of no fishing on Tuesdays due to social interactions which serves as a form of socialisation. Young ones were socialised through the interactions with

their parents, guardians and elders of the communities; as such, learn more about the coastal resources and environment. In effect, people's interaction with the coastal resources and environment was derived and regulated through socialisation (Haralambos & Holborn, 2004).

It was also evident from the study that the coastal people attached meanings to their resources based on others' reactions towards the object. For instance, it came out that the perfo rmance of rituals to the deities yielded great catch of fish which consequently deepened their beliefs in that practice in the past. This study supports the idea that people's behaviours were influenced by their circumstances in the sense of a formative process in which meanings are employed and altered as instruments for action.. As a result, the meanings that the participants attributed to things were dependant on how others reacted to them (Blumer, 1986).

Summary

The first section of this chapter described the social, demographic and economic backgrounds of the participants selected from Moree and Apam and background information of some government officials in the fishery sub-sector in the Central Region of Ghana. Their socio-demographics showed that most participants fell with the middle age (40-59 years) with more fishermen than fishmongers. The majority of them were married with Christian background and no formal education who have spent a larger number of years as inhabitant by birth in their respective communities.

The second section related to the indigenous knowledge system of the people in Apam and Moree to their coastal resources. It is evident that the coastal people relied on the sea and other auxiliary resources such as the beach

sand, salt, and the lagoons for their basic needs. It was stated that the coastal people believe that their resources are the creation of Deity, habitat of deities, and sources of their livelihoods. This kind of indigenous knowledge was obtained through socialisation, long engagement with the resources, traditional authorities, and songs.

The chapter also captured the participants' observation of some changes in the state of, both coastal livelihood resources and their belief systems over the years. So far as the former was concerned, the fish stock in the sea were reported to be dwindling, the beach sand had reduced in quantity, and the purity and volumes of the lagoons were all reported to have changed for the worst. The belief systems had also undergone some significant changes due to the advent of Christianity and formal education.

Despite the changes in the belief systems, the local people still remained steadfast in maintaining the 'no fishing day' on Tuesday traditional practice in their bid to preserve the sea resource and retain the respect the deities. The transfer of knowledge was passed on to them by their forefathers regardless of the fact that they gathered knowledge through their interaction with the traditional authorities and their long engagement with the coastal resources.

CHAPTER SEVEN

INDIGENOUS KNOWLEDGE, RESOURCE UTILISATION, AND LIVELIHOOD STRATEGIES

Introduction

This chapter explores the impact of indigenous knowledge on resource utilisation and livelihood strategies adopted by the participants in the study area. Having identified the sea, sand, land (rocks/mangrove forest) and salt as the commonest coastal resources in their communities, the researcher sought to examine how the participants had used their indigenous knowledge to utilise the resources for their livelihoods. This chapter, therefore, navigates into the indigenous utilisation of the resources, the factors affecting their livelihoods and how they had been managing them (livelihoods) over the years.

Objective two: Indigenous Knowledge and its Integration into the Livelihood Strategies

Just as the entrepreneur sees human capital as the most useful resource in business, the sea, sand, and the land are also useful resources for the fishermen, fishmongers, sand dealers, salt miners, and the community members, at large. The benefits of the sea, land and sand are enormous and it is relevant to argue that, the beneficiaries of these resources cut across the length and breadth of the country. The sea, in addition to producing fishes for domestic consumption and commercial purposes, at both local and national levels, the beach sand has been fetched to be used as a fundamental material for the building and construction sub-sector. They are efficient, sustainable, eliminate costs associated with repairs of concrete spilling and mitigate the

adverse effects of the climate on steel-reinforced concrete structures (Mazzocchi, 2020).

The coastal resources had symbolic value for the people in Apam and Moree. Community members had settled on the land for habitat, but they depended on the sea and sand for their livelihoods. The people also perceived the sea, sand and the land as God's creation, meant to provide their physiological, safety and social needs, hence had a strong bond with those resources. The participants reported that, the sea was the most relevant resource at their disposal because, it was their main sources of livelihoods. With the sea at their disposal, they believed that, at least, they could be sure of satisfying their basic needs through fishing and its related activities. It had created employment for a greater number of people, both indigenes and immigrants from other communities. This has increased the population of the area as many people had migrated there to eke a livelihood. The sections below present resource utilisation by participants in the areas of medicinal, metaphysical and livelihoods, based on their indigenous knowledge.

Medicinal and Metaphysical Uses

The indigenous knowledge of the participants, no doubt, had impacted their utilisation of the coastal resources available in the communities. This was based on their beliefs that the coastal resources had multiplicity of utility value, including medicinal and metaphysical properties. The participants reported of the medicinal and metaphysical properties of the sea, lagoons, and the rocks. They claimed that, they used the water from the sea to treat different kinds of skin diseases, piles, and waist pains. To them, people who suffered from waist pains and hernia just needed to fetch the raw sea water

and used it to enema, to gain some relief within a short period of time. How useful the resources were, depended on the person since some used the resources for a good purpose, as mentioned earlier. For example, the efficacy of the sea water in treating skin and other diseases, in addition to other socio-economic functions was considered an important use of the sea. The narratives below represent some of the views of the participants:

> *The sea is so important to us. We depend on it for so many things, especially, to treat many internal and skin diseases. For example, we use it to treat hernia, just by fetching the raw sea water to enema. People even use it for spiritual purposes as they fetch it to curse those who offend them.* (A 47-year-old fisherman, Apam)

> *The sea has healing powers, for instance, we use the water to enema to cure waist pains. Some people also use it for spiritual healing and cleansing. Pastors and other spiritualists ask people come here to fetch the sea water for Akwankyere (spiritual breakthrough). We believe that no ghost can chase or harm you if one baths with the sea water. However, to nullify any undeityly use of the sea water, one has to drop a coin into the water before fetching.* (FGD-CM4, Apam)

In the supernatural realm, it was reported that, the sea was used for spiritual healing and cleansing. When people realised that things did not happen as it should they sought spiritual intervention from the sea deity. To the participants, even some pastors often directed their clients to the sea and offer a prayer at night, with the belief that their problems would be solved. Some pastors and other spiritualists also baptised new converts in the sea and ask members/clients to fetch the sea water for spiritual breakthrough. It was believed that, no ghost could chase or harm anyone, if one bathed with sea water. For example, a participant expressed his view in this way:

> *Apart from the physical treatments of diseases, we do also get spiritual healings from the sea water and the deities in the lagoon and the rocks. The deities often reveal to the*

> *priests/priestesses of some impending calamities and prescribe the kind of rituals to be performed in order to avert such mishaps. (*FGD-CM3, Apam)

The usefulness of the resources depended on the user. While some used the resources for the right reasons, others used it for the wrong reasons. The study revealed that some people fetched the sea water to curse others for various reasons. The participants claimed that, people who did not trust the established systems of conflict resolution often resorted to the sea for justice through cursing the supposed accused person. The frequent use of the sea water for curses and their ramifications had necessitated the making of rules to govern the fetching of the water, especially by strangers. A stranger could not go into the sea with empty containers to fetch the sea water. One would need to drop a coin into the sea before using a smaller bucket to fetch, and that could nullify any negative intended purpose. It was reported that people from afar and near had been going to the study communities to fetch the sea water for such spiritual purposes. In narrating the lack of uniformity in the spiritual uses and its regulations, a 47-year-old fisherman had this to say:

> *People use the spiritual powers of the deities in the sea and the rocks for diverse reasons. Some pray to the deities for healings and blessings of all kinds, while others for cursing. Because the elders might not know people's intentions for fetching the sea water, for instance, one has to drop a coin into the sea before fetching it. This is to neutralise any bad intentions it was meant for.*

Livelihoods Benefits

Livelihood issues played out significantly during the interviews with the people of Apam and Moree. It is imperative to indicate that, there appeared to be an interconnection between the utilisation of resources and the livelihoods of coastal dwellers in the study area. For the participants, fishing

was their primary occupation, with sand and salt being secondary sources of income; and thus, spent a lot of time mending their nets and fixing their boats anytime there was a holdup in the fishing activities. The majority of the people in Apam and Moree had, traditionally earned a livelihood through their engagements with the sea, sand and salt resources. Hence, these resources had traditionally, served as their source of livelihoods.

However, for most of the participants, fishing and its related businesses remained their primary occupation, where they earned income to support themselves and their families. A few of them had other sources of livelihood. Aside fishing, a number of them were involved in sand mining, while few people were into craftsmanship, petty trading, and salt mining for the purposes of making income. In all, fishing had been the commonly identified occupation of the natives of Apam and Moree. However, all the three livelihood activities of the participants in the study area, including fishing, sand, and salt mining pivoted around the sea. The participants were of the view that the sea was so important to them in the sense that it was, traditionally the main source of their livelihoods. The following responses support the fact the participants depended on the sea for their livelihoods so much.

> *In this community, almost everyone is involved in fishing. My father was a fisherman and I am also a fisherman. I cannot earn money from anywhere except to go for fishing from the sea. When we have a good catch, it is good for me and the family because I sell extra income and my wife can smoke the rest for sale to raise some to support the family. The sea is my only hope in life. (A* 45-years Fisherman, Moree)

> *We are all involved in fishing. The proceeds from the fishing activities are what we use to cater for our families and expand our businesses and community at*

> *large. In fact, I have to state that we do not have any major business or job we can resort to if fishing fails us.* (FGD-CM 8, Apam)

Apart from the sea, the participants also made mention of the sand at the beaches, as one of the resources they accessed for their livelihoods. Even though the government had banned sea sand mining, it was discovered that, the people mined it under cover as a livelihood support system. Some fetched the sand to build their own houses while others used it for commercial purposes by selling it to outsiders. It was also revealed that, the people used the beach as a recreational facility, where they played all manner of games after a day's work and during festivities. Some of the claims made by the participants include the following:

> *We fetch sand for sale and to make building blocks. We use the sea sand because it is smoother for the building construction, especially, for plastering. It is also free; the only thing you need is the strength to carry it from the shore to where you want to use it.* (A 47-year-old fisherman, Apam)

> *At times people come with big trucks to transport the sand from the shore and sell it. The sand mining has become a source of livelihoods to most of the women who are not into fish trade. (A 45-year-old fishmonger, Apam*)

> *The sand also has its own economic and social benefits. Apart from fetching to sell or construction of houses, we also play in it. It is the reason why we do not defecate along certain part of the beach. We have demarcated the rocky area for the purpose of defecation.* (FGD-CM2, Apam)

Salt mining was another economic activity that was undertaken at Apam. The traditional authorities had contracted an entrepreneur to mine the salt in commercial quantities so that the profit accrued could be shared between the company and the traditional leaders on behalf of the community.

For proper accountability, the community had appointed two representatives to be part of the production process for monitoring purposes.

It was revealed that a greater portion of the salt was sold to traders who came from other part of the country, and the locals, for either domestic consumption and for fish processing. There some fish sellers, who had specialised in processing salted fish for sale. These women relied heavily on the salt industry for the production of salted fish in the community.

There was also Fort Patience at Apam, which was built by the Dutch in 1702. Though, in terms of tourism, it did not fetch much revenue to the people, they saw it as an important monument. It was revealed that ,the Fort once served as a hiding place where the people pitched camp to fight against their enemies. For that reason, they saw it as an important ancestral home and perform rituals to thank the deities and ancestors in the Fort during festivals. The few rooms in the Fort also served as guest rooms for strangers and locals alike.

However, there were neither salt mining activities nor Forts at Moree. The Fort Nassau which was built by the Dutch in 1612 had collapsed beyond repairs, and the salt mining activities had also died out. The benefits accrued from these resources, including economic goods, recreation, building and construction, cure of sickness, spiritual assistance and guidance deepened their beliefs. Such intercessions were believed to have influenced their behaviour towards the coastal resources because of the benefits they derived from such resources. Irrespective of their benefits, one cannot undermine the impact coastal resources have on the livelihood experience of the people, which is up for discussion in the next section.

Challenges Affecting Livelihoods

Despite the vast array of resources in the study area there were certain factors that affected the livelihood activities of the people, thereby making them vulnerable. Participants identified factors such as high tides, irregular rainfall pattern, seasonality, and declining fish stock to be the natural occurrences that determined the availability of catch. Other challenges were human induced, which included, irregular supply of pre-mix fuel, inadequate loan facilities, non-uniform nature of pricing of goods and services and seasonality of fishing, poor planning, and high level of dishonesty of customers.

Irregular Flow of Income

The first among the challenges detailed by participants in the study area was the inconsistent flow of income arising from the erratic nature of fishing in these communities. Those irregularities were attributed to the seasonality of the fishing and sand mining businesses, coupled with economic hardship. Even the non-fishers depended on the fishers ability to get good catch of fish to also make a living. For it was when fishers had enough catch that they got money to invest in putting up buildings for others such as artisans to get jobs to do.

With the people need money to invest in their businesses as compared to the past times. This was the very reason why the participants, to a greater extent, faced a number of livelihood challenges. In addition to seasonality, participants also claimed the the illegal fishing practices and over population of humans and canoes in the fishing industry also accounted for their irregular incomes. As a result, they were not able to meet their expectations.

Considering the fact that the participants were overly dependent on the sea for fishing and sand mining, only a handful of them had some form of alternative livelihood strategies pursued during the lean and closed seasons. Participants claimed that they often had no choice than to devise survival, instead of livelihood strategies. As they claimed there was hardly a survival strategy to rely on, some of the participants in the study area were seen sitting idle, mostly at their landing beaches during the closed/ or ean season, resulting in seasonal poverty.

It was clear that, the incomes generated from their livelihood activities were not enough to meet their varying needs, and this made the people battle with making enough income to save and invest. The reason was that participants were confronted with several challenges affecting their livelihoods that put them in a vulnerability context. This had rippling effect on paying for their children's education and the provision of basic needs. In such a situation, the only alternative was to withdraw the children from their favourite schools to public one which many parents considered as a last resort. Dwindling incomes also could lead to family conflicts as some of the wives would insist on getting money from the men to take care of the home. The following narratives epitomise the vulnerable conditions the participants found themselves in:

> *As a fisherman, fishing is my main source of livelihood. Though the income is not enough, I use it to take care of my wards' educational needs. I am also the father to my siblings and our mother, so I take care of them because my father is dead. Life has become very difficult of late, because we are into a hand-to-mouth kind of living. We are not able to save. Whatever income I get is used for everyday expenditure, making it difficult to save.* (45-year-old fisherman, Apam)

> *I have a lot of challenges but the main one is irregular income flow. This is due to the seasonality of the fishing business. You see, we depend on the successes of the fishers to also make a living. It is when they have money that they invest in building for us to get a job to do. So, I drain my account when we enter the lean season and wait again for another bumper (major) season for me to be sure of another income flow. The problem is that now the bumper season in itself exists by name not in terms of fish catch.*. (A 47-year-old mason/sand dealer, Apam).

> *The money we used to make has dwindled as compared to the past times. Cost of living is also becoming expensive and we do not gain much income from the fishing business like we used to, which makes it difficult to cater for our families. Sometimes we struggle to make ends meet. But for the free education policy by the government most of our children could not get access to senior high school Education.* (A male key informant, Moree)

Unpredictable Rains and Sunshine

Fish traders who processed salted fish for sale and salt miners also complained of irregular rainfall patterns that affected their activities. According to the fish processers, the rains came at the time they were not expecting it making the salting and drying processes precarious. That often led to loss of incomes as too much rains caused rotting of their fishes. Likewise, the workers in the salt production business complained of irregular rainfall which made it difficult for them to plan their activities. The salt miners, likewise, complained that the rains, sometimes came down when they were near the peak of the evaporation or crystallisation processes. This often prolonged the processes, thereby affecting the productivity and the profit margin of the business. The following narratives depict the participants' views:

> *Rainfall really disturbs us. Because to have the fish salted, we need the sun to dry it up. If it rains, our goal may not be achieved. Again, this business is not always profit earned so, sometimes it becomes difficult to raise money. Sometimes, we lose all the money we invest. When it is not raining, we are okay. (*A 37-year-old fish monger, Apam)

> *Our work needs much sunshine. The more the sun shines, the more the evaporation of the water vapour and the faster the crystallisation. Salt production does need rain, as the rain water dilutes the salt concentration in the entrapped (pond) water. As for the salt content in the sea, it does not change but crystallisation takes a long time to be achieved the moment we draw it into the ponds, and the rain falls into it.* (A 63-year-old worker in the salt industry, Apam).

Pre-mix Fuel and FishPricing

The premix fuel is a subsidised petroleum product that was a key fishing input used by artisanal fishers to power their outboard motors for their fishing expeditions. All their things being equal, an effective and efficient production, allocation, distribution and sale of premix fuel could improve the production of fish since the majority of fishers in Apam and Moree, who were operating the artisanal sector, powered their outboard motors with premix fuel. The participants however, revealed irregular supply of premix fuel in the study communities.

As with any good or service, the prices of fuel is one of the defining features and an indicator of whether there will be a loss or gain at the end of trade. The challenge faced by the fishers in terms of prices of fuel was very problematic because their causative agents were in different forms, one of which was pre-mix fuel. Pre-mix availability were the beginning of the woes or joy of the fishers, as that influenced the pricing of the fish sold to the fishmongers. The demand for and supply of the premix fuel also affected its

price. The price of premix fuel also affected the price at which fish was bought and sold.

The fishermen appeared to sell their fish caught to fishmongers at a high price due to the high cost of production. Consequently, the fishmongers complained of running at a constant loss due to pricing of the fish from the men, they (the men) justified it by shifting the blame on the cost of operations, especially premix fuel. However, those claims of high cost of premix fuel was disputed by the officials of the Fisheries Commission, arguing that, the government had overly subsidised the product as compared to other types of fuel.

The participants speculated that, the subsidised pre-mix fuel distributed by the government was hoarded by some officials. They complained that those officials sold the fuel at exorbitant prices, and that adversely affected the operations of fishers, which inadvertently affect the market price of their catch. The following quotes represent the views of the participants:

> *One major challenge we face here is irregular supply of premix fuel. The government supplies do not often come as expected, and in right quantities too, so one is forced to buy it from the open market, and thus is very expensive. (*A male key informant, Apam)

> *The most challenging problem is the irregular supply of pre-mix fuel. People hoard the fuel government subsidises and later sell at very high prices to us.* (FGD-CE4, Apam)

> *The government has already subsidised the pre-mix fuel, but the fishers always complain about the cost being too expensive. The pre-mix fuel is far cheaper than all the other types of fuel in the market.* (A female key informant, Moree)

Inaccessible Loans from Bank

It is not uncommon for persons who are into business, or at least to have the intention of doing so to seek for loans from banks. In the fishing expedition, sponsors such as owners of canoes, outboard motors, nets and purchasers of premix fuels often secure loans from banks for fishermen and fishmongers to pre-finance their fishing activities with the aim of paying back. Hitherto, a pre-requisite to access the start-up business loans from banks was various forms of collateral security which could be sold off to pay the loans, if it was not repaid in time. Unfortunately, many of the participants did not have the assets to present to the banks as a condition for obtaining the loans. It was, therefore, difficult to access this facility.

The uncertain nature of the fishing venture made it very difficult for the investors in the artisanal fishing industry to access loan facilities. Since the making of profits was not always assured, it was challenging to convince creditors they would be able to pay back the loan. Also, the demands made by these banks made it difficult to get the loan facilities as most of the people claimed they were low-income earning people. Some participants expressed the above situation in the following quotations:

> *The problem is that we often borrow to invest in our fishing activities. So, as we return without much catch, continuously, it makes it difficult for us to pay back the loans. This often creates conflict between us on one hand and the lenders and the women on the other handr. It is due to this uncertainty that made the banks not to give us loans.* (A male key informant, Apam)

> *I have been incurring losses due to the increasing cost of the fish I buy from the men. I used to engage in susu as a forms of savings, but now I am not able to do so due to low returns. I am not also able to secure loans from the banks to expand my business because I do not have any property to present as collateral. The men are not willing to reduce*

> *the prices because of the increasing cost they also claim to incur due to the high cost of pre-mix fuel. I have reduced the quantity of fish I buy for processing to limit the cost. (*A 37-year-old fish monger, Moree)

Poor Planning

Another issue that emerged from the study was poor planning on the part of the fishermen and fishmongers. It is a popular knowledge that proper planning money management skills. One was required to budget to ensure that, the income earned was put to proper use. The study, however, showed that ,many of the participants lacked money management skills, they were spendthrifts without planning towards the future, which often ended them in poverty.

A few of the participants too had managed to save for their retirement or old age and investment. This latter group of participants clearly had a different attitude towards financial literacy and planning. Although their incomes were fairly small, they had employed effective and efficient planning to transform their opportunities into realities. Some of them made the following statements:

> *We borrow a lot as fishers, for both investment and for consumption. Before we get to the bumper season, we are already in huge debt, and as such the little we make is used to service debts. This makes us go through the vicious cycle of poverty. Even with the little we get from fishing some of us are able to save save many of us are unable to save for future use as a result of improper planning.(*FGD-CE7, Apam)

> *Poverty is a common thing among fishers in fishing communities in Ghana in general. I know because I live here and I have other friends in other fishing communities, who are in the same situation. But, one thing is that not every fisherman is poor. While some plan very well with the incomes they make, others do not plan at all, and they really suffer in the lean season, when there is little fish harvest. Some plan (point to himself) while others only*

> *enjoy everything now and go hungry tomorrow*. (A 54-year-old Fisherman, Apam)

Dishonest Customers

Participants, especially the fish mongers, mentioned dishonest customers as one of the many challenges affecting their businesses. A dishonest employee or customer is a threat to a start-up business. A necessary and sufficient condition for a business is an honest and paying customer of the goods and services purchased (Eshun, 2020). In an interaction with an elder who was also a fisherman, he strongly argued the that fishing industry was largely seen by the people, as trust-ridden -business, in that without having trusted people patronising and paying for the goods and services being offered on credit the business was likely to collapse.

The captains (leaders of the various crew groups) of canoes claimed that, fish traders who bought fish on credit did not stick to agreed terms of payments, while fish traders also complained that trusted customers often refused to pay back fish they had bought on credit. Their challenge was that, the men would not take any of such stories due to lack of trust. In such situations, they (the women) would have to look for money to pay them, and thus had been a major cause of the collapse of their businesses. The quote below supports the above situation:

> *Some fish traders also dupe us, sometimes. They trade trade with us for some time for you to develop trust in them, and give the fish to them on credit. Just one day they will buy it on credit, leave and you will never see them again. Our wives who process and take the dry fish to the various markets also come home, complaining of the same dishonest customers.* (FGD-CE5, Apam)

Managing the Livelihood Challenges

Confronted with the above challenges, the people of Apam and Moree strategised, by engaging themselves in other activities that could ensure their survival. Although they had limited income from the fishing, sand and salt businesses, a few of them saved with 'susu' companies and banks, opened provision shops, purchased personal effects and utensils that could be sold later, overly depended on their partners (mostly wives) and owners of canoes or their 'masters' for support.

A look at the responses shows that the participants took steps to address some of the challenges associated with their fishing businesses including savings, or at least, had the intention to save from the meagre income, opened shops to sell items and sometimes fell on their secondary occupation for extra income. It was revealed that, some of the male participants had established cold stores or other shops for their wives as survival strategies. The some of the fishmongers engaged in petty trading, others sold some of their personal belongings (cloths, utensils, and others) they acquired during the peak season as survival strategies, during the lean seasons. The fishermen also found themselves undertaking some jobs like masonry and other opportunities that demanded no special skills or training.

The study also discovered that, some youngsters preferred to stay at home, rather than engage in other productive ventures, with the excuse of not having any special skills or formal education that would secure them gainful employment. Some described the situation in this way, when the researcher asked them of how they managed in such difficult situations:

> *I have a small shop that I operate. Sometimes I sell cooking utensils to support the family. Also, I sometimes*

> *take loans from my susu operaters, when the situations become worse.* (A 37-year-old fish monger, Moree)

> *I most often depend on my wife for survival. She goes to Takoradi to buy fish from the cold stores and process them for sale. So, they take care of us during the lean season. For some of us who are masters, our small boys will always come to us seeking for help especially, during closed season.* (FGD-CE3, Apam)

> *I am a fisherman and a mason as well, so I have opened a bank account that I save part of the money I get. I fall on the little saved for the survival of my family, during the lean season. Because I am honest in all my dealings, people come to my aid in times of need. At times too, I borrow from friends to support my family.* (A 47-year-old fisherman, Apam)

Discussions on Resource Utilisation and Livelihood Strategies

The coastal resources were utilised for many purposes. The study revealed that, the participants had fishing as their primary occupation, which served as a sources of livelihood and to support themselves and their families. The study confirms the argument that the majority of people living in the coastal areas are fishers and that they derive their livelihood from fishing and related activities (McGoodwin, 2001).

The sea water, in addition to producing fishes for domestic consumption and commercial purpose is also used, with the sea sand for moulding concrete blocks for building and construction. The finding on the use of the sea sand for building and construction supports Anim et al's (2013) assertion that, open-cast mining provides building materials for the construction industry in Ghana. This activity is widespread across the four coastal regions for personal or commercial reasons.

The study also reported of the medicinal and metaphysical properties of the sea. They claimed that, many people used the sea water to treat different

kinds of skin diseases, piles, and waist pains. This study corroborates Nani et al (2016) conclusion that deep sea water has the potential of curing several ailments, including skin diseases. Deep sea water has been found in some studies to aid in the treatment of health problems, particularly those related to lifestyle-related disorders such as cardiovascular disease, diabetes, obesity, cancer, and skin problems. Also, the finding on the medicinal use of the sea water from the study confirms Bak et al's (2012) claim that, concentrated deep-sea water could help prevent the development of atopic dermatitis.

Metaphysically, it was discovered that, the sea and lagoons were used for spiritual healing and cleansing. Both pastors and traditionalists were reported to depend on these water bodies for solutions to a number of socio-religious problems. This was based on the belief that, the water bodies hosted deities that are perceived to provide solutions to many social problems, personal problems and misfortunes (Agyarko, 2013 ; Frimpong, 2011).

The financial power of fishermen in Apam and Moree dwindles particularly during the period of low harvest. This supports the argument by Kleih et al (2003) that, the livelihoods of fishing communities are relatively good during the main fishing season, reducing cash income to a short period per year, and putting pressure on household cash flow and food security during the lean season.

Many individuals in the study communities were suffering from diminishing incomes and rising financial instability, primarily as a result of greater competition over the declining fish population (Campbell et al, 2006). The finding also confirms Mensah and Antwi's (2002), argument that, marine fishing communities in Ghana, are charaterised with low levels of production

and, hence, low incomes, poor living conditions and chronic indebtedness. More canoe fleets are competing with one another to catch diminishing fish stocks: more people are chasing fewer fish stock. In other circumstances, such as in Ghana's coastal fisheries, decreased catches per fisherman is a crucial factor contributing to declining revenues (Ward, Myers & Blanchard, 2004).

High cost of fish sold to the traders was largely influenced by the demand and supply of premix fuel. The cost of premix fuel and other energy sources has become increasingly volatile. This according to the Food and Agriculture Organisation (FAO) has had a significant negative impact on fish prices (FAO, 2015). Profitability and livelihoods are potentially very vulnerable to premix fuel costs, which are one of the primary cost variables over which the sector has little immediate control. In the report by Frimpong (2011), there has been often a shortage of premix fuel in the various coastal towns of the country for which the fishermen lament as affecting them negatively. The shortage and the corresponding increase in price of premix fuel has been attributed to issues of corruption, diversions and smuggling to neighbouring destinations, which have made the commodity costly to fishermen (Ghana News Agency, 2020)

Another issue was that, many of the participants were unable to obtain loans or other credit facilities from banking institutions due to rigorous collateral security requirements. The study supports the claim that, artisanal fisheries' rising capital costs are related to limited access to formal bank credit due to low loan repayment rate caused by poor loan management, low catches, high risks of sector participation, and relatively high indebtedness of fishers (Acquah & Addo, 2011). However, in a study by Ruddle and Davis (2011), on

informal credit systems in fishing communities in Vietnam, sampled fisheries households obtained credit and other financial services from various sources predominantly banks, and family members, with less collateral, and in some cases, no interest is charged on the loans.

A self-inflicted challenge detailed by participants was poor planning on the part of the coastal fishers. This finding confirms the assertion by other scholars that poor planning and incoherent land sea governance have affected the well-being of the coastal people directly and indirectly (Duxbury & Dickinson, 2007; Visbeck et al. 2014). In alluding to reasons for the poverty of fishers, Fabio et al. (2003) identified poor prioritisation of their needs as one of the causes of poverty. Certainly, poor prioritisation of needs is a function of poor planning and the contributes to the poverty of the fishers. The challenges had rendered the livelihoods of the participant, highly vulnerable.

The study discovered that some youngsters preferred to stay at home, rather than engage in other productive ventures, with the excuse of not having any special skills or formal education that would secure them gainful employment. These livelihood challenges and the strategies of the people of Apam and Moree are not exhaustive and unique to them. For instance, in the study of the socio-economic conditions of the fishermen in Sylhet, Bangladesh, Hussain and Hoq (2010) found that, during the lean season when the water bodies are constricted, the majority of the fishers preferred to remain underemployed or unemployed, rather than engage in other ventures they had limited experience in. Hussain and Hoq (2010) also mentioned that, fishermen in the area generally face a lot of struggles and try to cope by starving for, at least, one meal a day than they do on normal days. However,

this finding contradicts the argument by however, this finding contradicts Asiedu et al's (2013) that, majority of fishers are willing to adopt an alternative livelihood as a sustainable management tool in Ghana.

To insulate themselves from the impact of the challenges, a few of the participants had diversified their livelihoods by opening provisions shops, selling of already acquired personal items, and sometimes practised their secondary occupation (masonry, photography, sand mining) as alternative sources of income. They had used part of such incomes to build houses, supported their children's education and their family members as well. This is consistent with Amevenku, Asravor, and Kuwornu's (2019) findings that, the risky nature of fishing has driven many fishing households in Ghana's Volta Basin to diversify their livelihood strategies, despite the fact that fishing remained key in the component of all their livelihood strategies. The ecology of the Volta Basin allowed fishers to engage in crop farming in addition to fishing. It, however, contradicts the Food and Agricultural Organisation's (2005) report that fishers earned significant income that was not remitted to their households, leaving their families in conditions of poverty. It is worth to infer that such contradiction might be due to the differences in time and study areas.

In relation to the sustainable livelihood approach, the study revealed that, the participants were living in a vulnerable situation. This is because findings of the study clearly showed that, the available local resources (sea fish, sand, salt, and land) in Apam and Moree had not sufficiently addressed the livelihood requirements of the people. The issue was that, in spite of the available resources, their livelihoods were threatened by several challenges,

and these have consequently affected their incomes, food security, and their general development. This vulnerability has claimed to be caused by external factors that, local people are often not able to control (Sheets, 1999).

The transformational processes and institutions had come to affect the livelihoods of the participants. These included over-comercialisation of the coastal resources, seasonalities, trends and shocks that affected the income flow of the participants. This also supports Aseidu et al. (2013), who claimed that Ghana's coastal resources (fishing) are under threat and shocks, as a result of increased fishing efforts, illegal fishing, and industrial fishing vessels, as well as pirate attacks are inching closer to our territorial borders.

In the midst of the vulnerability, access to the various assets (capital) was to play a key role in a successful pursue of livelihood strategies and their sustainability (Scoones, 2009). The participants had mainly depended on the natural capital for their livelihoods. The study identified the sea, sand, salt, the land, lagoons and other natural resources as their main sources of livelihoods.

However, the study revealed that, the open nature of the sea, sand and other coastal resources allowed for free and largely unregulated entry. This had led to over exploitation of the resources as the participants maintained that the people had used all manner of unapproved methods to exploit the resources. This, coupled with the seasonality of the livelihood resources, resulted in low catches of fishes and decline of beach sand. This supports Bromley and Cernea (1989) and Hardin's (1968) arguments that, the lack of regulation for common goods creates incentives for individuals to free ride at the expense of the entire group, resulting in the calamity of overusing the

coastal livelihood resource, especially when the community is over-populated. In the same way, as sand mining at the beaches was beneficial to the operators, it remained as the cause of erosion and encroachment of the sea to the society as a whole (Uetake, 2012).

Other limitations to the access to coastal resources were that, fishers did not have the kind of formal education and special skills that could offer them alternative employment. It was also discovered that, the industrial trawlers often had advantage over the artisanal fishers as the former often crossed their boundaries into the exclusive economic zones reserved for the later. It is, also, worth noting that access to financial capital was not easily available, as there were not enough banking services at the disposal of the people to borrow money for investment into the fishing business by the fishers. This supports the finding by Anokye et al. (2015) that, artisanal fishers at Shama, in the Western Region of Ghana, often face the problem of access to finance capital, as banks often do not want to lend money to them. This, the authors identified high interest rates charged by the banks and the fishers inability to save with the banks, hence their inability to secure loans from such facilities.

Summary

The chapter revealed that, coastal resources were symbolic value for the participants because of their benefits to them. The sea, as compared to the other resources, was the most significant resource, and from it the people extracted fishes, salt and sand for their subsistence and for commercial purposes, and above, all enhanced their livelihoods. Apart from relying on the sea for medicinal and metaphysical purposes, it was the source of their

primary occupation (Fishing). Income earned from fishing was, essentially used to build houses, supported their children's education and their family members, as well with little savings to reinvest into their fishing business.

The chapter also hilighted about the fact that, the participants were living in a vulnerability context due to the livelihood challenges they faced. Among the challenges identified in their primary occupation included irregular flow of income due to the seasonality of fishing, poor planning, high pricing of fishes due to the shortage of premix fuel, inaccessible loans from banks resulting from lack of collateral security. In closed seasons, they had limited alternative strategies in place to survive. While many fell on low skilled jobs that essentially paid less, others preferred to stay at home without jobs. The next chapter concerntrates on the people's indigenous knowledge and the sustainability of their livelihood resources.

CHAPTER EIGHT

INDIGENOUS KNOWLEDGE AND SUSTAINABILITY OF LIVELIHOOD RESOURCES

Introduction

Ths chapter assesses the sustainability of coastal livelihood resources in the study areas. Issues relating to sustainability of such livelihood resources that emerged in the study are categorised into factors affecting the resource sustainability; indigenous knowledge and resource sustainability; setbacks to successful implementation of coastal resource sustainability; and participants' views on how to protect and preserve the resources.

Objective Three: Assess the effect of indigenous knowledge on the long-term sustainability of coastal resources in the study area.

Generally, this ojective of the study sought to assess the participants' understanding of sustainability of the coastal livelihood resources and how they had used their indigenous knowledge to preserve such reources for both current and future uses. This is premised on the fact that, the coatal livelihood resources in Ghan, have dwindled over the years. The themes below give detail discussions on the phenomenon.

Factors Affecting Resource Sustainability

Participants were of the view that, the rate at which people had disregarded the indigenous knowledge practices in recent years left nothing to be desired. This had led to the use of all manner of inappropriate fishing activities and sand mining in the study area, and these had threatened the sustainability of the coastal resources.

Specifically, inappropriate fishing practices, illegal sand mining, indiscriminate waste disposal, increasing population in the coastal communities were considered to be factors responsible for the unsustainability of the coastal resources in the study area. Other factors included the neglect of traditional beliefs and practices, corrupt practices among people responsible for protecting the resources, the politics of coastal resource management, Christian teachings, and modernisation.

However, a sober, rigorous assessment of the interactions with the people revealed that the underlying factors affecting the sustainability of coastal resources could be categorised as structural and individual causes or an interplay between both. As some of the participants blamed government representatives and the indigenes for not playing their roles in conserving the coastal resources, others argued that the problem was purely caused by individuals in the communities.

External Factors

The participants attributed their inability to maintain ecological balance to the flaws in government institutions. A review of their responses showed that government representatives in institutions such as the Ministry of Fisheries and Aquaculture, Fisheries Commission, Environmental Protection Agency and the Marine Police who ought to oversee the conservation of the coastal livelihood resources, through their monitoring and supervision, had not successfully executed their responsibilities. In instances where the institutions had to control trawlers whose activities damaged the ocean and the coastal livelihood resources; they had failed to do so.

The trans-fishing (Saiko) business was considered as one major factor that depleted the sea of its resources, thereby endangering the sustainability of the fishes. To the participants, government officials had failed to apply the laws when the bigger trawlers were involved. Participants did not understand why fishermen arrested for buying Saiko fish from the bigger trawlers, and left the sellers (industrial fishing boats) from facing similar punishment.

Participants also claimed that, the Navy and Marine Police often collected money from them at sea and left offenders to continue their illegal activities. As they claimed, the bigger trawlers would even throw the smaller fishes back into the sea if the artisanal fishers did not purchase them, thereby causing pollution of the sea. The claims of officials condoning and conniving was presented by a participant in this way:

> *The marine police, who are charged with the responsibility of arresting the culprits, collect money and leave them. We were once arrested by the navy and marine police for engaging in light fishing. They called me, the leader, out into their boat, and moved me to a distance away for the crew. They then told me that the light fishing activity is like cocaine business, if you are caught, the consequence is huge. Since I understood the implication of what they told me, I bargained with them, paid two hundred and fifty (250) Ghana cedis and free us. So, if they arrest ten of such groups, in a day, you can imagine the amount of money they will go home with.* (FGD-M1, Moree)

Their argument was that, government should turn its attention to the industrial trawlers who use mono filler nets to catch the unwanted fishes, and not the artisanal fishers who buy them, as the later rather helped the system, by playing roles as scavengers. This had created another type of artisanal fishers (fishing without fishing nets), whose business was to go to the sea only to purchase fish sold by Saiko operators, instead of fishing for a catch by themselves.

The situation was such that even the government officials responsible for checking the landings of the fish catch, gave responses that were not different from the fishers. For example, in one of my routine observations, some canoes had landed and the crew members were offloading slabs of fishes, instead of the normal ones in basins, as the practice has been. The researcher enquired from a key informant who told me they were all part of the activities of Saiko. The fish caught from such activities were in slabs due to the paper slabs they used to package them. The researcher was told by a informant that, the Saiko issue was complex and difficult handle. Like the fishers alluded to, the key informant was of the view that the big trawlers would throw the unwanted fish back into the sea, and would cause its pollution. The following extracts dipict the views of the participants:

> *The trawling method of fishing is another bad practice that drains the sea of its fish resources. We have been told that a single trawling fishing boat's harvest can fill about 600 medium sized canoes. Currently, we have about 200 of these trawling boats on our sea. So, if these number of boats are always on the sea for fishing, then do you expect us to get something?* No. (A male key informant, Moree)

> *The activities of the pair trawlers and big fishing boats should be checked from time to time. They should not be allowed to be fishing all the time. They compete with us at our Exclusive Economic Zone which is the shallow part instead of going to the deep sea since their vessels have that capacity. Their vessels are supposed to harvest big fishes, but they dredge the sea and harvest small fishes in addition, and these put us to a disadvantaged position.* (A 44-year-old fisherman, Apam)

> *Turn and look at the Saiko operators working. These are fishers who do not go to the sea with nets to catch fishes. They buy unwanted fishes from the industrial trawlers and transfer them or trans-shipped to the canoe operators at sea. This has resulted in the decline of small pelagic such as sardineller, thereby affecting those who depend on such fishes for their fishing business. (*A male key informant, Apam)

> There *was an incidence here when the marine police arrested a Saiko dealer at the beach and instead of keeping the fish at a cold store to be used as evidence in the law court, the marine policemen said they could not bear that cost, so they sold the whole consignment back to the owner and left. So, tell me! How can the people stop?* (A male key informant, Apam)

The following figures also, potray the nature of saiko fishe and the paper slaps that were used to package them.

Figure 5: A Saiko Catch at Apam Seashore
Source: Anokye (2020)

Figure 6: Paper slabs used by the local fishers for the Saiko business at Apam
Source: Anokye (2020)

Internal Factors

The narratives on the internal factors affecting the sustainability of coastal livelihood resources revealed that light fishing, the use of chemicals

and unapproved nets were a common phenomena among the artisanal fishers and industrial ones alike. It is, however, important to note that those practices led to the harvesting of fingerlings which are unfairly denied growth to reproduce more to increase the fish stock. It was also difficult to disentangle those practices from the hardship, greed, and selfishness of corrupt fishers and local leaders who ought to, but refused to enforce the customary and national laws at the local level respectively. Both the fishers and local leaders were very much aware of the dangers associated with unapproved of fishing practices, but ignored them for their parochial interests.

Use of Chemicals in Fishing

Some responses from the participants indicated that, bad fishing methods, such as use of chemicals, light fishing and unapproved nets were highly responsible for the unsustainability of the fishing industry. The participants attested to the fact that the fishers used chemicals in the fishing activities. They claimed that Dichlorodiphenyltrichhloroethane (DDT), embalming chemicals, and chemicals for killing rodents and trees aided their fish catch. It was revealed that, the use of chemicals was common during the lean season when fishers could not get good harvests. The practice was that, fishers filled bottles with a mixture of chemicals with perforated tops, and dropped them at the bottom of the sea with the aid of sinkers. As the chemicals are released, the fishes; including fingerlings, matured ones, consumables, and non-consumables alike, would feel uncomfortable and come out of their hideouts to be harvested.

Such activities were reported to have contributed to the reduction of fish stock in the sea. Though, they were aware of the repercussions of their

actions, their justifications were that times were hard and as such, they needed to do everything possible to get fish for sale to meet their operational costs and for survival. Ironically, people outside the fishing industry such as mortuary attendants played a role by supplying chemicals used for preserving corpses to deviant fishers to perpetuate their unacceptable acts. The following narratives throw more light on their claims:

> *The issue is that some of our fishermen have cultivated the habit of engaging in bad fishing practices. By using the chemicals such as DDT, chemicals for embalming dead bodies, chemical for killing rodents and special woods for fishing. So, we mix these poisnous chemicals in a bottles and sink it into the bottom of the sea. We then open the bottle for the poisnous content to come out. This forces the fishes to come out of their hideouts for us to catch them. We end up harvesting both wanted and the unwanted fishes. This practice intensifies the depletion of the fish stock in the sea.* (FGD-FM8, Moree)

> *We put the chemicals in three different bottles with perforated tops and tie them with a sinker. When we drop the bottles in the bottom of sea, and the chemicals are released, the fingerlings and matured as well as the consumables and non-consumables become uncomfortable, and come out of their hideouts for us to catch them. (*FGD-CM6, Moree)

> *Also, the mortuary workers illegally sell harmfull chemicals to us. If we want to preserve the sea for the future, then we should not only ban light fishing but look for some underground dealings that are more harmful than the light fishing. (*FGD-CM5, Moree)

Light Fishing

The issue of light fishing was identified as one of the many challenges confronting the sustainability of coastal livelihood resources, in both study communities. All the participants unanimously attributed the introduction of modern technologies, including light fishing as a major contribution to the depletion of the marine resources, thereby jeopardising the future of the next

generation's livelihoods. Though, they were aware of the implications of light fishing for the sustainability of the resources, some fishers boldly confirmed that they were involved in the act. However, few of the practitioners of light fishing disagreed with their colleagues about the impact of their actions on the sustainability of the coastal resources. Such participants rather shifted the blames on the Saiko operators, and the increasing canoe population in the coastal areas, creating over-exploitation of the resources. The narratives below depict some of their responses:

> *As for me, I am deeply involved in light fishing. Even if I stop, others will do it so until the government is able to stop all fishers in the country, I will continue.* (A 45-year-old Fisherman, Moree)

> *The use of light in fishing has destroyed the fishing business with regard to how fishes are caught. Also, rich fishermen who are able to build big boats actually harvest more fish than those of us with small canoes.* (FGD-CM2, Moree)

Use of Unapproved Nets

The study revealed that the use of unapproved fishing nets also contributed to the fast declining fish catch in the study communities. According to the participants, there were categories of canoes associated with the types of fishes each category was supposed to exploit. However, due to greed on the part of the fishers and the decline of fishes, they had bought nets of all sizes and use them at the blind side of the regulators. The issue was that many of the fishers registered the approved nets, yet hid the unapproved ones in their canoes to use when the need arose. It was also mentioned that, some of the fishers used mono filler nets which are plastic and not suitable for marine fishing. It was reported that some fishers even used mosquito nets for fishing.

According to the participants, if the fishers continued to exploit the sea resources without being regulated, the sea would be left for the next generation as a water body but not for fishing. One participant expressed his sentiment below:

> *There is a particular net with small holes, which is for harvesting a particular type of fish near the shore. Those of us who do fishing at the high seas use nets with bigger holes. But, with the introduction of light fishing in recent years and its resultant depletion of the sea, we hide some of these small-holed nets in our canoes for fishing. This results in the catching of both mature fishes and fingerlings, thereby depleting the sea further. We have already destroyed the sea. Why do you think you came to meet everyone sitting under our sheds at this time of the day? It is because we will not get anything if we go fishing.* (FGD-CE2, Apam)

The views of the government officials corroborated the claims made by the fishers and the fish mongers concerning the use of unapproved nets, eventually affecting the sustainability of the coastal resources. They claimed that, though the fishers had registered their canoes and the types of nets they would use, they hide all manner of unapproved nets for fishing. When the researcher enquired from the officers as to why they had allowed the menace go on without concern, as government representatives, their responses, though disappointing, epitomised the problem of implementation of the regulations in the country. To them, even if they reported the infractions by the fishers, the powers that be would let them go scot-free. A participant presented the problem in this way:

> *The fishers are using all manner of nets for fishing which is inimical to the sustenance of the fish resources. Many of them register their boats with specific net to be used but, still procure unapproved ones and hide them in them in their canoes. So, when it becomes difficult for them to get the required fish they set off to catch, they would then use the unapproved ones. Such nets could catch any fish,*

> *including fingerlings, thereby depleting the sea of its stock. Example of such unapproved net is the mono filler net which is plastic, and it is not supposed to be used in the marine waters. Some even use mosquito nets for fishing. (*Government official)

Increases in Fleets of Canoes

The issue of over population and increase in canoe fleets came out strongly as an important factor responsible for the depletion of the sea resources, and also put pressure on the land for settlers. Some of the participants claimed that it was not the fish stock in the sea that had declined, rather the canoe fleet had increased, reducing fish caught per person (canoe).

The study discovered that Apam had 492 registered canoes and Moree had 661 of them. The interviews with the fisheries officials showed that, one of the major factors responsible for the over-exploitation of the coastal resources, especially, fisheries was over capacity. The claim was that, there was free entry system into the sea across the nation. The only restriction was the capital to buy the canoe. There were no rules governing the use of the sea as to who and how many canoes should be allowed to enter the sea at any point in time. For this reason, the people were buying new canoes every day, putting pressure on the sea. That created excesses in the quantity of fish they were supposed to catch, thereby overly depleting the fish resource of the sea.

For that reason, a proposal had been made to call for the registration of new canoes, pending new regulations. For example, a government official claimed that, plans were far advanced to halt the registration of new canoes in the country as a whole. However, the official was concerned about the implications of such measures on the livelihoods of some coastal dwellers.

When the researcher inquired as to what had caused the population of canoes to increase within the communities, it came out that relatives and indigenes who were in urban areas and abroad bought canoes, for family members to support their livelihoods. Such a gesture was towards reducing the expectations for remittances. Others also bought the canoes and rented them out to other fishermen to work with. So, the fishing work was not just for local people who engaged in it for livelihoods, but an investment for outsiders too. The more those capitalists invested in the industry, the more the local fishers were put at a disadvantaged livelihood situation. So, the problem was that, so many fishing boats on the sea meant struggles over the limited resources. In such circumstances, people used any available means (approved or unapproved) to get fish for survival to the disregard for tradition, as presented below.

> *The increase in both human and canoe population in this area has affected the utilisation of the natural resources. Gone were the days when the population was small, there was less pressure on the resources, but now our population is growing rapidly and all of us are depending on the sea for survival. If the natural resources are depleted, we will not derive the necessary benefits and very soon there will be no fish to catch in the sea.* (A male key informant, Moree)

> *The astronomical increase in canoe population has also contributed to the decline in fish catch per head. At first, the educated elites were not interested in fishing, but now coastal educated elites have invested so much in the fishing industry by buying so many canoes to people to work for them. Apart from putting pressure on the sea, they are also depriving us, the local people, of our livelihoods. They only employ and pay the crew upon their return from the expedition.* (A male key informant, Apam)

Population Increases and Sanitation Challenges

Increasing human population in the coastal areas was claimed to put pressure on land for housing, and this posed other attendant challenges. It was revealed that, the surrounding vegetation cover along the lagoons in the study area had been cleared for settlements, leaving the water bodies to dry up. Aside the exposure to direct sunshine, the lagoons had become waste repositories. For instance, when government officials were asked about the sanitation and sustainability of the coastal environment in Apam and Moree, their responses were that they tried every means possible, including environmental health education, arresting and prosecutions of some offenders, provided public places of convenience and garbage collection bins, yet the people littered the environment. The narrative below shows how a key informant expressed her view on the situation:

> *In fact, these community members do not see anything wrong with open excretion along the shore with the idea that the sea breeze gives them fresh air while doing that. They think that the heat and the stench in public toilets are unpleasant and as such preference is given to open defecation. To them they came to meet their parents and grandparents excrete along the beach and nothing happened to them. That they were even stronger than those who use the enclosed rooms for latrine.*

The researcher, then decided to crosscheck the information given by the officers by observing the actual practices in the communities. Some observation of the beaches and the lagoons confirmed the claim by the officers to some extent. The researcher went around early mornings, it was observed that women and children constantly dumped refuse into the lagoons and the sea in both communities. Also, defecating along those water bodies was a routine, as adults and children, males and females were all found

defecating at the beaches. There were also refuse dumps that had been created near the lagoons. Ironically, the participants did not seem to bother about the effects of their actions, as exemplified by the narrative below:

> *The sea is so big that these human excreta cannot pollute it as people are claiming. The men who go for fishing, where do they ease themselves? Is it not the same sea? I do not think defecating at the shores is a problem.* (FGD-SD6, Moree)

At the beach on one Sunday afternoon, the researcher observed a man who was raking a pile of refuse, most of which were polythene products toward the beach. I was curious and went closer to find out the essence of his action. He boldly told me that, it was to allow those waste materials to be carried away by the sea. To make things clearer to me he remarked, "*You come here tomorrow morning and you see that the sea has come to clear everything".*

Apparently, the indigenes saw nothing wrong with their actions to the extent that a young lady who had come to excrete at the beach confronted me, after someone had wrongly told her the researcher was there to arrest them. She would not understand why they should not excrete at the area they had designated for that purpose. Apparently, the people in both communities had designated parts of the beaches for defecation. When she realised, I was a researcher, she entreated me to question the rationale behind the ban on excreting along the beach. Her point was that, the water closet toilet facility the community had constructed at the beach had its outlet into the sea. So, to her and others who came around, it was meaningless to ban them from excreting along the beach since both their faeces and that of the public toilet all end up in the sea. Some also were of the view that the excretion could not pollute the sea.

The other reasons they gave in justifying their actions were that, the public toilets were smelly, and often caused the ladies to experience what they referred to as 'white' (a virginal discharge). They also complained about the cost of using the public toilet. They did not understand why they should pay 30 pesewas when they could do it at open space nearby, and enjoy the sea breeze at the same time. The following pictorial scenes give credence to the pollution problem described above:

Figure 7: Refuse dump at the bank of a lagoon at Apam
Source: Anokye (2020)

Figure 8: Polluted beach at Moree
Source: Anokye (2020)

Figure 9: A man raking waste materials towards the sea at Moree
Source: Anokye (2020)

Figure 10: A tube to discharge public toilet waste into the sea at Moree
Source: Anokye (2020)

Illegal Sand Mining

The phenomenon of sand mining featured strongly in relation to the unsustainability of the coastal resources. As some of the participants were aware of the destructive nature of their actions, others thought the contrary. The former claimed that, the activities of sand miners had had diverse impact on both the resources and the communities themselves. It was revealed that, sand mining at the beaches had exposed the rocks in the ocean, especially, at Moree, and this had made it difficult for fishes to land their canoes. It also

came out that, such activities had reduced the sand deposits, paving way for the sea waves erode their settlements during periods of high tides. My observations in the community of Apam confirmed the assertion as the researcher saw many of the houses near the shore submerged by water.

It was observed that the sand mining activities was more common and done in the open at Moree than it was at Apam. At Apam, the enforcement of the ban on sand mining was apparently effective, and as such, even the few who were doing it under cover were not prepared to accept the fact that they were sand miners. The few that the researcher interviewed claimed they were masons because they feared he had come to investigate them to be arrested. This fear was due to the fact that Apam was a District capital, and all the government agencies have their offices there, consepuently, their activities were regularly monitored, and the bye-laws were enforced to some extent.

At Moree, the situation was different as it was the only coastal community in the Abura-Asebu-Kwamankese District. There was no permanent fisheries officer stationed in the community. The fisheries activities there were supervised by an officer from the Fisheries Commission at Cape Coast. There was also an assistant Community Environmental Health sub-officer who worked from Cape Coast. That seemed to affect their monitoring and enforcement roles in ensuring that, the people did the right thing. So, it was not surprising the people accepted their positions as sand miners and willingly participated in a Focused Group Discussion organised in one of the miners' houses. Notwithstanding their knowledge about the ban and the dangers the sand mining posed to the community, they did not see the reason for the ban since they had relied on the activity as supplementary

income to fishing. They did not understand why they had been barred by the government from fetching the sand since they depended on it for their livelihoods. To them, sand mining was a legitimate business, and should be left as such. The narratives and pictures below confirm the commercial nature of the sand mining activities in the study areas.

> *For instance, the sea sand which separates the sea from the land is seriously under threat, due to sand mining. Yet, when we put a ban on it, people see us as trying to deny them their right to benefit from a deity given resource.* (A male key informant, Moree)

> *Sand mining has been one of the major hindrances to the sustainability of the coastal environment. Sand serves as a boundary between the sea and the land, and over exploitation of it paves the way for the sea to encroach their dwelling places. Dumping of refuse and other waste materials is affecting the aquatic life in the sea. As I am talking to you our lagoons are full of garbage. (*A male key informant, Moree)

> *The sea has come too close to our settlement areas. We used to have heaps of sand along the coast but now everything is gone due to excessive sand mining. It is the reason why the sea is encroaching. Deity made the sand serve as a boundary between the sea and the land, so as we keep on mining the sand, that boundary has been removed. All the coconut trees are falling down because we have over mined the sand that support them. We used to have so many coconuts trees along the beaches in this community, but now you can see the whole place is bare. They have been uprooted by the waves. (FGD-CE4, Apam)*

Figure 11: Scooped sand from the sea bed at Moree
Source: Anokye (2020)

Figure 12: Young boys loading a truck with sand at Moree
Source: Anokye (2020)

Politics, Conflict of Interest, and Social Network Systems

The study also revealed that, political inclinations of the local leaders, social networks and conflict of interests worked against any meaningful coastal resource management systems in the communities. In matters of politics, it came out that, the people and their leaders alike had been divided by national politics. Participants claimed that the party in power determined who should get access to, and the quantity of premix fuel. They claimed that adjudication of offences and their punishments were subject to the party one belonged to, and the party of the chief fisherman or the elders. A case was cited of a chief fisherman who was an active political party member, and his activities created a divided front among the fishers. For that reason, any decision he took was seen by the people with a political lens. Some participants narrated the problems as follows:

> *The chief fisherman and his council of elders have become accomplices of the parties in national politics. There was a time the DCE of the District was the nephew of the chief fisherman who could not hide his loyalt,y and started wearing the ruling party's T-shirts. Hence, those fishers in the opposing party started showing him negative attitudes.*

> *They gave political meaning to some of his actions. So, as I am speaking, the people see him as championing the bid of a political party, but not the fishers.* (A male key informant, Apam)

> *The major problem is that, even though these chiefs are supposed to be leading the communities, current political arrangements make it difficult for them to do this effectively. The national politics has had too much influence on them. One of such areas is the control and sale of pre-mix fuel. The party in power determines the group of people who controls the sale of the fuel, and this in effect, determines who should get which quantity.* (A 31-year-old fish monger, Moree)

The participants also complained that the local leaders found it difficult to implement some of their own internal rules and regulations. This emanated from conflict of interest as a result of the institution of systems of patronage and clientelism. For instance, participants argued that, some of the leaders found it difficult to punish some offenders due to their social relations. Often, some influential people also plead for mercy for their favourites, who have committed offences to be left off the hook. The fishers and the sand miners also complained that some of the leaders were accomplices of the illegal fishing and sand mining activities hence, their inability to enforce the rules governing such practices.

Participants at Apam also complained of what they considered as unkindness on part of their leaders in their attempt to implement the laws. To them, the leaders placed unnecessary charges on any little offence that the fishermen committed. They were fined heavily for petty thefts, quarrelling, and cursing. Due to their meagre incomes, they found it difficult to pay, and their failure to pay the hefty fines caused them to receive twenty-five lashes. Honestly, this was seen as an act of human right abuse on the part of the leaders.

However, those allegations were discounted by the elders. They claimed that they were fair and utilised the fund generated from the fishing activities for the benefit of the whole community and the fishers in particular. They argued that it was such money they had used to put up an office complex at the landing beach.

When they were asked to comment on the human abuse element in their disciplinary methods, the leaders were of the view that, it was better to handle theft cases, fighting, cursing and other offenses they considered minor, internally rather than resorting to the police or the court regime. According to them, they did not want their youths to be unnecessarily arrested and put behind bars to tannish their image, so there was the need to protect them against official criminal records. To the elders, in as much as they wanted to protect the youth, they did not also want to lose sight of the fact that, indiscipline youth of today, would undermine the moral fabric of the next generations, hence the punitive measures. For example, an excerpt below depicts the view of a participant:

> *The leaders have not put any measures in place to protect the sea, except the restrictive and uncomfortable laws on us. Their own fishing canoes are part of the light fishing so they find it difficult to talk about it. The only thing they do is to place unnecessary charges on any small offence and they also lash/cane us, sometimes. We take twenty-five strokes of the cane, sometimes for petty offenses we commit, including stealing of fish or fighting. It is written and pasted on walls at the office. If you curse someone, you pay a huge fine. The problem is that they do not do anything good with the money taken from us as punishment, they rather use it for their own personal gains.* (FGD-CM4, Apam)

Indigenous Knowledge and Resource Sustainability

This section presents data on the indigenous measures, participants had over the years, put in place to conserving the livelihood resources bequeathed them by nature. For this reason, the researcher explored who they considered responsible and indigenous measures they had employed to ensure sustainability of the coastal resources at their disposal.

Before discussing how the participant used their indigenous knowledge to protect and preserve the resources, there is a cursory look at who the participants considered responsible in that regard. Participants claimed that the people themselves, their leaders, and the government and its agencies were the key players responsible for protecting the coastal resources.

In the first place, the participants did not exonerate themselves from their roles in protecting and preserving the coastal resources. They saw it as a duty, as community members, to protect and preserve the resources so that, the future generations would not be denied of their access to the resources. To the participants, since they depended on the resources, it behoved on them to maintain them for their own survival and that of the succeeding generations.

> *It is our responsibility as fishermen to help conserve the sea. We need to be educated from time to time on the need for the conservation of the sea as well as other resources in the community. We inherited these resources from our fathers therefore, we should exploit them with caution and protect them for our children to also benefit from them. (A male key informant, Apam)*

Also, traditional leaders which included the chiefs, chief priests/priestesses, chief fishermen/fishmongers and elders, as well as the people of Moree and Apam had a shared responsibility to ensure the effective conservation and sustainability of coastal livelihood resources. When the

question of whose responsibility it was to protect the resources, the chief fishermen, together with their elders, were mentioned by all the participants, as they were seen to be the custodian of the local laws. These leaders commanded respect from the local people and largely obeyed their rules, hence were in good position to make rules concerning the coastal resources and see to their full implementation. Also, the fetish priests/priestesses were mentioned for their roles in determining the likes and dislikes of the deities. They were seen to be responsible for mediating between the living and the deities, and the ancestors and also prescribed the kinds of sacrifices needed to pacify the deities or avert impending calamities.

> *It is the duty of our traditional leaders to protect the resources for the future generations. For example, we take orders from the chief fisherman in the community. If he gives us orders not to go fishing on Tuesdays, we will not go. (A 45-year-old participant, Moree)*

However, in terms of sharing the burden of sustainability of the resources, the participants considered the government to be the first to be considered since the state had all the powers to make and enforce laws when necessary. Participants saw individual responsibilities as basic, but due to the quest to meet their livelihoods demands, they could not be trusted, especially, when it came to the judicious utilisation of the resources. Participants claimed that they could only advise but did not have the power to force people to stop illegal fishing, sand mining, or open excretion. Participants also claimed that, the local leaders had lost control over the people for diverse reasons, and as such could not do much. For that reason, they indicated, that it was the government that could put in place measures for the management of coastal

resources to ensure sustainability. In addition, participants argued that, it was not possible to restrict another fisherman from using the resources, except the laws from government such as a participant posited below:

> *The government has the greatest responsibility of protecting the resources, as it wields the power to do so. It is the government that can actually enact laws and ensure its adherence.* (FGD-CM1, Moree)

In terms of the use of indigenous knowledge to sustain the coastal resources, both the FGDs and in-depth interviews produced results that, suggested that the people were aware of the various measures capable of sustaining the livelihoods resources of the communities. These included the customary laws, various belief systems, rituals they performed, use of their knowledge on celestial bodies, bye laws and national legislations.

Customary Laws

Customary laws and taboos had been formulated to control the activities of the members of the communities of Moree and Apam, aimed at protecting and preserving the coastal resources. Customary laws on the coastal resources include a ban on fishing on Tuesdays, ban on unapproved fishing methods, prohibition of sand mining and non-harvesting of certain sea creatures were enforced by the collective efforts of the chief fishermen, the fetish priests/priestesses, and elders of the communities. Participants claimed, for instance that there were demarcated areas along the beaches where people were not allowed to fetch sand, excrete, and build houses because those areas were seen as the places of abode of the deities.

It was a taboo to fish, fetch water or cut trees around a particular section of the lagoon in Moree as the place had been reserved for the principal deity in the community. It was reported that, the act sought to protect the

lagoon, to some extent, and many of the fishes in the lagoon used that sacred portion as their hideouts. It was only when the priests/priestesses gave permission that fishers could go there for fishing, especially in the lean seasons, that fishing occurred in the protected portion of the lagoon. These expressions support the above discussion:

> *As fishermen, we believe that Tuesdays are sacred days for the conservation of the Sea. Hence, we do not go for fishing on such days. We still observe Tuesdays as our rest day*. (A 54-year-old fisherman, Apam)

> *There is a portion of the lagoon that we are not supposed to undertake fishing activities or fetch the fresh water. That place is reserved for the community deity. It is only the fetish priests/priestesses who are allowed to visit that when they want to perform rituals. (*FDG-CM 2, Moree)

However, in recent times, some of the customary laws that were used to protect the resources had undergone modifications. For instance, when the traditional leaders needed funds to embark on any activities of importance, such as festivals, the fetish priests/priestesses were called upon to perform rituals to pacify the deities to allow some groups of fishers to go for expedition on some Tuesdays. The catch from such circumstances were divided between the fishers and the traditional leaders, including the fetish priests/priestesses.

Similarly, responses by participants in Moree were indication of their maintenance of certain practices performed by their forefathers. In addition to observing Tuesdays, they had also tried to add Sundays as non-fishing days. This, perhaps was due to the influence of Christianity, as most of the participants had become Christians. It was also observed that the leadership of the landing beach had assumed additional positions including church elders in

their churches and would not want to embark on fishing expedition on Sundays.

Beliefs and Rituals

Another indigenous knowledge system that had contributed to the sustainability of the livelihood resources in the study area was the belief system of the people. The participants had the belief that, the coastal resources transcended the realm of being mere livelihood resources; rather they were either deities themselves or harboured the spirits. For that reason, the participants saw the need to respect and treat the resources with utmost care since offending the deities could bring misfortunes to the individual or the community as a whole. The belief was that commitment to every sacrifice demanded could yield several benefits, including bumper harvests which lead to financial improvement, good living and gross positive livelihood outcomes.

Those sacrifices were a means of expressing appreciation to the deities that resided in the resources for their help in enriching the livelihood activities of the people. The belief was that, whenever such rituals were performed and accepted by the deities, the people could be sure of regular supply of the resources for both current and future generations. For example, the elders of Apam had been slaughtering cow and sheep to the great deity (Nana Apaa) and others as annual rituals (festival) to honour them and to ask for their blessings in the ensuing year(s). However, in 2020, when the data of this study was being collected, that ritual had not been performed. Some of the participants, especially, the fetish priestesses were not pleased with the non-performance of the required rituals, and this had consequences for the communities. The non-performance of rituals was attributed to the emergence of the COVID-19

pandemic, which had forced government to put a ban on mass social gathering. For example, a 54-year-old fisherman expressed his sentiment about the beliefs and practices in this way:

> *In this community, some of the indigenous knowledge on coastal resources that are still upheld by the people is the sacrifice we make to the deities that inhabit in the coastal resources. These sacrifices are a means of expressing appreciation to the deities for their help in enriching the livelihood activities of the residents.*

Performance of ritual in honour of the deities was seen as a sure way of having pumper harvest and protection of the people in general. So, any deviation from such a performance could incur the displeasure of the deities. It was not surprising that, just after the drowning of some 12 children at Apam on Sunday, 7th March, 2021, the Traditional Council quickly mobilised the needed resources for rituals to pacify the sea deities before their burial. These included a cow, three sheep, thirty-three tubers of yam, and three cartons of schnapps. Coincidentally, these were the very items the fetish priestess claimed the Traditional Council could not provide to perform the necessary rituals to honour the deities in September, 2020, due to the COVID-19 restrictions.

However, such practices were not recorded at Moree, as there was no traditional chief in the community and the chief fisherman who could initiate that was a church leader. That notwithstanding, the fetish priests/priestesses performed such rituals and sacrifices and protected the sacred lagoons in the absence of a substantive chief. The priestesses complained of the non-cooperative attitudes towards the performance of the rituals by a section of the people who did not subscribe to traditions. The priests and priestesses were not pleased with the situation, and complained that, they had to struggle with the leaders, before they were allowed to perform libation before the new landing

beach government was constructing for the community commenced. The fetish priests/priestesses were finally allowed to slaughter a cow at the location and performed all the necessary rituals before they started the construction of the landing beach. The extract below typifies the mood of one of the participant:

> *The elders, nowadays take decisions concerning the community without the knowledge of the chief priest and priestess. Even when the government came to construct the landing beach, no traditional prayers were initially said because because we do not have a chief. We had to vehemently, protest before they finally agreed to the performance of the traditional prayers and rituals. We slaughtered a cow at the location and performed all the necessary ritual before they started the construction of the landing beach.* (A female key informant, Moree)

Knowledge about Celestial Bodies

Participants also claimed that they had a plethora of knowledge about the celestial and other natural bodies that guided their fishing and the sand/pebbles mining activities. They made mention of the use of the location and movements of the moon and stars to determine the availability of fishes at particular parts of the sea before they embarked on fishing expeditions. They emphasised the potency of such knowledge which did not fail them. They also had a significant amount of knowledge about the breeding systems of the various species of fishes, hence they had their own understanding of non-fishing seasons and the types of fishing nets to be used at any point in time. Many of the older participants bemoaned the disregard of such indigenous knowledge systems by the current generation. To the older participants, young fishers did not use the stars and the moon to locate fishes, but they were always seen going to fish. It was asserted by the participants that, the lack of application of indigenous knowledge on the movements of celestial bodies and

breeding systems of fish species, has contributed to their low fish catch of late. Their argument was that sustainability could be ensured if the indigenous knowledge is used. For example, a participant had this to say:

> *We use our knowledge of the celestial bodies to guide us in our fishing activities. Our knowledge of the breeding culture of the various fish species determines when to harvest particular species of fishes. In that way, we can preserve the sea from over fishing.* (FDG-CM 2, Moree)

Existence of Bye-laws

It was also reported that bye-laws had been drafted by the District Assemblies along the coast of Ghana that seek to regulate the activities of the local people regarding the utilisation of the coastal resources, including fishing and sand mining activities. The bye-laws covered areas of members' welfare and protection of the resources. On the former, the law instructed fishers, both local and migrants, to give a portion of their catch to the chief fisherman or his representative and failure to do so attracted a fine of 300 cedis. The bye-law also prohibited fighting, quarrelling, stealing, and cursing at the various beaches and violators were to pay fine of 500 cedis. Such deviant behaviour among fishers did not directly affect the sustainability of the resources, but was absurd in the eyes of the sea deities. The bye-laws also sought to promote the general health and cleanliness at the beach. For that reason, there was a ban on banned indiscriminate dumping of rubbish and waste fish products and excretion to reduce pollution of the sea and adjacent lagoons. Offenders were to pay fines as well. The bye-laws also prohibited inappropriate fishing practices such as the use of chemicals since that caused massive destruction of aquatic lives of all kinds.

However good the bye-laws were, there were challenges associated with the implementation. Though the by law had been written in English Language and translated into the various local languages along the coast, including Fante, Nzema, Ga, and Ewe, many of the people could not read it, given the high level illiteracy rate in these communities, including the study area. Another challenge expressed by the participants was the delay in gazetting the bye-laws by the office of the Attorney General. The point was that the bye-laws had not been gazetted as at the time data was being collected for this research was conducted.

National Legislations

Aside the indigenous measures from the local communities, there was also a national government policy, that sought to preserve and protect the coastal resources from over-exploitation. The participants reported that the government, in consultation with traditional authorities and the leaders of the fishing group had banned commercial sand mining along the coast and bad fishing practices. Also, the Ministry of Fisheries and Aquaculture implemented a closed-fishing strategy (July and August) as the major spawning period for fishes, in an attempt to protecting the coastal resources from over exploitation. It was, therefore, a criminal offence for fishers to undertake fishing activities during that stipulated period.

However, although the fishers did not have much problem with the closed-fishing strategy, some could not agree with government on the timing. Some of them preferred May-June due to the types of fish they harvested. The participants also made mention of the national ban on illegal fishing, and sand

mining activities to protect the livelihoods of the future generations. The quotes below represents the views of the participants on the issue.

> *The government, through Ministry of Fisheries and Aqua Culture, has introduced a closed-fishing season along the coast of Ghana. This aims at ensuring sustainable fishing in the country.* (A female key informant, Moree)

> *The close fishing season law by government is helpful since it is a way to help conserve the fish stock in the sea by giving room for reproduction to replace lost ones. The sea is the property we inherited from our fathers, therefore, we should take caution and keep it in good shape for our children.* (A male key informant, Moree)

Setbacks to Successful Implementation of Coastal Resource Sustainability

Given the above measures that had been put in place from local through to the national level, to preserve and protect the coastal resources, one would wonder why the problems of illegal fishing, sand mining, and pollution of the environment still exist in the study area. This is because, with the depth of indigenous knowledge and practices of the people, it was normal for one to expect sustainable use of the coastal resources to the advantage of both the current and future generations. Interaction with the participants showed that, certain debilitating factors had rendered the use of indigenous knowledge to preserve and protect the coastal livelihood resources ineffective. Among the prominent ones included, modern science, Christian teachings, and livelihood challenges, which are discussed below.

Indigenous Knowledge and Modern Science

Clash of modern and customary practices took a centre stage in assessing the sustainability of coastal resources in the study. It was revealed that, until recent times, the coastal resources and fishing related activities were

guided by customary laws and beliefs. However, modern policies had emerged as the main force of regulations of coastal resources without much recourse to the customary norms, thereby creating clashes. The participants argued that, the government did not take their views into account when implementing the closed season policy- an initiative that contradicted their fishing calendar and norms.

The lack of collective bargaining vis-a-vis appropriate consultations between the state and fishers on policies governing coastal resources appeared to be a major setback to a successful implementation of resource sustainability mechanisms. The traditional-modernity conflict manifested itself in the study area in terms of, which knowledge base was to be accepted. As the officials of the Fisheries Department were using scientific reasons to argue that the fishes hatch their eggs in March, the fishers talked about May-June and September, depending on the types of fish they were interested in. Yet, there were some participants who supported government's time lines for the closed-fishing strategy. The differing periods of fish spawning identified by the government and the local fishers was a source of conflict among them.

Contrary to the above, the officials argued that the fisher associations and other relevant stakeholders were consulted before policies were implemented. They claimed that, leaders of the various Fishers' Associations were consulted by the experts who prepared the documents that sought to regulate fishing activities in the country. It was argued that, the laws had been translated into the languages spoken by the coastal communities. These include Ewe, Fante, Nzema, and Ga, for the benefit of the fishing communities. However, it is fair to argue that, even the translation into the

local languages would not solve the problem since most fishers and fish mongers could not read, whether in English language or local dialect. The following quotes from the interactions with the participants affirm the points made:

> *We know the breeding season for the fishes. The closed season of the government conflicts with ours because the fishes hatch their eggs in September. That is when we can halt fishing but it is otherwise with the government's position.* (FGD-CM6, Apam)

> *The laws were written by experts in consultation with relevant stakeholders, including the fisher associations, and have been translated into Ewe, Ga, Fante, and Nzema. Copies of these laws have been given to all fishing groups along the beaches of the country, according to the languages they speak.* (A female key informant, Moree)

Christian Teachings and Tradition

Another aspect of the modernity-tradition dichotomy was the Christian beliefs against traditional beliefs in the study communities. Some of the participants were of the view that, the sustainability of the resources in the past had been influenced by the fear and pacification of the deities to solicit their continuous blessings for replenishing the sea with fishes and sand bars at the shores. Some of the resources, such as the lagoons and the rocky areas were reserved as places of abode for the deities. Neither fishing activities nor sand mining was allowed in such places, and this helped to preserve the resources, to some extent. The decline in the fear of the deities, due to Christian teachings, has led to the abuse of the resources. The argument was that, the so-called wrath and punishments from the deities were believed to be nullified by 'superior' Christian prayers. This had resulted in the encroachment on sacred areas which hitherto, were preserves of the community deities.

To the participants, the leaders had refused to perform those rituals with support of other members of the communities, due to Christian teachings. The act of performing rituals such as making libation, slaughtering animals and preparing special meals as offering to the deities were seen as idol worshipping in Christianity. The participants were so much concerned about the fact that the local church members who were found participating in the performances of the traditional rituals were often suspended or threatened with suspension. The following quotes are example of the participants' views.

> *Some of ourtraditional leaders have become church elders, and do not wantto perform rituals in the community for the deities to bless us with more fishes of late and protect us. The churches are destroying our tradition because they equate tradition to idol worshiping. So, when you have to appease the deities for something to come, as soon as you do it, they say you are worshiping idols so we have all left it. You see now people do not fear the sea and can do anything to it.* (FGD-FM8, Moree)

> *In the past, both the good and the mishaps were attributed to the deities and as such, people were mindful of their wraths of the deities if they abused them. The coming of Christianity has demystified those beliefs allowing the people to treat the resources, especially, the sea anyhow.* (A male key informant, Apam)

Vulnerable Livelihood Situations

The vulnerable livelihoods situations, in which participants operated, were considered to be a major factor that impeded the plans to conserve the coastal livelihood resources in the study area. As the participants heavily depended on the coastal resources for survival, it made it difficult for them to adhere to their own local measures, and any policy that sought to restrict their access and usage of such resources.

When the participants were asked why they had not used their indigenous knowledge to help salvage the coastal resources, especially, the bad fishing practices, they responded by resorting to blame game. The fishers accused the fish mongers for not using their powers as the financiers and sponsors of the fishing activities to help deal with the illegal fishing. To some of the men if the women decided to boycott the buying of the fishes caught illegally, it would reduce the problem. The fish mongers also claimed that they could not do much due to livelihood challenges. The point made was that, it was the women who often took care of the family's daily expenditures, and also pre-financed the fishing activities in the study area, and as such played an important role in the livelihoods of the people in the communities. Their argument was that, the fishers would go and sell the catch elsewhere if they (fish mongers) refused to buy their catch and would not be able to retrieve their invested capital, let alone have something to take care of the family. The following extracts are examples of the participants' views;

> *The unfortunate thing is that the women who control the business do not also help matters. They should not buy any fish caught with light or chemicals. They are able to identify the differences, but they gloss over it and buy. This encourages the men to engage in such practices.* (FGD-CM2, Apam)

> *As fish traders, we are able to identify fishes that are caught using light, chemicals, or other inappropriate methods, but we are unable to stop the men from doing that. If we decide not to buy their catch after sponsoring the expeditions, they will take them elsewhere and we will lose our investments.* (FGD-FM2, Moree)

The sand miners also claimed the ban was affecting their livelihoods seriously, and that served as justification for their inability to comply with the ban on beach sand mining. To them, the fishing business was no longer

rewarding, and as such they depended on the sand as supplementary economic activity for their livelihoods. Therefore, the ban by the government was considered as the last straw that broke the camel's back. For example, a participant lamented this way:

> *It is very difficult to stop the sand mining business. That is what we have been doing to support our livelihoods since the fishing business is not fetching us enough income. So, preventing us from such supporting survival activity means the government wants us to die of hunger*. (FGD-SD5, Moree

Participants' Suggestions for Ensuring Resource Sustainability

Participants reported that, there were three ways to sustain the coastal resources from their own perspectives. First was the need for the onus laid on the traditional leaders and government officials to enforce their laws on sustainability of coastal resources. Second was the need to revisit the abandoned traditional norms and taboos which aided sustainability. The state apparatus could also be tasked to enforce the laws governing coastal resources utilisations and preservations. Thus, sustainability could be realised through the collective efforts of local the people and the state institutions.

Participants believed that, to sustain coastal resources, there was the need for them to obey coastal management regulations. They believed that their traditional ways of preserving the resources proved ineffective due to the prevailing circumstances, and admonished the government to take stricter measures to reverse the level of degradation of the resources. They specifically mentioned a complete halt of trans-fishing activities (SAIKO), implementation of local bye-laws, and adherence to customary laws. Others were the regulation of registration of new canoes, provision of livelihoods

support systems to the people, collaboration between governmental agencies and the local authorities, and the need for public education, as the way forward.

Adherence to the Ban on Illegal and Trans-Fishing Activities (SAIKO)

Participants advocated for the government officials to administer justice and punish violators without fear or favour to serve as deterrent to others. It was reported that strict enforcement of the ban against illegal fishing and sand mining would go a long way to reverse the ever-increasing depletion of the coastal resources. To others, the offshore trawlers (SAIKO) should go on break for some time because their fishing nets scraped the bottom of the ocean, collecting all the fishes, especially the fingerlings. They also claimed that, the activities of the pair trawlers and big fishing boats when checked periodically, would go a long way to reduce the harvesting of fingerlings.

The participants' understanding was that, the fisheries enforcement unit (the Marine Police), Navy and other agencies responsible for ensuring the adherence to the laws regulating marine fishing should play their roles effectively. They were considered to be the key people when it comes to the protection of the marine resources; so, if they did their work well, the problem would be minimised and, in that case, we could talk of sustaining the marine resources. They claimed that, they often fished in the waters of Cote d'Idvoire, yet they never engaged in any illegal activities because the law enforcers there were strict and would not take away bribe. For example, a 37-year-old fisherman in an interview had this to say:

> *The best way to protect the sea is to stop light fishing. We are all aware of the effects of light fishing, but those who have been doing it insist, thatm, until the Chinese stop their trawling activities, they will also not stop using the light in fishing. So, the government should ensure proper enforcement of the laws regarding fishing. As for me I have not seen anyone being punished for that reason here. Because, those who formulate these rules are the same people who violate them. The light is used for fishing in almost all the fishing towns in the country.*

Extracts from a 65-year old key informant from Apam further captured it in this way:

> *It is the responsibility of government to implement the laws it has passed. If the government does not use force to compel us, there is no way the current degrading fishing practices will stop. This is because many of us have collected loans and have to pay back with interest. So, we have to do anything that can get us enough income so as to pay back the loans with the interests. My brother, it is not that they are unaware of the effects of our actions; it is a matter of survival. So, who am I, as a local leader, to stop them from their livelihood activities? The government officials must work.*

Adherence to Customary Laws

The participants also advocated for the need for them to begin to perform traditional rites to ensure that the deities also support and bless their activities. To them, going back to their old ways of interacting with resources would help them than the use of modern technologies that had been serving as the means of the destruction of the resources. They saw chief fisher men as the most important people at the local levels to champion that course of action. Importantly, they stressed the need for the strict observation of Tuesday as the non-fishing day along the coast.

> *We must rekindle the observation of the customary laws to ensure that the deities also support and bless our activities. It is the duty of all fishermen to help conserve the sea such as observing no fishing on Tuesday's rule. The problem is that it*

> *will be a cheat if we observe the rule while fishers from other nearby communities do not. That is one of the reasons why we are not observing the sacred day rule. It is the responsibility of Apofohen (chief fishermen) to ensure that Tuesdays are observed duly across all fishing communities. In the past, anyone who disobeyed this rule was made to hand-over all the fish harvested and fined upon returning from the sea. But, now because the leaders own these fishing boats and violate the rules themselves, we do not see them punishing anyone. Now, traditional rites and customs are not upheld here anymore.* (FGD-CM4, Apam)

Implementation of local bye-Laws

Participants were of the view that the government could support the local authorities to ensure sustainability of the coastal resources. Their view was that the changing social structures of the communities made it difficult for the local people to maintain effective sustainability of the coastal resources. Though there were laws banning sand mining, it seemed the people, especially at Moree flouted it with impunity. With this, participants called for the need for the government agencies to double their efforts to halt the menace.

Although the Environmental Health Officers had made significant strides to ensure that coastal resources were managed and sustained, it appeared the delay in the gazetting of the bye-laws halted the empowerment programmes for the fishermen and fishmongers in the communities. There appeared to be a chain of command whenever there was a need to embark on a clean-up exercise in the communities. In such situations, the Assembly members in both localities played the communication and organisation roles in making sure that, such exercises were executed successfully.

In relation to the existence of bye-laws that supported the use of indigenous knowledge in the management and sustainability of coastal

resources, it was revealed that, the main problem was ineffective implementation of the bye-laws, which was also resulted from lack of gazetting of the law. The following quotes typify the views of the participants in that regard:

> *We have a bye-law, but it has not been gazetted, so we cannot use it until it is gazetted. We have prepared a draft which the District Assembly has submitted to the Regional Coordinating Council, to be forwarded to the Attorney General, for approval. That law is important because it deals with specific roles the various traditional institutions expected play. The ownership of their own destiny and the resources not felt by the people. But because it is not gazetted we cannot use it.* (A 68-year old male key informant, Moree)

> *The law banning sand mining should be enforced to the later. The people know that what they are doing is bad yet they are not willing to stop it. The bye-laws of the District Assemblies should be gazetted so as to give us the power to implement some of the policies at the district levels. We should also enforce the law regulating sanitation in the country equally. Though public education is important, emphasis should be put on enforcement of the law more than education, without considering who is involved. We have been educating the people for the past thirteen years that I have been working here, it has not yielded any meaningful results.* (A male informant, Apam)

Regulations on Registration of New Canoes

The study revealed that, the free access nature of the sea was one of the issues that accounted for the over-population of canoes in the study area. The participants were of the view that, the problem of depletion of the coastal resources, especially the fish stock was not solely due to the illegal fishing practices, but also the increasing number of canoes on the sea. The participants admonished the government to take a second look at the free entry nature of fishers to the sea, without regulations.The argument was that restricting the number of canoes on the sea would help reduce the problem the fast declining

of the fish stock in the sea. The participants suggested that the government could halt the registration of new canoes for, at least, a year and those who were found to flouting the rules governing fishing be suspended for a period of time to reduce the pressure on the resources. This position was strongly held by the officers from the Fisheries and Environmental Health units. However, some of the fishers opposed such proposition, saying that it would affect the livelihoods of such people. A female participant said:

> *I think the government and the Apofehene should put measures in place to reduce the number of canoe fleets on the sea at any point in time. I will suggest that there should be a halt in the registration of new canoes for a year or two. This may reduce the pressure on the sea.* (A female key informant, Moree)

Provision of Alternative Livelihoods for the People

When the participants were asked about the way forward, alternative livelihoods came out strongly as means to reduce over dependence on the natural resources. For instance, the sand miners highlighted the need for alternative livelihoods so as not to depend so much on the sand mining for their livelihoods. To them, fetching the sand for personal housing projects alone would not cause much havoc, but the commercialisation of it was the problem. So, to reduce the burden on them, the government should give them jobs. When the researcher asked them the kind of jobs they could do, taking their levels of education into consideration, some said they should be employed by Zoomlion or Zoil to help clean the community. For example, an extract from FGD at Moree captured the arguments of the participants this way:

> *The government should give us job to do and we will all be at peace. Even though many of us are not educated*

> *we can be employed by Zoomlion or Zoil to clean the community. I used to work with Zoil, which was helpful, but I was laid off due to change of government in the past.*

Collaboration between Government Agencies and the lLcal Authorities

The study also revealed that, much is needed to be done in the area of collaboration between the government officials and the local authorities so as to jointly find solution to the problem of over-exploitation of the coastal resources. For instance, when a question was posed to a government official at Moree, as to the kind of collaboration she had with the locals, her response was that, at times the young educated people were engaged to help collect data for her in her absence.

Another area of collaboration the study identified was that, the chief fisherman played a major role in the registration of canoes for fishing in their jurisdiction, since he lived and interacted with the local people directly. He provided information to the government officials on the state of the canoes, in terms of, the active and inactive ones and those that had been relocated as well. The participants, therefore, advocated for legal backing of the work of the chief fisherman.

The people further argued that, collaborations between the key stakeholders in the communities would enhance public education on the need to preserve the coastal resources as they tried to exploit them for their livelihoods. The argument was that, the community members should be educated to have ownership of the resources, and to be willing to use or exploit them with care, so as to reduce the waste. To the participants, that could help the people to have attitudinal change on how to relate to the very

resources they depended on so much for their survival. Some also suggested that, the pastors should be brought on board, so as to use part of their church services to preach on the need for the members to avoid the issues of illegal fishing practices, sand mining, and general sanitation. the quote below represents the views of the participants:

> *There is the need for legal backing for the work of the chief fisherman. In the past, we accorded the elderly with fear and respect, but today we do not have it so, everyone decides to do anything he or she wishes. It is the duty of each and every one to protect the sea. But, it is the duty of the leaders of the fishermen, government, assembly members, DCE, Ministers and Members of Parliament to unite and enforce these rules.* (FGD, Moree)

While some of the participants argued that it was possible to conserve the coastal resources through strict adherence to indigenous laws, others said that it was difficult to preserve the coastal livelihood resources, given the deep-rooted internal and external flaws that had been in existence for ages. Participants, who felt it was difficult to sustain the coastal resources, said so because of the differences over the customary laws governing fishing activities among fishing communities, including other different ethnic groups. While some fishers in some communities had just a day of no fishing, others had two or more. Such inconsistencies in the customary laws compelled participants to violate the laws of other communities.

In addition, some participants felt that their traditional laws were overshadowed by state laws, making it difficult to obey the customary laws in their communities. The state sanctioned culprits who violated the laws as compared to traditional leaders. Some participants expressed their views in this way:

> *The chiefs and elders should make sure that we adhere to the ban on fishing on Tuesdays. This is one way of protecting the sea. The placing of sanctions on sand mining is another factor that is used to preserve the coastal resources in this community.* (A 54-year-old fisherman, Apam)

Discussion on Sustainability of Livelihood Resources

On the issue of factors affecting sustainability, the trans-fishing (Saiko) business or industrial trawlers was considered as one major factor that depleted the sea of its resources, thereby endangering the sustainability of the marine resources. In consonant with several studies, traditional fishermen and industrial trawlers have struggled for space and fishing resources with the latter prevailing (Christensen, Raakjær, & Olesen, 2007; Shah & Selamat, 2016; Zhang, 2016). This finding also confirms Ostrom's (2007) assertion that, without delineating the boundaries of common property resource and closing it to outsiders, they will exploit the resources, to the detriment of indigenous users, and deprive them of their means to livelihoods as expected. The finding also affirms Mensah and Antwi (2002) argument that, in open access, there are no accountabilities or limitations to property rights, and any individual or group can make use of such resources without regard for the interests of others seeking the same.

The issue of corruption emerged strongly from the current study as the Navy and the Marine Police officers often collected bribes from the fishers at sea and left offenders to continue their illegal activities. There was a set of structural weaknesses that existed; such as weak surveillance and enforcement, allowing illegal, unreported and unregulated fishing to continue to be practised unabated (World Economic Forum, 2020). According to

Standing (2008), two elements that may impede law enforcement and the efficacy of marine inspections include corruption and conflict of interest. Bribe payments and government cooperation in crimes can also obstruct law enforcement and prosecutions

This study also corroborates the findings of Abane, Akonor, Ekumah and Adjei (2013), and that of Akpalu, Eriksen and Vondolia (2018) which observed that Ghana's fishing industry is plagued with a lot of illegal, nreported and unregulated fishing activities which has been a product of unregulated management regimes, that give room to foreign industrial fishing fleets to engage in illegal fishing activities competing with local fishers. Abane et al. (2013) contended that, in response to the competition, artisanal fishers have also adopted illegal methods in fishing which results in some form of punishment. The Environmental Justice Foundation in its 2018 report revealed how some Chinese trawling vessels caught engaging in illegal activities, sometimes fail to pay fines that are they are charged for violating the fisheries laws. These issues continue to remain one important concern to artisanal fishers.

In addition, the leaders in the landing beaches in Moree and Apam faced difficulty in implementing some of their own internal rules and regulations due to the abuse of power, conflict of interest and the social network (kinship) systems in the communities. This argument is in line with Adams' (1998) observation that, traditional leaders, frequently abuse their powers of resource custodianship, not always for personal gain, but sometimes for what they believe will be in the best interest of their communities.

It was found that bad fishing methods (usage of harmful chemicals for fishing, light fishing, and unauthorised fishing nets) affected the sustainability of coastal resources, especially the fish. This corroborates Ocloo's (2015) study that, the reduction of fish catch, and the overall sustainability of fishes were linked to bad fishing practices such as using light and dynamite in fishing. These practices, either kill the fishes prematurely or destroy their gametes (eggs and sperm cells). A report by Hen Mpoano (2015) also stressed that an integral problem that affected the sustainability of sea resource was bad fishing practices through the use of dynamites and light for fishing.

Over population in coastal areas and its corresponding increase in canoes was one of the challenges coastal people face. This is in line with the World Health Organisation's (2005) projection that, future coastal population growth will make coastal ecosystems more vulnerable. This is because rising demand and competition for coastal resources would result from the over-population and the growth in canoe users; thus, increasing pressures on coastal zones, ecosystems, and thus reducing the capacity to provide sustainable resources (Neumann et al. 2015; Merkens et al. 2016).

Issues of littering the beaches caused pollution that affected the sea. This finding was in line with other studies. The beaches and the lagoons of the study areas had been turned into refuse dump, with all manner of both plastic and faecal matter were released into the water bodies. Plastics have the potential of harming aquatic life, as some fishes consume bits of plastic materials. These findings support Parker's (2018) claim that plastic pollution has the greatest impact on sea turtles, as well as some jellyfish species, because it causes oesophageal obstruction and accumulates in whales'

stomachs. Similarly, Carson, Colbert, Kaylor, and McDermid (2011) claimed that, tuna, swordfish, and lantern fish inadvertently swallow plastics, which then enter the ocean food chain (Ganguly, 2018).

When the subject of sand mining was raised, two opposing schools of thought surfaced. One school of thought was of the view that, the practice does not affect their activities as fishermen. This argument was premised on the idea that, the lost sand was replaced by the sea waves each night, therefore, there was no need of worrying about the quantum of sand 'missing' in the daytime. As some of the participants were aware of the destructive nature of sand winning, others had a contrary view. The participants, especially the women, relied on the sand mining as an alternative source of livelihoods and the construction the construction sector heavily relied on beach sand and gravels in building of houses, bridges and roads. This resonates with Sumani's (2019) study which concluded that sand/gravel winning has both beneficial and harmful impacts on the coastal people.

Despite its economic benefits to the mining operators, the other school of thought, emphasised the negative effects on the coastal dwellers. Consequently, the extraction of sand and gravels had a number of adverse environmental impacts which were first reported in the developed world then later, in the developing nations (Addo & Adeyemi, 2013; Jonah et al., 2015; Mensah, 1997). The finding of the current study is no exception as house owners and other individuals engage in sand winning at the shores of Moree and Apam. The sand mining activities had caused so much erosion at the beaches of the study area, to the extent that the sea was at the verge of washing away some of the buildings at Moree. This confirms Mensah (1997),

argument that the process of sand mining has accelerated coastal environmental degradation to an alarming rate in many areas, and that there is the need for a concerted effort by policy makers, sand contractors, engineers, traditional rulers and local residents to find a solution to the coastal environmental problem.

Despite the challenges that affect the sustainability of the coastal resources, the participants were not oblivious of the existing indigenous mechanisms towards protecting and preserving them. There were taboos on Tuesday sea fishing in both communities, as fetching of water and harvesting trees at the banks of the lagoon at Moree were regulated by the same belief system. It was also revealed that, for the people to enjoy continuous supply of the resources, the necessary rituals and sacrifices were performed periodically. These were to regulate the utilisation of the resources to ensure their sustainability, show appreciations for the previous bumper harvests, and to pray for abundant supply in the succeeding years (Agyarko, 2013 & Awuah-Nyamekye, 2009).

Aside the above local measures, there were also, District Asembly bye-laws and national legislations that the participants were aware of. As the District Assembly bye-laws were to promote conducive beach environment, the national legislations were reported to protect the sea and the beach sand from over-exploitation.

The study revealed that, until recent times, the coastal resources and fishing-related activities were guided by customary laws and beliefs. It has been well established that, traditional knowledge, beliefs and practices play a very crucial role in the lives and work of fisher folks in fishing communities.

(Adjei & Sika-Bright, 2019). However, modern policies had emerged as the main force of regulation of coastal resources, without recourse to the customary norms. In the process, the traditional laws had been overshadowed by modern laws of the state, making it difficult to obey the customary laws in the communities (Risiro et al., 2013 & Adams,1998)). This presupposes that, experiential knowledge alone cannot be depended on for developing strategic management plans, since the accessibility, collection, storage and preservation of such knowledge become a challenging enterprise (Briggs, 2005). Likewise, Adjei and Sika-Bright's (2019) finding that modernisation and the introduction of Christianity and Islam into the fishing communities had provided two worlds in which tradition and modernity either compete with or complement each other in some situations. As a result, many traditional beliefs and practices have been abandoned.

Given the numerous challenges confronting the use of indigenous knowledge to preserve and protect the coastal resources, it was discovered that there was the need for some form of collaboration between government agencies and local community members to enhance coastal resource sustainability. This confirms Kelman, Mercer and Gaillard (2012) recommendation for a more integrative process that merges both local and scientific knowledge in solving community problems. The authors, however, postulated that, increased connectivity and globalisation of the world has rendered some local knowledge less useful; as some are perceived to have the tendency to aggravate vulnerability. The competition between modernity and traditional beliefs has, therefore, led to the abandonment of many traditional beliefs regarding fishing (Adjei & Sika-Bright, 2019). This seems to account

for the inadequate inclusion of customary laws in fisheries management policy.

Though many of the participants attested to the fact that, the inappropriate fishing and sand mining activities had dire consequences of the sustainability of the resources, they found it difficult to halt it since it was a livelihood issue. It is in this context that Ansah, et al (2022) identified livelihood issues, as well as, financial and community development issues, in which fishers choose to violate the customs for the achievement of immediate livelihood and community needs. The point was that, the participants lived within a vulnerability context without any meaningful coping strategies. This further pushed them to adopt other surviving strategies such as sand mining and illegal fishing practices, which aggravate their vulnerability in the long run (Asiedu, et al, 2013 & Scoones, 2009). The participants, therefore, highlighted the need for alternative livelihoods so as to reduce the over-dependence on the coastal resources.

The current study also revealed that the open access nature of the coastal livelihood resources had created managerial problems in the study areas. This confirms the claim by Akpalu, Eriksen and Vondolia (2018) that the unregulated management regimes characterised coastal resources and had resulted in the deterioration of socio-economic well-being of those who depend on such resources for their livelihoods. For a better management of the resources, the participants gave responses that suggest that, they did actually prefer collaboration between government agencies and the local authorities to best deal with the problem of sustainability of the livelihood resources. This supports the Theory of Social Action by Ostrom (2007), who suggested that,

in managing common property resource, a collective-choice arrangement is the best solution. The argument is that, users of common properties should have a say in the rules that govern how resources are bound to meet local needs.

However, because coastal resources are public goods, if local people are allowed to select how to use them, they will not act in the group's best interest, and they need be governed by some pre-determined rules (Ostrom, 2007, Olson, 1965). However, the participants' demand for national government restrictions on the application of the Tuesday non-fishing rules runs counter to Ostrom's (2007) argument that, formal rules developed for a complete nation can rarely take into account the unique characteristics of the resources.

Summary

The sustainability of coastal livelihood resources is a challenge in Moree and Apam, and this can be attributed to external and internal causes. The study revealed that inappropriate fishing practices, increasing population in the coastal communities, pollution, neglect of traditional beliefs and practices, corrupt practices among people responsible for protecting the resources, sand mining, were responsible for the unsustainability of the coastal resources in the study areas.

It was also evident in the chapter that, not only did modern or government policies on coastal resources triumph over traditional authority, but also traditional or local leaders faced challenges to implement their own internal rules and regulations governing the coastal resources due to conflict of interests and the systems of patronage and clientelism in the communities.

Also, the chapter revealed that despite the mountain of challenges, the participants had a plethora of indigenous knowledge and practices on how to sustain coastal resources. Specifically, there were customary laws, beliefs and rituals, local bye-laws and national legislations that were in existence in the communities. It was, however, discovered that there was a difference between the existence of the indigenous measures and their full adherence to the laws. Factors such as modernity, Christian teachings, and livelihoods vulnerabilities had been the main debilitating factors that worked against the people's quest to use their indigenous knowledge to conserve the resources.

The chapter ended with the suggestions from the participants as to the way forward. Suggestions were made to the effect that traditional leaders should revisit the use of traditional laws and taboos including Tuesday or a rest day rule as a means to conserve sacred places. It was also captured that the government agencies should be fair and firm, if they want to use state powers to regulate the utilisation of the coastal resources. More importantly, collaborations between state apparatus and traditional leaders would be the surest way to that could help sustain the coastal livelihood resources. The next chapter presents the summary of the study, conclusions, and recommendations.

CHAPTER NINE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The chapter concludes the research journey by looking at the summary of the study, conclusions, and recommendations. It also covers the researcher's contribution to knowledge and literature and suggestions for future studies.

Summary

The study sougjht to investigate how the local peoples' knowledge about the coastal resources influence their utilisation and sustainability.at Moree and Apam communities in the Central Region of Ghana. The study aimed to accomplish three specific objectives: to identify and link indigenous knowledge systems to coastal livelihood resources in the study area; examine how indigenous knowledge systems are integrated into livelihood strategies; and to assess the impact of indigenous knowledge on the long-term sustainability of coastal resources in the study area.

The study employed the exploratory research design to explore, describe, and interpret the shared culture, values, norms, and traditions of the local people in Moree and Apam, which formed the foundations of indigenous knowledge. In the primary data gathering methods, a total of 36 participants were selected to provided relevant information useful to the study, through purposive, snoball, and convenient samplin techniques. Interview guide, Focus Group Discussion guide, and observation guide were the instruments used to collect data for the study. The NVIVO software was used to process the primary data. As lenses to inform the research, the

researcher used Symbolic Interactionism and Theory of Collective Action, as well as a conceptual framework adapted from Awuku (2016). The findings of the study, were based on interviews with fishermen, fishmongers, fetish priestesses, sand and salt miners, representatives of Fisheries Commission and Environmental Health Office in Apam and Moree.

Key Findings of the Study

The key findings of the study were as follows:

1. The people of Apam and Moree had over the years, used their indigenous knowledge to identify resources in the environment, through family socialisation interaction with traditional authorities and the long engagement with coastal resources.
2. There was a telling effect of modernity and Christianity on the indigenous knowledge systems in the study area. As the people wanted to preserve their indigenous practices in relation to the coastal resources, they were challenged by modernity thereby creating division among the locals, as some still believed in the metaphysical properties; others saw them as mere natural objects for their utility purposes.
3. The participants were living in a vulnerability context as their income flow was irregular largely, due to human factors, such as poor planning, unfavourable prices of fish catch, as well as goods and services, low pricing of fish, irregular supply of premix fuel, inaccessible loans from banks and the dishonesty of customers put them in the state of vulnerability.

4. There were structural and individual causes or both as the major factors responsible for the unsustainable exploitation of the coastal resources. That is, the structural and individual cause or an interplay between both, adversely affected sustainability of the coastal resources.

5. The current measures both internal and external, implemented independently, have proven to be ineffective in dealing with the nature of degradation of the coastal resources in the study area. It was revealed that there had been deep rooted internal and external shortcomings in the current measures to protect the resources. These included inconsistencies between the customary laws among the coastal communities and the state legal regime, as there is overshadowing of the state laws over the local customs.

6. There is the need for collaborations between government officials and traditional authorities, would go a long way, to help regulate the open access nature of the coastal resources and their utilisations. In this regard it was recommended that collaborations between governmental agencies and the local authorities would serve as a catalyst to the problems.

Conclusions

Based on the key findings, the study concludes that:

1. The communities have accumulated indigenous knowledge through socialisation and that has helped them to identify and utilise the resources in their environment.

2. There were in unsustainable livelihood and vulnerabilities in the study area, propelled by both natural and human-induced factors. Seasonality of fishing, high tides, and irregular rainfall patterns, coupled with irregular supply of pre-mix fuel and pricing, loan facilities, poor planning by the people, dishonest customers, who often booted away with their monies after buying on credit from the fishers, resulted in irregular income flow.
3. The indigenous knowledge system however, entrenched in the communities, should not wholly work. It had been interrupted by certain modern exogenous factors, leading to damaging relationship between the social systems and the coastal ecological system in the study areas.
4. Sustainability of the coastal livelihood resources requires multiplicity of measures from both indigenous knowledge system and modern science as coastal resource management system.

Recommendations

The following recommendations are made based on the study's key findings and conclusions in order to improve the strategies for sustaining coastal resources in the study area:

1. To reduce the effects of the ban on sand and closed-fishing season policies on the people it is recommended that, the government should provide livelihood support schemes such as emploiying the locals in the community sanitation companies to help reduce their over-dependence on the coastal livelihood resources.

2. The Ministry of Fisheries and Aqua-Culture, and the Fisheries Commission should strengthen the enforcement its laws towards a complete halt to trans-fishing activities (SAIKO) in Ghana. The trawlers who engage in illegalities should be punished without fear or favour to serve as deterrent to others. Such strict enforcement of the ban against illegal fishing by the industrial trawlers will serve as warning to the artisanal fishers and sand miners. All other things being equal, when the activities of the pair trawlers and big fishing boats are checked periodically it would go a long way to reduce the harvesting of fingerlings.
3. The Navy, the Marine Police, and other agencies responsible for ensuring the adherence to the laws regulating coastal resource utilisation should be constantly monitored to ensure that that play their roles effectively. This is due to the understanding that they are key to the protection of the coastal livelihood resources; so, if they did their work well the problem would be minimised if not eradicated totally.
4. Since the free access nature of the sea was one of the issues that accounted for the over-population of canoe in the study area, the Fisheries Commission should take a second look at the free entry nature of the sea. The Commission, in conjunction with the chiefermen, should consider halting the registration of new canoes for at least a year and the already registered ones that flout the rules governing fishing be suspended for a period of time to reduce the pressure on the resources. Even though that has the potential of

affecting the livelihoods of such people it will serve as social control mechanism

5. There is the need for collaboration between state officials in the fishing industry and local authorities so as to find ways of coming into compromise on the use of traditional and modern methods of conservation. The state should provide legal backing to the work of the chief fisherman. Such collaborations among the key stakeholders in the communities would enhance public education on the need to preserve the coastal resources as they tried to exploit them for their livelihoods.

6. The traditional religious leaders should be supported by the local landing beaches to perform traditional rituals to satisfy the religious and psychological needs of the people. The fear of the deities and other perceived marine spirits when encouraged, will go a long way to help treat those resources that are seen as hosting such metaphysical objects with respect. To be more specific, the Tuesday non-fishing day tradition should be enforced by the various landing beaches in the country. As it is now, the rule has been relaxed in many of the fishing communities, promoting unfairness in the system, for those who comply by the rule. The chief fishermen are the most important people at the local level to champion the strict observation of the Tuesday as the non-fishing day along the coast, consequently they should ensure its observance as such.

7. To the community members, it is recommended that should see the resources as their sources of livelihoods and for that matter, do

everything possible to preserve them for their benefit and that of future generations.

Contribution to Knowledge

The study has made some modest contribution to knowledge and the literature on the relationship between the possession of indigenous knowledge and conservation of coastal resources. Various authors in the literature have claimed that, indigenous knowledge is the best way of preserving and protecting natural resources (Berkes, 1999). They believe it is critical for the long-term viability of difficult-to-manage ecosystems like tropical forests and wetlands, as well as a source of inspiration for environmental ethics, in which its existence serves as a guide, organizer, and regulator of people's lifestyles, as well as a foundation for their livelihood and environmental conservation.

It was based on this understanding of the importance of indigenous knowledge system to the sustenance of coastal resources that, made the researcher adapt Awuku's (2016) conceptual framework to inform the study. The framework showed that indigenous institutions are made up of actors or stakeholders, including chiefs, elders, chief priest, priest, queen mothers, clan heads, family heads, chief fishermen and fishmongers, crew members and canoe owners as a whole, who may interact with one another.

According to the framework, the belief system of the indigenous people can influence the manner in which resources (salt, sand, fishes, and tourist sites among others) can be utilised. When it is effectively and efficiently utilised, it positively affects their livelihood which eventually influences resource sustainability. In this study, it was found that the people

had indigenous knowledge systems concerning the utilisation and sustainability of the coastal livelihood resources.

Despite this rich knowledge about the sustainable utilisation of the coastal resources, the study revealed that other extraneous variables, which the adapted framework did not envisage, impeded its effective utilisation. These variables included the activities of the industrial fishers which the participants saw their operations as detrimental to their well-being as they disregarded the national marine laws that prohibited the industrial trawlers from crossing the exclusive economic zone. The study revealed that though the people knew the light fishing was bad, but if they stopped, the industrial trawlers would still over exploit the resources with the devastating nature of their activities. Population growth and its attendant livelihood challenges were seen as another serious antithesis to the use of indigenous belief and norms to conserve the coastal resources. Transforming factors such as political interference, Christianity, modern science education, and corruption on the part of enforcers of local and national regulations, served as impediments to effective use of the indigenous knowledge.

The study has also been able to link the Symbolic Interactionists and Collective Action theories to the conceptual framework. Symbolic Interactinists argue that people's interaction with the coastal resources are based on the meanings they attached to those resources in the form of beliefs, norms, values,myths, and taboos which translate into indigenous knowledge system. Also a strand of the Theory of Collective Action by Ostrom (2007) 'Common Property resources are dipicted in the framework as the coastal resources which open to all manner of people, leading to overexploitation..

From these revelations, the researcher, therefore propose a new framework in Figure 4 that encapsulates the extraneous variables (inhibiting factors) discovered by the study.

This figure shows that, the achievement of sustainability of the coastal livelihood resources depends on how both government officials and local authories will handle the inhibiting variables in the framework, including trans-fishing activities, the vulnerable livelihood situations in the study area, political patronage and conflict of interests and the christians' rejection of traditional rites and practices in the study area. Below is the researcher's proposed conceptual framework that explains the relationship between the indigenous knowledge and the sustainability of the coastal resources.

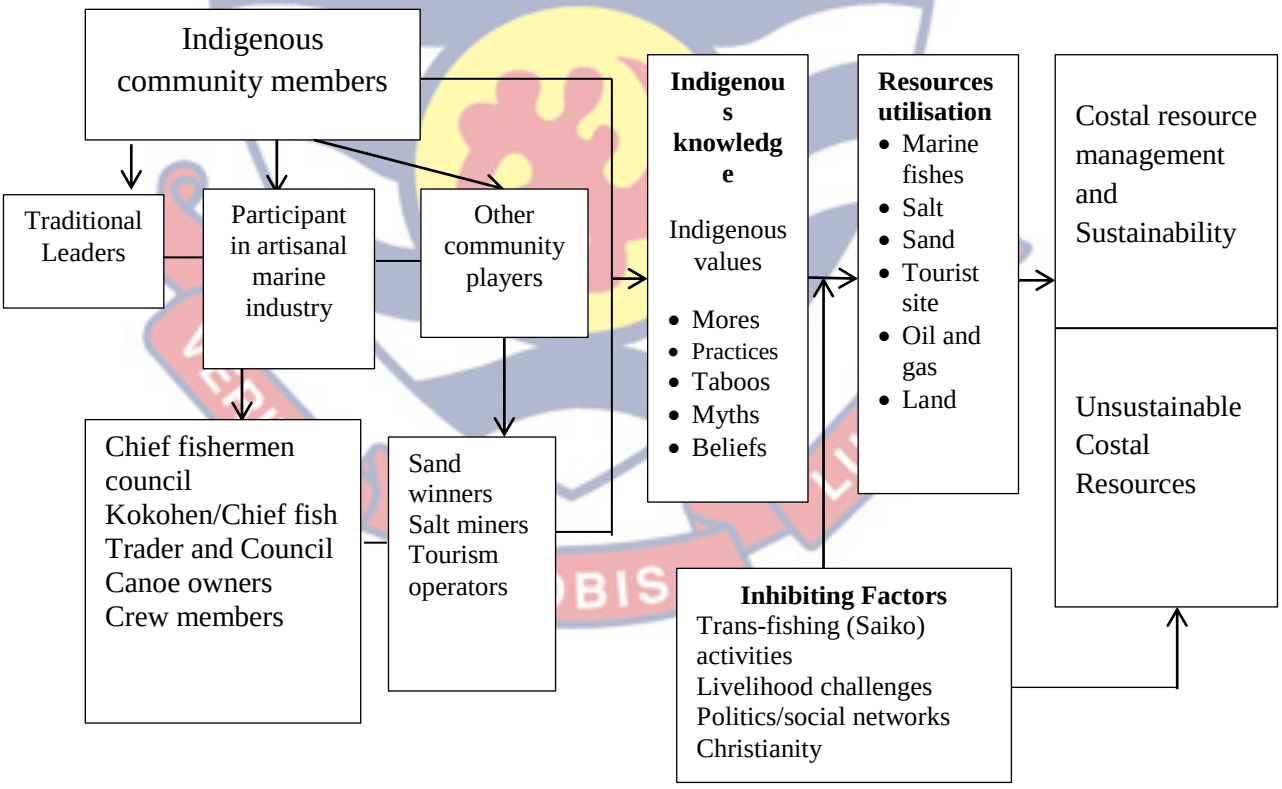

Figure 13: Proposed framework to sustaining indigenous knowledge and coastal livelihood resource.
Source: Anokye (2021)

Suggestion for Further Studies

Given the fact that the study is limited to only two coastal communities, in the Central Region, the findings could only be limitted to those communities. It is, therefore recommended that, further studies can also be conducted by expanding the scope of the study area to cover the other coastal areas or regions in the country. This will give a broader picture of the problem that was investigated. As it is the findings from this study cannot be based on contextual generalisation since it was centred on only two specific coastal communities

Also, any future researchers who would like to research on how indigenous knowledge systems shape people's relationships with the environment should not just concentrate on only the knowledge itself, but also the mediating factors that have been highlighted by this study.

Summary

This final chapter of the thesis gave a brief summary of how the study was carried out. Also, the key findings that came out of the study were presented in the chapter, as it was revealed that the people had over the years used their indigenous knowledge to identify resources in the environment, through family socialisation interaction with traditional authorities and the long engagement with coastal resources. The conclusions that were derived from the findings were presented, as well as the recommendations made by the researcher. The chapter ended with the researcher's contributions to knowledge and suggestions for further studies.

BIBLIOGRAPHY

Abane, H., Akonor, E., Ekumah, E., & Adjei, J. (2013). Four governance case studies and their implications for Ghana fisheries sector: USAID-URI Integrated Coastal and Fisheries Governance (ICFG) Initiative. Rhode Island, USA: Coastal Resources Center, Graduate School of Oceanography, University of Rhode Island.

Abeku-Essel, E. (2018). The role of taboos in African governance systems. *Polgári Szemle: Gazdasági És Társadalmi Folyóirat*, *14*(4-6), 372-386.

Acorn International (2015). Independent study of coastal environmental conditions in Ghana. Toronto, Canada: Acorn International Publications.

Acquah, H. D., & Addo, J. (2011). Determinants of loan repayment performance of fishermen: Empirical evidence from Ghana. *Cercetări Agronomice în Moldova, 4* (148), 89-97.

Adams, T. (1998). The interface between traditional and modern methods of fishery management in the Pacific Islands. *Ocean and Coastal Management*, *1*(1)1-13

Addo, K. A., & Adeyemi, M. (2013). Assessing the impact of sea-level rise on a vulnerable coastal community in Accra, Ghana. *Journal of Disaster Risk Studies, 5*(1), 1-8.

Adjei & Sika-Bright (2019). Traditional Beliefs and Sea Fishing in Selected Coastal Communities in the Western Region of Ghana. *Ghana Journal of Geography*, *11*(1), 1-19.

Afoakwah, R., Osei, M. B. D. & Effah, E. (2018). A Guide on Illegal Fishing Activities in Ghana. USAID/Ghana Sustainable Fisheries Management Project. Narragansett, RI: Coastal Resources Center, Graduate School of Oceanography, University of Rhode Island. Prepared by the University of Cape Coast, Ghana. GH2014_SCI048_UCC 64 pp

Agrawal, A. (2001). Common property institutions and sustainable governance of resources. *World Development*, *29*(10), 1649-1672.

Agrawal, A. (2003). Sustainable governance of common-pool resources: context, methods, and politics. *Annual Review of Anthropology*, *32*(3), 243-262.

Agyarko, R. O. (2013). Deity of life: Rethinking the Akan Christian concept of Deity in the light of the ecological crisis. *The Ecumenical Review*, *65*(1), 51-66.

Ajibade, L. T. (2003). In search for methodology for the collection and evaluation of farmers' indigenous environmental knowledge. *Indilinga African Journal of Indigenous Knowledge Systems*, *2*(1), 99-105.

Akpalu, W., Eriksen, S. S., & Vondolia, G. K. (2018). *The fisheries sector in Ghana: A political economy analysis*. Oslo, Norway: Norwegian Institute of International Affairs.

Akesseh, E. (2022). African Religions: Practices and Communities. *Encyclopaedia of Religious Ethics*, *4*(1), 822-830.

Akullo, D., Kanzikwera, R., Birungi, P., Alum, W., Aliguma, L., & Barwogeza, M. (2007, August). Indigenous knowledge in agriculture: A case study of the challenges in sharing knowledge of past generations in a globalized context in Uganda. In *World Library and*

Information Congress: 73rd IFLA General Conference and Council (pp. 19-23).

Akutse, P., & Samey, B. (2015). Baseline Survey Report for Winneba and Apam. The USAID/Ghana Sustainable Fisheries Management Project (SFMP). Narragansett, RI: Coastal Resources Center, Graduate School of Oceanography, University of Rhode Island and SNV Netherlands Development Organization. GH2014_ACT013_SNV.

Alabi-Doku, B. N., Chen, S., Ampofo-Yeboah, A., & Asiedu, B. (2020). Ghana's fisheries policies; evolution and performance. Asian Journal of Fisheries and Aquatic Research , *4*(2), 11-22.

Alexiades, M. N., & Laird, S. A. (2002). Laying the foundation: Equitable biodiversity research relationships. *London, England: Earthscan*.

Amevenku, F. K. Y., Asravor, R. K. & Kuwornu, J. K. M. (2019). Determinants of livelihood strategies of fishing households in the volta Basin, Ghana. *Cogent Economics and Finance, 7* (1), 1–15

Amponsah, S. K. K. (2015). *Assessment of the Security of Coastal Fishing Operations in Ghana from the Perspectives of Safety Poverty and Catches* (Doctoral dissertation, University of Ghana).

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

Anokye, F. A., Abane, H. & Ekumah, E. K. (2015). Moral economy and the sustainability of the artisanal marine industry in Shama, Ghana. *Oguaa Journal of Social Sciences. 7*(3), 71-85.

Anoliefo, G. O., Isikhuemhen, O. S., & Ochije, N. R. (2003). Environmental implications of the erosion of cultural taboo practices in Awka-South Local Government Area of Anambra State, Nigeria: Forests, trees, and water resource preservation. *Journal of Agricultural and Environmental Ethics*, *16*(3), 281-296.

Ansah, J. W., Oduro, J. Y. & Wilson, D. (2022). Narratives of Non-Compliance in "Tuesday Non-Fishing Day" in Ghana. The Palgrave Handbook of Blue Heritage, 357-382.

Ansah-Koi, N. A. (2008). *Wealth re-distribution mechanisms in the coastal town of Moree, Ghana*. (Master's Thesis, University of Bergen, Norway).

Appiah-Opoku, S. (2007). Indigenous beliefs and environmental stewardship: A rural Ghana experience. *Journal of Cultural Geography*, *24*(2), 79-98.

Ashraf, M. A., Maah, M. J., Yusoff, I., & Wajid, A. Karama. M.(2011). Sand mining effects, causes and concerns: A Case Study from Bestari Jaya, Selangor, Peninsular Malaysia. *Scientific Research and Essays*, *6*(6), 1216-1231.

Asiedu, B., F. Nunoo, K. E. Ofori-Danson, P. K. Sarpong, D. B. & Sumaila, U. R. (2013). Poverty measurements in small-scale fisheries of Ghana: A step towards poverty eradication. *Current Research Journal of Social Sciences*, *5* (3), 5–90

Atteh O. D. (1992). *Indigenous local knowledge as a key to local level development: Possibilities, constraints, and planning issues.* Ames, USA: Iowa State University.

Auty, R. (2003). Natural resources and gradual reform in Uzbekistan and Turkmenistan. Oxford, England: Blackwell Publishing Limited.

Awuah-Nyamekye, S. (2009). Salvaging nature: The Akan religio-cultural perspective. *Worldviews: Global Religions, Culture, and Ecology*, *13*(3), 251-282.

Awuah-Nyamekye, S. (2018). Ecological Resistance Movements: A Case Study From Ghana. Oguaa Journal of Religion and Human Values, *4*(1), 72-88.

Awuku, E. T. (2016). *Indigenous knowledge in water resource management in the upper Tano river basin, Ghana* (Doctoral dissertation, University of Cape Coast).

Ayaa, D. D. and Waswa, F. (2016). Role of indigenous knowledge systems in the conservation of the bio-physical environment among the Teso community in Busia County-Kenya. *African Journal of Environmental Science and Technology*, *10*(12), 467-475.

Axinn, G. W. & Ghimire, J. D. (2007). *Social organisation, population and land use*. Michigan, United States of America: Population Studies Center Research Report.

Babbie, E. (2013), *The Basics of Social Research*. Massachusetts, USA: Wadswort Cangage Learning.

Bahta, S. (2017). Promotion of indigenous knowledge through scientific research is fundamental to sustainable development: An anthropological perspective. *Sociology and Anthropology*, *5*(9), 776-780.

Bak, J. P., Kim, Y. M., Son, J., Kim, C. J., & Kim, E. H. (2012). Application of concentrated deep-sea water inhibits the development of atopic: Dermatitis-like skin lesions in NC/Ngamice. *BMC Complementary and Alternative Medicine, 12*(1), 1-10.

Baland, J. M., & J. P. Platteau, (1996). *Halting Degradation of Natural Resources. Is there a role for rural communities*? Oxford, England: Clarendon Press.

Barre, R. Y., Grant, M., & Draper, D. (2009). The role of taboos in conservation of sacred groves in Ghana's Tallensi-Nabdam district. *Social & Cultural Geography, 10*(1), 25-39.

Barry J. (2007). Environment and social theory (2nd Ed). New York, USA: Routledge.

Becker, H. S. (1996). The epistemology of qualitative research. *Context and Meaning in Social Inquiry, 27(2),* 53-71.

Beeko, E. O. (2005). Creative processes in Akan musical cultures: Innovation within tradition. Pennsylvania, USA: University of Pittsburgh.

Bell, J. D., Kronen, M., Vunisea, A., Nash, W. J., Keeble, G., Demmke, A., & Andréfouët, S. (2009). Planning the use of fish for food security in the Pacific. *Marine Policy*, *33*(1), 64-76.

Bendsen, H., & Motsholapheko, M. R. (2003). The role of indigenous technical knowledge in natural resource management in Ngamiland. Sexaxa, Botswana: Harry Oppenheimer Okavango Research Centre. Retrieved from http://www.thesis.com/data/ literature_OK/Bendsen3. pdf.

Béné, C., Barange, M., Subasinghe, R., Pinstrup-Andersen, P., Merino, G., Hemre, G. I., & Williams, M. (2015). Feeding 9 billion by 2050–Putting fish back on the menu. *Food Security*, *7*(2), 261-274.

Berg, B. L. (2007). *Qualitative research methods for the social sciences*. London: Pearson. Blaxter, L., Hughes, C. &Tight, M. (2006). How to Research (3rd Ed.). New York, USA: McGraw-Hill Education.

Becker, H. S. (1996). The epistemology of qualitative research. *Ethnography and Human Development*, *27(2)*, 53-71.

Berkes, F. (1999). Traditional ecological knowledge in perspective. Ottawa, Canada: International Development Research Centre.

Berkes, F. (1993). Traditional ecological knowledge in perspective. *Concepts and Cases Journal, 2*(1), 1-9.

Bizikova, L. (2011). Understanding the Contribution of the Environment to Human Well-Being: A review of literature. Geneva, Switzerland: International Institute for Sustainable Development (IISD).

Blaikie, N. (2009). *Designing social research: The logic of anticipation*. Oxford, England: Polity.

Blumer, H. (1986). *Symbolic interactionism perspective and method*. Los Angeles, USA: Prentice-Hull Inc.

Boamah, E. (2014). Towards effective management and preservation of digital cultural heritage resources: an exploration of contextual factors in Ghana (Doctoral dissertation, Victoria University of Wellington).

Boateng, I. (2006). Institutional frameworks in the administration of coastal and marine space in Africa. Administering marine spaces. *International Issues, 102(2), 49-55.*

Boelens, R. A., Chiba, M., & Nakashima, D. (2006). Water and indigenous peoples. Paris, France: UNESCO Publications.

Bromley, D. W., & Cernea, M. M. (1989). *The management of common property natural resources: Some conceptual and operational fallacies*. Washington, D.C., USA: World Bank Publications.

Bromley, D. W. (1992). The commons, common property, and environmental policy. *Environmental and Resource Economics, 2*(1), 1-17.

Butle, F. (2009). Customer Relationship Management: Concepts and Technology. *International Journal of Biodiversity Science, Ecosystem Services & Management, 12*(1-2), 24-38.

Bortei-Doku Aryeetey, E. (2000). *Moree Individual Survey on Small Scale Fisheries, Population Dynamics and Fisheries Management.* PCE-report, MacArthur Foundation. Accra, Ghana: Institute of Social, Statistical and Economic Research (ISSER), University of Ghana.

Botchway, D. V. N., & Sarpong, A. A. A. (2015). Indigenous work ethics among Akan of Ghana. *Religions: A Scholarly Journal, 2015*(1), 14-29.

Boyce, C. Neale, P. (2006*). Conducting in-depth interviews: A guide for designing and conducting in-depth interviews for evaluation input*. Massachusetts, USA: Pathfinder International.

Braat, L. C., & De Groot, R. (2012). The ecosystem services agenda: Bridging the worlds of natural science and economics, conservation and development, and public and private policy. *Ecosystem Services, 1*(1), 4-15.

Briggs, J. (2005). The use of indigenous knowledge in development: problems and challenges. *Progress in Development Studies, 5*(2), 99-114.

Brodhang, C. & Taliere, S. (2006). *Sustainable development strategies: Tools for policy coherence. Natural Resource Forum, 3*(1), 24-53.

Bromley, D. W., & Cernea, M. M. (1989). *The management of common property natural resources: Some conceptual and operational fallacies*. Washington, D.C., USA: World Bank Publications.

Bromley, D. W. (1992). The commons, common property, and environmental policy. *Environmental and Resource Economics, 2*(1), 1-17.

Brook R. K, & McLachlan S. M. (2008). Trends and prospects for local knowledge in ecological and conservation research and monitoring. *Biodivers Conservation,17*(3), 3501–3512

Bryman, A., & Bell, E. (2007). *Business research methods*. Oxford, England: Oxford University Press.

Callicott, J. B. (1994). Moral monism in environmental ethics defended. *Journal of Philosophical Research, 19*(2), 51-60.

Carson, H. S., Colbert, S. L., Kaylor, M. J., & McDermid, K. J. (2011). Small plastic debris changes water movement and heat transfer through beach sediments. *Marine Pollution Bulletin, 62*(8), 1708-1713.

Campbell, J., Whittingham, E., & Townsley, P. (2006). Responding to coastal poverty: should we be doing things differently or doing different things. Wallingford, England*:* CABI.

Chambers, R. & Conway, R. (1992). *Sustainable rural livelihoods: Practical concepts for the 21st century*. IDS discussion paper, No. 296. Pp.127-130.

Chebanne, A. M. (2008). A sociolinguistic perspective of the indigenous communities of Botswana. *African Study Monographs, 29*(3), 93-118.

Chemhuru, M., & Masaka, D. (2010). Taboos as sources of Shona people's environmental ethics. *Journal of Sustainable Development in Africa, 12*(7), 121-133.

Christensen, A-S., Raakjær, J., & Olesen, T. (2007). The voices of Danish fishermen in resource management: An examination of the system of negotiated economy. *Ocean & Coastal Management, 50*(1), 551-563.

Claxton, H. (2010). Indigenous knowledge and occidental science: how both forms of knowledge can contribute to an understanding of sustainability? *The Journal of Pan African Studies, 8(4),* 10-15.

Clough, P., & Nutbrown, C. (2012). A student′ s guide to methodology. California, USA: Sage Publications.

Clough, B. (2013). *Continuing the journey amongst mangroves*. Yokohama, Japan: International Society for Mangrove Ecosystems (ISME).

Cohen, M. Z., Kahn, D. L., Steeves, R. H. (2000). *Hermeneutic phenomenological research: A practical guide for nurse researchers*. Thousand Oaks, USA: Sage Publications.

Cohen, L, Manion, L, & Morison, K. (2011). *Research methods in education*. (5th edition)., London, England: Routledge.

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed method approaches*. Thousand Oaks, USA: Sage Publications.

Creswell, J. W. (2007). An introduction to mixed methods research. Lincoln, Nebraska, USA: University of Nebraska.

Creswell, J. W., & Tashakkori, A. (2007). Differing perspectives on mixed methods research. *Journal of Mixed Methods Research, 1*(4), 303-308.

Creswell, J. W. (2008). *Educational research: Planning conducting and evaluating qualitative research*. New Jersey, USA: Pearson Prentice Hall Merrill.

Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed methods approach*. London, England: Sage Publications.

Creswell, J.W., & Plano-Clark, V. L. (2011). *Designing and conducting mixed method research*. Thousand Oaks, USA: Sage Publications.

Cresswell, T. (2014). Place: An introduction. New Jersey, USA: John Wiley & Sons.

Danquah, J. A., Roberts, C. O., & Appiah, M. (2021). Effects of ddecline in fish landings on the livelihoods of coastal ccommunities in Central Region of Ghana. *Coastal Management, 49*(6), 617-635.

Dantzker, M., & Hunter, R. (2012). Research and ethics. Research Methods for Criminology and Criminal Justice, *7*(4), 19-30.

Dastidar, P. G. (2004). Ocean science and technology research across the countries: A global scenario. *Scientometrics, 59*(1), 15-27.

Dawoe, E. K., Quashie-Sam, J. Isaac, M. E., & Opong, S. K. (2012). Exploring farmers' local knowledge and perceptions of soil fertility and management in the Ashanti Region of Ghana. *Global Journal of Soil Science. 6*(170) 96-103.

DEFRA (Department for Environment, Food, and Rural Affairs) (2002) *Survey of Public Attitudes to Quality of Life and to the Environment-2001*. London, England: DEFRA.

De Haan, S. (2009). Potato Diversity at Height: multiple dimensions of farmer-driven in-situ conservation in the Andes. Wageningen, Netherlands: Wageningen University and Research.

Dercher, J. 1996. Conservation, small mammals, and the future of sacred groves in West Africa. *Biodiversity and Conservation, 6*(3), 1007-1026.

Derkyi, M. A. A. (2007). *Sustainable Community Management, Utilisation and Conservation of Mangrove Ecosystems in Ghana*. Accra, Ghana: ITTO PRE-PROJECT PPD.

Dłużewska, A. (2016). Cultural ecosystem services–framework, theories and practices. *Problemy Ekorozwoju*, *11*(1), 101-110.

Dosu, G. (2017). *Perceptions of socio-cultural beliefs and taboos among the Ghanaian fishers and fisheries authorities: A case study of the Jamestown fishing community in the Greater Accra Region of Ghana* (Master's thesis, Arctic University of Norway).

Dudley, N., Liza H.-Zogib, & Mansourian, S (2009). The links between protected areas, faiths, and sacred natural sites. *Conservation Biology, 23* (3), 568–577.

Duxbury, J., & Dickinson, S.W., (2007). Principles for sustainable governance of the coastal zone: in the context of coastal disasters. *Ecological Economics, 63*(10), 319–330.

Ellis, C. (2009). Education for all: Reassessing the historiography of education in colonial India. *History Compass*, *7*(2), 363-375.

Esia-Donkoh, K. (2011). Beyond Science: Traditional concept of preservation and biodiversity in Ghana: Focus on two traditional areas in Central Region. *Oguaa Journal of Social Sciences. 6*(1), 141-168.

Essel, E. A. (2020). Assessing the Role and Significance of Chiefs in the Governance of Cape Coast, Teshie and Kumasi Societies in Ghana. *Journal of International Relations, 8*(12), 514-525.

Eshun, S. N. (2020). *Labour Intensive Public Work (LIPW) Programme as an empowerment tool for youth development: The Ghanaian experience* (Doctoral dissertation, Christian Service University College).

Ewel, K., Twilley, R., & Ong, J. I. N. (1998). Different kinds of mangrove forests provide different goods and services. *Global Ecology & Biogeography Letters, 7*(1), 83-94.

Eyong, C, T; Mufuaya, M. & Foy, I, I. (2004). Literature and Culture –The sustainability connection from an African Perspective. In *Regional Sustainable Development Review*: Africa, Oxford: Eolss Publishers.

Ezeanye-Esiobu, C. (2019). *Indigenous knowledge and education in Africa*. London, England: Spring Nature.

Fabio, P., Braimah, L.I., Bortey, A., Wadzah, N., Cromwell, A., Dacosta, M, & Salvati, N. (2003). *Poverty profile of riverine communities of the southern volta lake*, Cotonou in Benin. Rome, Italy: FAO.

FAO (2000). Fish as food: aquaculture's contribution. Rome, Italy: FAO.

FAO (2005). Report of the FAO-WorldFish Center workshop on small-scale aquaculture in sub-Saharan Africa: revisiting the aquaculture target group paradigm. Rome, Italy: FAO.

FAO (2009). Principles and methods for the risk assessment of chemicals in food. Rome, Italy: FAO.

FAO (2014). Technical paper on Ghana National Plan of Action on illegal, unreported and unregulated fishing. Rome, Italy: FAO.

FAO (2015). FAO and the 17 Sustainable Development Goals. Rome, Italy: FAO

Farooquee, N. A., Majila, B. S., & Kala, C. P. (2004). Indigenous knowledge systems and sustainable management of natural resources in a high-altitude society in Kumaun Himalaya, India. *Journal of Human Ecology*, *16*(1), 33-42.

Fofana, I. N. (2009). *A socio-economic sustainability assessment of livelihoods from scrap metal collection in Freetown, Sierra Leone* (Doctoral dissertation, Lund University).

Fraenkel, J. R., & Wallen, N. E. (2006). *How to design and evaluate research in education* (5th ed.). New York: McGraw-Hill Publishing.

Frimpong, A. D. (2011). Purity and Impurity: Menstruation and its impact on the role of Akan women in the church. Amsterdam, Netherlands: Vrije Universiteit Amsterdam.

Frumkin, H. (2001). Beyond toxicity: Human health and the natural environment. *American Journal of Preventive Medicine*, *20*(3), 234-240.

Fulton, S., & Krainovich-Miller, B. (2010). Gathering and Appraising the Literature. IN LoBiondo-Wood, G. & Haber, J. *Nursing Research: Methods and critical appraisal for evidence-based prcatice* (7th ed.). Missouri, USA : Mosby Elsevier.

Ganguly, S. & Choudhary, S. (2018). Adverse effect of plastic pollution affecting animals and birds: A rising concern. *Acta Scientific Agriculture*, *2*(10), 41-42.

Ghana Minerals and Mining Law (1986). Analysis of the trends of gold mining in Ghana. Acrra, Ghana: Ghana Minerals snd Mining Law.

Ghana News Agency (2020). Addressing challenges in premix smuggling: Perspectives from stakeholders. Accra, Ghana: Ghana News Agency. Retrieved from https://gna.org.gh/2020/10/addressing-challenges-in-premix-smuggling-perspectives-from-stakeholders/

Ghana Statistical Service (2012). The 2010 population and housing census report. Accra, Ghana: Ghana Statistical Service.

Goodland, R. (1995). The concept of environmental sustainability. Annual Review of Ecology and Systematics, *9*(2), 1-24.

Gutti, B., Aji, M. M., & Magaji, G. (2012). Environmental impact of natural resources exploitation in Nigeria and the way forward. *Journal of Applied Technology in Environmental Sanitation*, *2*(2), 95-102.

Gyasi E. A., Karikari O., Kranjac-Berisavljevic G. & Vordzogbe V. V. (2006). Study of climate change vulnerability and adaptation assessment relative to land management in Ghana. Accra, Ghana: University of Ghana Legon.

Haidi, J. A., & Hassan, T. K. (2014). The use of Indigenous Knowledge in Agriculture and its Role in Sustainable Development. *International Journal of Science and Research (IJSR). 6*(14) 2319-7064.

Hale, L. Z., Meliane, I., Davidson, S., Sandwith, T., Beck, M., Hoekstra, J., ... & Marshall, P. (2009). Ecosystem-based adaptation in marine and coastal ecosystems. Renewable Resources Journal, *25*(4), 21-28.

Hall, C. M. (2006). Tourism urbanisation and global environmental change. Oxfordshire, England: Routledge.

Hamilton, L., & Corbett-Whittier, C. (2013). Defining case study in education research. *Case study in Education Research, 5*(1), 3-22.

Haralambos, M. & Holborn, M. (2004). *Sociology: Themes and perspectives* (6th ed.). London, England: HarperCollins Publishers Limited.

Hardin, G. (1968). The tragedy of the commons. *Science*. *16*(2), 1243–1248.

Hauck, S. J. (2013). *Pastoralist societies in flux: The impact of ecology, markets, and governmental assistance on the Mukudeityo Maasai of Kenya* (Doctoral dissertation, Princeton University).

Hen Mpoano (2015). The USAID/Ghana Sustainable Fisheries Management Project (SFMP) national fisheries dialogue. Acrra, Ghana: Hen Mpoano.

Herrero, M., Thornton, P. K., Gerber, P., & Reid, R. S. (2009). Livestock, livelihoods and the environment: Understanding the trade-offs. *Current Opinion in Environmental Sustainability, 1*(2), 111-120.

Hiwasaki, L., Luna, E. & Syamsidik, S.R., (2014). *Local & indigenous knowledge for community resilience: Hydro-meteorological disaster risk reduction and climate change adaptation in coastal and small island communities*. Jakarta, Indonesia: UNESCO.

Hussain, M., & Hoq, M. E. (2010). Impacts of climate change on coastal and marine fisheries resources in Bangladesh. Sustainable management of fisheries resources of the Bay of Bengal, *53*(2), 53-73.

Hviding, E. (2003). Nature, culture, magic, science: on meta-languages for comparison in cultural ecology. Oxfordshire, England: Routledge.

Imenda, S. (2014). Is there a conceptual difference between theoretical and conceptual frameworks? *Journal of social sciences*, *38*(2), 185-195.

International Tropical Timber Organisation (2012). ITTO annual report. Yokohama, Japan: ITTO.

Ishizaka, S. (2013). Re-evaluating the Chipko (forest protection) movement in India. *South Asianist Journal*, *2*(1), 15-45.

Jackson, J.B.C., M.X. Kirby, W.H. Berger, K.A. Bjorndal, L.W. Botsford, B.J. Bourque, R.H. Bradbury, R. Cooke, J. Erlandson, J.A. Estes, T.P. Hughes, S. Kidwell, C.B. Lange, H.S. Lenihan, J.M. Pandolfi, C.H. Peterson, R.S. Steneck, M.J. Tegner & R.R. Warner. (2001). Historical overfishing and the recent collapse of coastal ecosystems. *Science*, *293*(4), 629-638.

Jonah, F. E. (2015). Managing coastal erosion hotspots along the Elmina, Cape Coast and Moree area of Ghana. *Ocean & Coastal Management*, *109*(7), 9-16.

Jonah, F.E. & Adu-Boahen, K., (2016). Coastal environmental injustice in Ghana: The activities of coastal sediment miners in the Elmina, Cape Coast and Moree area. *GeoJournal*, *81*(2), 185-196.

Jonah, F. E., Adjei-Boateng, D., Mensah, E. A. & Edziyie, R. E. (2015). Coastal Erosion in Ghana: Causes, Policies, and Management. *Coastal Management*, *44*(2), 116-130.

Jones, S., & Carswell, G. (2004). *Earthscan reader in environment, development and rural livelihoods*. Earthscan.

Johnstone, R., Muhando, C. & Francis, J. (1998). The status of coral reef of Zanzibar: One example of a regional predicament. *Ambio, 27* (8), 700–707.

Jongschaap, R. E. (2007). Sensitivity of a crop growth simulation model to variation in LAI and canopy nitrogen used for run-time calibration. *Ecological Modelling*, *200*(1-2), 89-98.

Kamwendo, G. & Kamwendo, J. (2014). Indigenous knowledge-systems and food security: Some examples from Malawi. *Journal of Human Ecology*, *48*(1), 97-101

Karama. M. (2011). Sand mining effects, causes and concerns: A case study from Bestari Jaya, Selangor, Peninsular Malaysia. *Scientific Research and Essays*, *6*(6), 1216-1231.

Kelley, S. W., Ramsey, J. S., & Byrnes, M. R. (2004). Evaluating shoreline response to offshore sand mining for beach nourishment. *Journal of Coastal Research*, *20*(1), 89- 100.

Kelman, I., Mercer, J., & Gaillard, J. C. (2012). Indigenous knowledge and disaster risk reduction. Journal of Geography, *97*(1), 12-21.

Kleih, U., Alam, K., Dastidar, R., Dutta, U., Oudwater, N., & Ward, A. (2003). Livelihoods in coastal fishing communities, and the marine fish marketing system of Bangladesh. Synthesis of participatory rural

appraisals in six villages, and assessment of the marketing system (NRI report no. 2712).

Kirk, J. & Miller, M. L. (1986). *Reliability and validity in qualitative research* (Qualitative Research Methods Series). London, England: Sage.

Kitchin, R. & Tate, N. J. (2000). *Conducting research into human geography*. Essex, England: Pearson Education Ltd.

Kitolelei, J. V., & Sato, T. (2016). Analysis of perceptions and knowledge in managing coastal resources: A case study in Fiji. *Frontiers in Marine Science*, *3*(1), 189-250.

Krauss, S. E. (2005). Research paradigms and meaning making: A primer. *Qualitative Report, 10*(4), 758-770.

Laser, N. (2015). *The state of fisheries in Ghana. Science and Fisheries Management*. Accra, Ghana: USAID.

Lasimbang, J. (2006). Natural resource management country studies: Regional indigenous peoples' programme. New York, USA: United Nations Development Programme.

Lienert, J., & Burger, P. (2015). Merging capabilities and livelihoods: analyzing the use of biological resources to improve well-being. *Ecology and Society*, *20*(2),40-50.

Lincoln, Y. S., & Guba, E. G. (1986). But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. New directions for program evaluation, 1986(30), 73-84.

Mapara, J. (2009). Indigenous knowledge systems in Zimbabwe: Juxtaposing postcolonial theory. *Journal of Pan African Studies*, *3*(1)**,** 15-45.

Maree, J. G., & Fraser, W. J. (2004). Outcomes-based assessment. *Sandown: Heinemann*.

Masalu, D. C. P., Shalli, M. S. and Kitula, R. A. (2010). Customs and Taboos: The role of indigenous knowledge in the management of fish stocks and coral reefs in Tanzania. Brisbane, Australia: University of Queensland.

Marquette, C., Koranteng. K., Overå, R., & Bortei-Doku, Y. (2002). Examined small-scale fisheries, population dynamics, and resource use in Africa: The case of Moree, Ghana. *Journal of the Human Environment,4*(1), 1-14.

Mathooko, J. M. (2005). Application of indigenous ecological knowledge in the management and sustainability of fisheries in East Africa: a long-neglected strategy? *Hydrobiologia 537*(9), 1–6.

Mazzocchi, F. (2020). A deeper meaning of sustainability: Insights from indigenous knowledge. *The Anthropocene Review*, *7*(1), 77-93.

McGoodwin, J. R. (2001). Understanding the cultures of fishing communities: A key to fisheries management and food security. Quebec City, Canada: Food & Agriculture Organisation.

Meinzen-Dick, R., DiGregorio, M., & McCarthy, N. (2004). Methods for studying collective action in rural development. *Agricultural systems*, *82*(3), 197-214.

Mensah, J. V. (1997). Causes and effects of coastal sand mining in Ghana. Singapore Journal of Tropical Geography, *18*(1), 69-88.

Mensah, J. V. & Antwi, K. B. (2002). Problems of artisanal marine fishermen in Ghna: The way ahead. *Singapore Journal of Tropical Geography*. 23(2), 217-235.

Mensah, J. V. (2003). Community perception of disappearing wetlands along the coast of the Central Region of Ghana. Centre for Development Studies, University of Cape Coast.

Merkens, J. L., Reimann, L., Hinkel, J., & Vafeidis, A. T. (2016). Gridded population projections for the coastal zone under the Shared Socioeconomic Pathways. Global and Planetary Change, *145*(9), 57-66.

Mertens, D. M. (2010). Transformative mixed methods research. Qualitative Inquiry, *16*(6), 469-474.

Millenium-Ecosystem-Assessment, E. (2005). Human wellbeing: Biodiversity synthesis. Washington, DC.,USA: Island Press.

Millar, D., & Haverkort, B. (2006). African knowledges and sciences: Exploring the ways of knowing of Sub-Saharan Africa. Leusden, Netherlands: Compas.

Ministry of Fisheries and Aquaculture Development (MoFAD) (2015). Annual Progress Report 2014. Accra, Ghana: MoFAD.

Ministry of Fisheries and Aquaculture Development (MoFAD) (2017). Annual Progress Report 2016. Accra Ghana: MoFAD.

Ministry of Fisheries and Aquaculture Development (MoFAD) (2013). 2012 Annual report. Accra, Ghana: MoFAD.

Morse, S., & McNamara, N. (2013). *Sustainable livelihood approach: A critique of theory and practice*. Berlin/Heidelberg, Germany: Springer Science & Business Media.

Mthethwa-Kunene K. E. F., (2014), *Exploring science teachers' pedagogical content knowledge in the teaching of genetics in Swaziland* (Doctoral dissertation, University of Pretoria Faculty of Education).

Munshi, I. (2000). Viewpoints and comments: Environment in sociological theory. *Sociological Bulletin*, *49*(2), 253-266.

Nani, M., Zura, S., Majid, F. A. A., Jaafar, A. B., Mahdzir, A., & Musa, M. N. (2016). Potential health benefits of deep-sea water: A review of *evidence-based complementary and alternative medicine, 2016*. Athabasca, Canada: Norman Temple.

Nelms, S. E., Duncan, E. M., Broderick, A. C., Galloway, T. S., Deityfrey, Matthew H., Hamann, M., Lindeque, P. K., & Deityley, B. J. (2015). Plastic and marine turtles: A review and call for research. *ICES Journal of Marine Science, 3*(1), 1-18.

Neumann, B., Ott, K., & Kenchington, R. (2017). Strong sustainability in coastal areas: a conceptual interpretation of SDG 14. *Sustainability science*, *12*(6), 1019-1035.

Neumann, B., Vafeidis, A. T., Zimmermann, J., & Nicholls, R. J. (2015). Future coastal population growth and exposure to sea-level rise and coastal flooding-A global assessment. *PLoS ONE, 10*(3): e0118571.

Nukunya, G. K. (2010). Tradition and change in Ghana: An introduction to sociology. Accra, Ghana: Ghana Universities Press.

Ocloo, C. (2015). Fishing activities and its challenges at James Town, Ghana. *Journal of Food Biochemistry*, *39*(6), 682-688.

Odekunle J. F. (2016). The impact of human activities on coastal zone for sustainable livelihood. *Journal of Agriculture and Environmental Management*, *5*(8), 253-256.

Ofori, R., & Dampson, D. G. (2011). Research methods and statistics using SPSS. Kumasi, Ghana: Payless Publication Limited.

Olson, M., (1965). *The logic of collective action*. Cambridge, England: Harvard University Press.

Omari, A. R. Bellingrath-Kimura, S. D., Addo, E. S., Oikawa, E. S., & Fujii. Y. (2018). Indigenous knowledge of soil quality and fertility management practices in selected farming communities of the Guinea savanna agro-ecological zone of Ghana. Basel, Switzerland: Multidisciplinary Digital Publishing Institute (MDPI).

Ong, J. E., & Gong, W. K. (2013). *Structure, function and management of mangrove ecosystems*. Okinawa, Japan: International Society for Mangrove Ecosystems.

Ostrom, E. (2007). A diagnostic approach for going beyond panaceas. *Proceedings of the national Academy of sciences*, *104*(39), 15181-15187.

Ostrom, E. (1999). Coping with the tragedies of the commons. *Annual Review of Political Science*, *2*(1), 493–535.

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge, England: Cambridge University Press.

Overå, R. (2001). *Institutions, mobility and resilience in the Fante migratory fisheries of West Africa.* Bergen, Norway: Christian Michelsen Institute.

Overå, R.(2003). Gender ideology and manoeuvring space for female fisheries entrepreneurs. *Institute of African Studies Research Review*, *19*(2), 49-62.

Owusu, P. K. (2009). Resource management in the Anlo-Ewe migrant fishing community Abakam in the central region, Ghana (Master's thesis, University of Bergen).

Parker, L. (2018). Environmentalism and education for sustainability in Indonesia. *Indonesia and the Malay World*, *46*(136), 235-240.

Pauly, D., Watson, R., & Alder, J. (2005). Global trends in world fisheries: impacts on marine ecosystems and food security. *Philosophical Transactions of the Royal Society Biological Sciences*, *360* (1453), 5-12.

Pauly, D., Christensen, V., Guénette, S., Pitcher, T. J., Sumaila, U. R., Walters, C. J., & Zeller, D. (2002). Towards sustainability in world fisheries. *Nature Journal*, *418*(6898), 689-695.

Peck Yen, T., Zulfarina, S., & Rohasliney, H. (2010). *Comparison of the Zooplankton Community in Kelantan River and Its Tributar, Pengkalan Chepa River: A Primary Study*. Tropical Life Science Report, *24*(1), 19–34.

Peckenham, J. M., Thornton, T., & Whalen, B. (2009). Sand and gravel mining: effects on ground water resources in Hancock County, Maine, USA. *Environmental Geology*, *56*(6), 1103-1114.

Pobee, J. S. (1979). *Toward an African theology*. Nashville, USA: Abingdon Press.

Posey, D. A. (1998). The 'balance sheet' and the 'sacred balance': Valuing the knowledge of indigenous and traditional peoples. *Global Religions, Culture, and Ecology*, *2*(2), 91-106.

Punch, K.F. (1998). *Introduction to social research: Quantitative and qualitative approaches*. London, England: Sage Publications.

Pitchaiah, P. S (2017). Impacts of sand mining on environment-A review. *International Journal of Geo informatics and Geological Science*, *4* (1), 21-35.

Pugel, K. & Linden, K. (2019). *Where is collective action approach and what makes it effective-a desk review*. The Hague, Netherlands: Class Action Global Guide.

Rinaldi, M., Wyżga, B., & Surian, N. (2005). Sediment mining in alluvial channels: physical effects and management perspectives. *River Research and Applications*, *21*(7), 805-828.

Risiro, J., Tshuma, D. T., & Basikiti, A. (2013). Indigenous knowledge systems and environmental management: A case study of Zaka District, Masvingo Province, Zimbabwe. *International Journal of Academic Research in Progressive Education and Development*, *2*(1), 19-39.

Ruddle, K., & Davis, A. (2011). What is "ecological" in local ecological knowledge? Lessons from Canada and Vietnam. *Society & Natural Resources*, *24*(9), 887-901.

Rysgaard, S., Christensen, P. B., Sørensen, M. V., Funch, P., & Berg, P. (2000). Marine meiofauna, carbon and nitrogen mineralization in sandy and soft sediments of Disko Bay, West Greenland. *Aquatic Microbial Ecology*, *21*(1), 59-71.

Salick, B. & Byg, A., eds. (2007). *Indigenous peoples and climate change*. Oxford, England: Tyndall Centre for Climate Change Research.

Sarfo-Mensah, P., & Oduro, W. (2007). Traditional natural resources management practices and biodiversity conservation in Ghana: A review of local concepts and issues on change and sustainability. African Studies Research Review, *14*(1), 42 – 51.

Schlacher, T. A., Schoeman, D. S., Dugan, J., Lastra, M., Jones, A., Scapini, F., & McLachlan, A. (2008). Sandy beach ecosystems: key features, sampling issues, management challenges and climate change impacts. *Marine Ecology*, *29*(3), 70-90.

Scoones, I (2009). Livelihoods perspectives and rural development. *Journal of Peasant Studies, 36(1), 171-196.*

Scoones, I. (1998). Sustainable Rural Livelihood: A framework for analysis. Brighton, England: Institute of Development Studies.

Sekhar, L. K., & Jayadev, S. K. (2003). Karimanal, mineral beach-sand, mining in the Alappuzha coast of Kerala: A people's perspective. Tamil Nadu, India: Department of Geography University of Madras.

Shah, J., & Selamat, H. (2016). Urban fishing challenges in Gaya Island in Malaysia. *World Applied Sciences Journal*, *34*(12), 1643-1651.

Sheets, D. S. L. G. (1999). Fisheries and poverty reduction. London, England: Department for International Development.

Shilabukha, K. (2015). *Indigenous knowledge and management systems for marine resources among the Giriama of North Coastal* (Doctoral dissertation, University of Nairobi).

Shilabukha, D. K. (2000). *The role of indigenous knowledge in the future management of the mangrove bio-diversity in Msambweni Division of Kwale District, Kenya* (Doctoral dissertation, University of Nairobi).

Simmons, N. (2018). *The SAGE Encyclopaedia of communication research methods*. Thousand Oaks, USA: Sage Publications.

Sinclair, M. (2007). A guide to understanding theoretical and conceptual frameworks. *Evidence-Based Midwifery*, *5*(2), 39-40.

Sowman, M., & Cardoso, P. (2010). Small-scale fisheries and food security strategies in countries in the Benguela Current Large Marine Ecosystem (BCLME) region: Angola, Namibia and South Africa. *Marine Policy*, *34*(6), 1163-1170.

Spalding, M. (2010). *World atlas of mangroves*. Oxfordshire, England: Routledge.

Standing, A. (2008). *Corruption and state-corporate crime in fisheries*. Anti-Corruption Resource Cerntre. Bergen, Norway: Chr. Michelsen Institute.

Stark, P. & Chew, K., (2001). Global Forecast 2002: Why global industry is shifting focus offshore into deep water. Oklahoma, USA: Pennwell.

Retrieved from www.os. pennnet.com/Articles/Article Display.cfm? Section = articles & aubsection =display&ARTICLE I D= 1 30743& KEYWORD =global

Sumani, J. B. B. (2019). Possible environmental and socio-economic ramifications of sand and gravel winning in Danko, Upper West Region of Ghana. *Ghana Journal of Geography*, *11*(2), 27-51

Suprina, R. (2021). Conservation Through Cosmovision-Based Methodology. *Jurnal Ilmiah Pariwisata*, *26*(5), 54-57.

Swaney, J. A. (1990). Common property, reciprocity, and community. *Journal of Economic Issues*, *24*(2), 451-462.

Taherdoost, H. (2016). Sampling methods in research methodology: How to choose a sampling technique for research. *International Journal of Academic Research in Management (IJARM)*, *5*(4), 37-41.

Tatira, L. (2000). *Zviera ZvaVaShona*. Gweru, Zimbabwe: Mambo Press.

Taylor-Powell, E., & Renner, M. (2003). *Analysing qualitative data*. Chicago,USA: University of Wisconsin-Extension.

Tewksbury, R. (2011). *Qualitative methodology*. The Routledge handbook of deviant behaviour, *9*(5), 75-81.

Tilman, D., & Lehman, C. (2001). Human-caused environmental change: impacts on plant diversity and evolution. *Proceedings of the National Academy of Sciences*, *98*(10), 5433-5440.

Turaki, Y. (2000). African traditional religious system as basis of understanding Christian spiritual warfare. Acta Theologica, *4*(2), 23-45. Retrieved from http://www.ausanne. Org/Brix.

Uetake, T. (2012). *Providing agri-environmental public goods through collective action: Lessons from New Zealand case studies*. Nelson, New Zealand: New Zealand Agricultural and Economic Resource Society.

United Nations Conference on the Environment and Development (1992). Agenda 21. Conches, Switzerland: United Nations.

United Nations (1994). Convention on desertification. New York, USA: United Nations.

United.Nations (2010). United Nations Commodity Trade Statistics Database-Statistics Division. New York, USA: United Nations.

United Nations (2018). 2018 UN World Water Development report, nature-based solutions for water. New York, USA:UN.

United Nations Population Fund (2005). Country profiles for population and reproductive health: Policy developments and indicators, 2005. New York,USA: UNFPA. Retrieved from http://www.unfpa.org/profile/index.cfm (accessed March 13, 2007).

UNCED (1992). Agenda 21 and the UNCED Proceedings. Rio de Janeiro, Brazil: UNCED.

UNDP (2011). Human Development Report 2011: Sustainability and equity: A better future for all. Paris, France: United Nations Development Programme.

UNDP (2011). Blueprint for ocean and coastal sustainability. Paris, France: UNDP.

Viles, H., & Spencer, T. (2014). *Coastal problems: Geomorphology, ecology and society at the coast*. Oxfordshire, England: Routledge.

Visbeck, M., Kronfeld-Goharani, U., Neumann, B., Rickels, W., Schmidt, J., Van Doorn, E. & Quaas, M. F. (2014). Securing blue wealth: The need for a special Sustainable Development Goal for the ocean and coasts. *Marine Policy*, *48*(3), 184-191.

Walliman, N. (2010). *Research methods: The basics*. Oxfordshire, England: Routledge.

Walters, A. W., & Post, D. M. (2008). An experimental disturbance alters fish size structure but not food chain length in streams. *Ecology*, *89*(12), 3261-3267.

Wane, N. N. (2005). African indigenous knowledge: Claiming, writing, storing, and sharing the discourse. *Journal of Thought*, *40*(2), 27-46.

Ward, P., Myers, R. A., & Blanchard, W. (2004). Fish lost at sea: the effect of soak time on pelagic long line catches. Halifax, Canada: Dalhousie University.

Warren, D. M. (1991). Using Indigenous Knowledge. Washington,DC.,USA: World Bank.

Willis, J. W. (2007). *Foundations of qualitative research: interpretive and critical approaches*. London, England: Sage.

World Bank(1998). *Economic research on the determinants of immigration. Washington, DC., USA: World Bank Publications.*

World Bank (1999). Indigenous knowledge for development: A framework for development. Washington, D.C.. USA: World Bank. Retrieved from http://www.worldbank.org/afr/ik/ikrept.pdf

World Bank (2002). *World development indicators on CD-Rom*. Washington, DC., USA: World Bank.

World Bank (2016). *Poverty and shared prosperity 2016: taking on inequality*. Washington, DC., USA: World Bank.

World Bank (2018). *Global Economic Prospects, January 2018: Broad-Based Upturn, but for How Long?* Washington, DC., USA: World Bank.

World Economic Forum (2020). The future of jobs report 2020. Geneva, Switzerland: World Economic Forum.

World Health Organization (2005). Mental health evidence. Geneva: Switzerlan: World Health Organization.

Wutete, O. (2014). *The role of indigenous knowledge in agriculture and environmental conservation: the case of Gutu District, Zimbabwe* (Doctoral dissertation, University of Fort Hare).

Xiuping, H. H. M., Kissya, E., & Yanes. (2010). *Indigenous Knowledge and Customary Law in Natural Resource Management: Experiences in Yunnan, China and Haruku, Indonesia*.Anderen, Netherlands: Asia Indigenous Peoples Pact (AIPP) Foundation.

Yin R. K. (2009). *Case study research: Design and methods*. Thousand Oaks,USA: Sage Publications.

Zerihun, G. (2005). *Socio-economic and environmental impact assessment of devolution of natural resource management in Adaba-Dodola forest priority area* (Doctoral dissertation, Addis Ababa University).

Zhang, H. (2016). Problems and countermeasures on the fishery development in the South China Sea. *International Journal Aquatic Fisheries Science*, *2*(1), 23-026.

APPENDICES

APPENDIX A

In-depth Interview Guide for the Fishers, Sand Winners, and Salt Miners

UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITY AND LEGAL STUDIES

FACULTY OF SOCIA L SCIENCES

DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY

INSTRUCTIONS: This study seeks to explore how indigenous knowledge on coastal environment influences their utilisation of coastal resources and their sustainability. This interview guide entails six sections, namely socio-demographic characteristics of respondents, the indigenous knowledge systems about the resources of this area; resource utilisation; sustainability of current livelihoods; the effects of resource utilisation on the sustainability of the environment, and the indigenous strategies adopted to maintain the sustainability of the coastal resources. Your responses are **confidential** and are **solely for academic purposes.**

A. DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANT

1. Sex…
2. Age of the interviewee……
3. Religious affiliation…..
4. Educational level……
5. Marital status ….
6. Number of children……
7. Primary Occupation ……
8. How long have you lived in this community?.....

B. INDIGENOUS KNOWLEDGE SYSTEMS ABOUT THE RESOURCES OF THE STUDY AREA

9. What are the resources found in this community [**Sea, sand, land, gravels, tourist sites, forest etc.]?**
10. What are the local **beliefs, myths, taboos, traditions and norms** concerning the coastal resources in this community?
11. Can you share some **songs, stories, proverbs,** etc. on these resources?
12. How did you acquire this knowledge over the coastal resources? (Parents, ancestors, leaders, etc.)
13. Which of this knowledge about the coastal resources have changed over the years and why?
14. What are some of the indigenous knowledge on coastal resources that are still upheld by the people in the community? Probe?
15. What problems do you face in transferring the indigenous knowledge on coastal resources in this community to the younger generation?

C. INDIGENOUS KNOWLEDGE SYSTEM AMONG THE PEOPLE AND RESOURCE UTILISATION

16. Which type of resource are you usually interested in and why? (Probe for utilitarian and ritual significance)?
17. What are the resources identified used for? [**Sea, sand, land, gravels, forest etc.]?**
18. How has your indigenous knowledge (**beliefs, myths, norms, etc.)** on coastal resources influenced the use of these resources?
19. What times of the year do you harvest these resources (**fisheries, sand, salt, tourist sites**)?

20. How are these elements related to the use of the coastal resources?
21. What are the factors hindering the use of indigenous knowledge **(beliefs, norms, myths, etc.)** in managing the resources in the community?

D. SUSTAINABILITY OF CURRENT LIVELIHOODS

22. What kind of activities do you do most of the time to earn income (Probe for seasons)?
23. How do you spend the income accrued from such activities?
24. Is your income enough to provide properties/assets for yourself and the family? (Probe: housing, equipment, livestock, education, health etc.)? If yes how, if no, why?
25. What are some of the challenges you face in making a living?
26. Which of the coping strategies have you adopted to deal with the livelihood challenge?

E. COASTAL RESOURCE UTILISATION AND THEIR SUSTAINABILITY

27. How do you monitor climatic conditions - rainfall, clouds, temperature, and wind?
28. What have been the state of climatic conditions over the years?
29. How has the change in the climatic conditions affected your economic activities?
30. In your view, what are the most important causes of degradation of coastal resources in your community?
31. What indigenous practices are used to preserve the coastal resources in this community?
32. In your opinion, what should be done to sustain the coastal resources?
33. Who are responsible for the preservation of the coastal resources in this community?

APPENDIX B

Focus Group Discussions Guide for the Elders, Fishers, Fish Mongers, and Sand Miners

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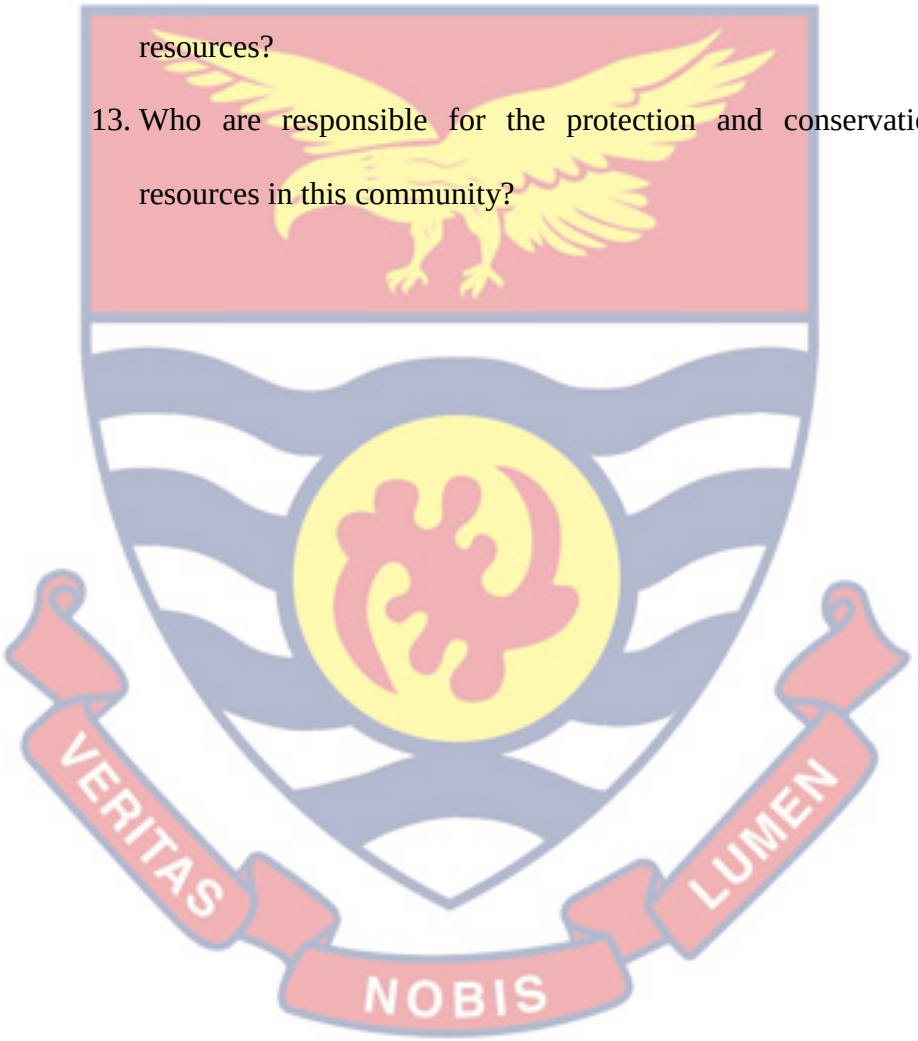
FOCUS GROUP DISCUSSIONS GUIDE FOR THE ELDERS, FISHERS, FISH MONGERS, AND SAND MINERS

This study seeks to explore how indigenous knowledge about coastal environment influences their utilisation of coastal resources and their sustainability. You have been selected as one of the participants of the study. The information you provide is purely for academic purpose. I, therefore, assure you of total confidentiality.

1. Please mention the coastal resources available to this community?
2. What are the local **beliefs, norms, myths, traditions, taboos, etc.** concerning these coastal resources?
3. How do these **beliefs, norms, myths, traditions, taboos,** etc. influence the utilisation of the resources?
4. Are these beliefs transferred to the young ones and what are the challenges in doing that?
5. How do the households in the community support their livelihoods?
6. What do they often spend their incomes on?
7. What are the livelihood challenges in this community?
8. What should be done to achieve sustainable livelihoods in the area?

9. What is the future of the resources in the community?
10. What are indigenous regulations systems (bye-laws) concerning the use of resources in the community?
11. How do the traditional **beliefs, norms, values, etc.** of the people influence the preservation of the coastal resources in this community?
12. What should be done to ensure the sustainability of the coastal resources?
13. Who are responsible for the protection and conservation of the resources in this community?



APPENDIX C

Key Informant Interview Guide for Chief Fishermen and Fetish Priestesses

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KEY INFORMANT INTERVIEW GUIDE FOR CHIEF FISHERMEN AND FETISH PRIESTESSES

This study seeks to explore how indigenous knowledge about coastal environment influences utilisation of coastal resources and their sustainability. You have been selected as one of the participants of the study. The information you provide is purely for academic purpose. I, therefore, assure you of total confidentiality.

1. Sex…
2. Age of the informant……
3. Religious affiliation…..
4. Educational level……
5. Marital status ….
6. Number of children……
7. Primary Occupation ……
8. How long have you lived here?.....
9. Whatwork do you do in this community?.....
10. Please mention some of the resources found in this coastal area?

11. What are the local **beliefs, norms, myths, traditions, taboos**, etc. concerning these coastal resources?
12. How do these **beliefs, norms, myths, traditions, taboos**, etc. influence the utilisation of the resources?
13. How are these resources utilised in the community?
14. What is the status of livelihood in this community?
15. What coping strategies have they adopted?
16. What is the future of the resources in the community?
17. What indigenous practices are used to preserve the resources in this community?
18. What are some of the factors hindering the use of indigenous knowledge in managing the resources in the community?
19. What should be done to ensure a sustainable use of coastal resources?
20. Would you say that when indigenous institutions are empowered in the communities, they can help the management of the coastal resources in the area? (Give reasons)
21. How are traditional authorities involved in decision-making processes at the community and district levels?
22. In your view, what can be done to ensure coastal resources sustainability?

APPENDIX D

Interview Guide for Fisheries/Environmental Health Unit Officers

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DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY

INTERVIEW GUIDE FOR FISHERIES/ENVIRONMENTAL HEALTH UNIT OFFICERS

This study seeks to explore how indigenous knowledge about coastal environment influences their utilisation of coastal resources and their sustainability. You have been selected as one of the participants of the study, and the information you provide is purely for academic purpose. I, therefore, assure you of total confidentiality.

1. Sex……..
2. Level of education……
3. Marital status……
4. Religion……
5. Name of agency……
6. What is your positiont or rank in the organisation?……
7. How long have you been working with the agency?
8. What are the objectives of the Agency in relation to coastal resources?
9. What are the mandate and core activities of your organisation in relation to the management of coastal resources?
10. Please, list institutions that you coordinate with, in the management of coastal resources in this district.

11. How is indigenous knowledge incorporated into the management of the coastal resources in this area?
12. What relationship exists between your organisation and the coastal local institutions?
13. What is the future of the resources in this community?
14. What are the challenges facing the sustainability of the coastal resources?
15. What are the challenges facing your outfit in participating in management of coastal resources?
16. Are there any bye-laws that support the use of indigenous knowledge in the management of the coastal resources in the area?
17. What effort have been put in place by your organisation to empower indigenous institutions in coastal resource management?
18. Do you think indigenous knowledge could bring relevant input in managing the coastal resources in this district?
19. Explain your answer in question 16 above
20. What suggestions will you like to offer to help sustain the coastal livelihood resources?.....

APPENDIX E

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1 The surroundings

2 Types of activities undertaken on the shore by men and women

3 Levels and types of pollution

5 Species of fish and their characteristics

6 Fishing gear

7. Sand winning along shore

8. Building project along the shore

9. Extent of degradation of the shore and the sea

APPENDIX F

Informed Consent Statement for the Study Tools

UNIVERSITY OF CAPE COAST
COLLEGE OF HUMANITY AND LEGAL STUDIES
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY
INFORMED CONSENT STATEMENT FOR THE STUDY TOOLS

Hello. My name is Francis Aning Anokye and I am working on the research with the Department of Sociology and Anthropology of the University of Cape Coast. The research is on indigenous knowledge and the sustainability of coastal resources in this area. The aim of this research is to explore how indigenous knowledge about coastal environment influences the utilisation of coastal resources and their sustainability.

I am seeking your permission to ask you some questions to learn more about the coastal resource utilisation in relation to the indigenous knowledge in this area. The people we interview will be asked questions about their relationship with the fisheries, sand winning, and salt mining.

The information you will provide shall be strictly confidential and will be used only for the purposes of this study. Your name or any other information that may identify you will not appear in any report from this study. The interview will take about one and half hours. Your participation in the study is voluntary. You have an opportunity to ask me questions concerning the study and your consent to participate.

I certify that I read this statement to the participant, that s/he fully understood its meaning, and that s/he verbally agreed to participate in the study.

Interviewer's Signature